NATIONAL OPEN UNIVERSITY OF NIGERIA

COURSE CODE: EDT 823

COURSE TITLE: RESEARCH AND MEDIA

COURSE
GUIDE

EDT 823
RESEARCH AND MEDIA

EDT 823: Research And Media

Course Developer — Dr. OBI, T.E.C
Abia State University,
Uturu

Course Writer — Dr. OBI, T.E.C.
Abia State University,
Uturu

Course Editor: — Prof. Lade J. Adeyanju
Faculty of Education,
Obafemi Awolowo University,
Ile Ife

Programme Leader — Dr. Ibrahim O. Salawu
School of Education
National Open University of Nigeria
Lagos.

Course Coordinator — Dr. Ibrahim O. Salawu
School of Education
National Open University of Nigeria
Lagos.

EDT 823 **COURSE GUIDE**

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EDT 823 RESEARCH AND MEDIA COURSE GUIDE

Introduction

What you will learn in this course

Welcome to EDT 823: Research and Media which is a three credit unit course offered to postgraduate students of the Masters (M.Ed) degree programme in Educational Technology. There are twenty-one study units in this course. The material has been developed to suit Nigerian students as practical examples from the local environment have been used. There are no compulsory prerequisites for the course.

This course guide is for distance postgraduate students that are enrolled in the M.Ed. Educational Technology programme of National Open University of Nigeria. This guide is one of the several resource tools available to you to help you complete this course successfully and ultimately your programme.

In this guide, you will find very useful information about this course: What the aims and objectives are about, what the course materials you will be using; the available services that you need to support your learning and information on assignments and examination. You also have guidelines on how to plan your time of study, the amount of time you are likely to spend on each study unit and your tutor marked assignments.

I strongly recommend that you go through this course guide and complete the feedback form at the end before you begin your study of the course. The feedback form must be submitted to your tutorial facilitator along with your first assignment. This guide also provides answers to several of your questions. However, do not hesitate to contact your study centre if you have further questions.

I wish you all the best in your learning experience and successful completion of this course.

COURSE AIMS

Here is the course aim for EDT. 823: Research and Media.

This course aims to equip you to answer the following questions on issues relating to research in Educational Media:

1. What is the meaning of research in Educational Media, and the various categories into which it fits.

2. Why is research in Educational Media important to teachers, school Administrators, Educational Technologists, Media Centre Directors, Teachers‟ Training Institutions, Media Designers, Producers and Users, and the general public?
3. How is research in Educational Media planned, designed, conducted with findings disseminated for educational improvement and for the improvement of conduct of educational media research itself?

Beyond helping you to theoretically answer the above questions, this course aims at creating media research writing practice situations so that students will effectively conduct their own research in educational media and submit report for facilitator assessment.

Course Objectives

The course objectives for EDT. 823: Research and Media are the objectives to be achieved in each unit of the course. You should read them before studying each unit.
On completion of this course you should be able to:

- Explain the meaning of research in educational media
- Identify the various categories which media research fit as well as the researchable aspects.
- Explain the history of media development and the impact of media use in the society and the educative process that sparked researches in educational media
- Discuss the past, present and future trends in research in educational media
- Describe the theoretical frame work and the principles that support research in educational media
- Apply theoretical frames and their psychological theoretical perspectives and learning principles to guide research in educational media and to obtain valid and reliable research results or findings.
- Explain educational Media research procedure
- Demonstrate competence in knowledge, skills and practice acquisition to design and conduct different types of research in educational media.
- Apply effectively basic statistical tools for analysis in educational media research.
- Conduct and disseminate findings on any chosen research topic from either experimental or descriptive research designs and submit a report for facilitator assessment
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Course Materials and Structure

Study Units

Module 1 Basic Issues and Concepts of Research in Educational Media

Unit 1 The meaning of media, the Brief Historical Development and the Impact.
Unit 2 The Problem of media use in the Instructional Process that sparked much researches in Educational Media
Unit 3 Concepts and Backgrounds of Research in Educational Media.
Unit 4 Past Trend in Research in Educational Media
Unit 5 Present Trend in Research in Educational Media
Unit 6 Further Trend in Research in Educational Media

Module 2 Theoretical Framework and Research procedure in Educational Media

Unit 1 Learning Theories
Unit 2 Perception and Communication Theories
Unit 3 Information Processing Theories.
Unit 4 Overview of Educational Media Research Procedure
Unit 5 Designing the Study
Unit 6 Literature Review

Module 3 Research Designand statistical tools in Educational media

Unit 1 Research Design
Unit 2 Instrument for Data Collection
Unit 3 Experimental Procedure
Unit 4 Definition of Statistics and the Common terms used in statistics
Unit 5 Descriptive Statistics
Unit 6 Inferential Statistics

Module 4 Types of Research Design

Unit 1 Experimental Research Design
Unit 2 Threats to Experimental Design Studies
Unit 3 Non-Experimental Research Design
Unit 4 Reporting Quasi-Experimental Study: A sample for practicum.

COURSE SUMMARY

There are twenty-one study units in this course. Each study unit consists of one week‟s work and should take you about three hours to complete. It includes specific objectives, guidance for study, reading material, and self Assessment Exercises. Together with tutor – marked assignments, these exercises will assist you in achieving the stated learning objectives of the individual study units and of the course.

Course Plan – Overview

This table is a presentation of the course and how long it should take you to complete each study unit and the accompanying assignments.

Unit	Title Study Unit	Weekly Activity	Assignment
Module 1	Basic Issues and Concepts in research in Educational Media	1	ASSIGNMENT
1	The meaning of the term media the brief historical development and the impact	3	Assignment
2.	The problems of media use in the Instructional process that sparked much research in educational media	4	Assignment
3.	Concepts and background of research in educational media	5	TMA I to be submitted
4	Past trend in research in educational media	8	Assignment
5	Present trend in research in educational media	4	Assignment
6	Future trend in research in educational media	2	TMA 2 to be submitted
Module 2	Theoretical Framework and research procedure in Educational Media		
1	Learning theories (stimulus-Response, Cognitive and social learning theories)	3	Assignment
2	Perception, Communication Theories	4	Assignment
3	Information processing theories	3	TMA 3 to be submitted
4	Overview of Educational Media Research Procedure	4	Assignment
5	Designing the Study	3	Assignment

6	Literature review	3	TMA 4 to be submitted
Module 3	Research Design and statistical tools in Educational media .		
1	Research design	Practice 12	Facilitators supervision
2	Instrument for data collection	Practice 12	
3	Experimental procedure	Practice 12	Submitted
4	Definitions of statistics and the common terms used in statistics	4	Assignment
5	Descriptive Statistics	2	Assignment
6	Inferential Statistics	3	TMA 6 to be submitted
Module 4	Types of Research Design		
1	Experimental Research Design	3	Assignment
2.	Threat to experimental research Design	3	Assignment
3	Non-Experimental Research Design	3	TMA 7 to be submitted
4	Identify a problem choose a topic and conduct the research experimental or descriptive	Practical 116	Findings to be disseminated.
	Revision	117	
	Examination	118	

Now, use this overview to plan your timetable.

References/Further Readings

Your course material is the main text for this course. However, you are encouraged to consult other sources as provided for you in list of references and further reading below:

Ali, A. (1996). Fundamentals of Research in Education. Awka Anambra State: Meks Publishers (Nig).

Ary, D.; Tocobs, L.C., and Razavieh. A, (1972). Introduction to Research in Education. New York: Haper and Row.

Best, J.W. (1977). Research in Education New Jersey: Prentice Hall, Inc.

Cook, T.D. and Campbell, D.T. (1979). Quasi-Experimental Design and Analysis. Skokie, II: Rand McNally.

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Kerlinger, F.N. (1973). Foundations of behavioural research An Introduction. New York: Longman

Mehrens, W.A. and Lehmann, J. (1975). Measurement and Evaluation in Education and Psychology. New York: Holt.

Nwana, O.C. Introduction to Educational Research for Student – Teachers. Ibadan: Heinemann Educational Books Limited.

Obi, T.E.C. (2008). Effects of Multimedia Approach on Retention of High, Middle and Low Ability Students in Secondary School Economics. Abuja FCT Educational Secretariat Journal of Curriculum Studies and Instruction. 1(1), 162 – 171.

Olaitan, S.O. and Nwoke, G.I. (1988) Practical Research Methods in Education. Onitsha: Summer Educational Publishers

How to Get the Most from this Course

In distance learning, the Study Units replace the university lecturer. The advantage is that you can read and work through the course materials at your pace, and at a time and place that suits you best. Think of it as reading the lecture instead of listening to a lecturer. Just as a lecturer might give you in-class exercise, your Study Units provide exercises for you to do at appropriate times.

Each of the Study Units has common features which are designed to aid your learning. The first feature is an introduction to the subject matter of the unit and how

a particular unit is integrated with 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 your have completed the unit. You should use these objectives to guide your study.

When you have finished the unit, you should go back and check whether you have achieved the objectives. Self Assessment Exercises are interspersed throughout each study unit and answers are given at the end of the course.

These exercises are designed to help you recall what you have studied and to evaluate learning by yourself. You should do each Self Assessment Exercise as you come to it in the study unit. The summary at the end of each unit will help you to recall all the main topics discussed in the main content of each unit. There are also tutor-marked questions at the end of each unit. Working on these questions will help you to achieve the objectives of the unit and prepare you for the assignments which you will submit and the final examination.

It should take you about three hours to complete a study unit, the exercises and assignments. When you have completed the first study unit take note of how long it took you and use this information to draw up a timetable to guide your study for the rest of your course. The wide margins on the left and right side of the pages of your course book are meant for you to make notes of main ideas or key points at which you can use when revising the course. If you make use of all these features, you will significantly increase your chances of passing the course.

Course Deliver

As an open and distance learner, you learn through several ways. You learn when you interact with the content in your course material in the same way as a student interacts with the teacher in a conventional institution. You also learn when you are guided through the course; however you are not taught the course. Instead, your course material is your teacher, and as such you will not be able to get answers to any questions which may arise from your study of the material. It is for this reason that, in addition to the course material which you have received, the delivery of this course is supported by tutorial, facilitation, and counselling support services. Although these services are not compulsory, you are encouraged to take maximum advantage of them.

Tutorial Sessions

The tutorial hours for this course is 12 hours. Tutorial sessions form a part of your learning process as you have opportunity to receive face-to-face contact with your tutorial facilitator and to receive answers to questions or clarifications which you may have. You may also contact your tutorial facilitator by phone or mail.

On your part, you will be expected to prepare ahead of time by studying the relevant study units. Write your questions so as to gain maximum benefit from tutorial sessions. Information about the location and time schedule for facilitation will be available at your study centre.

Tutorial sessions are a flexible arrangement between you and your tutorial facilitator. You will need to contact your study centre to arrange the time schedule for the sessions. You will also need to obtain your tutorial facilitator‟s phone number and email address.

Tutorial sessions are optional. However, the benefits of participating in them provide you a forum for interaction and peer group discussions which will minimize the isolation you may experience as a distance learner.

Facilitation

Facilitation is learning that takes place both within and outside of tutorial sessions. Your tutorial facilitator guides your learning by doing the following:

- provide answers to your questions during tutorial sessions, on phone or by email;
- coordinate group discussions;
- provide feedback on your assignments;
- pose questions to confirm learning outcomes;
- coordinate, mark and record your assignment/examination score; and
- monitor your progress.

The language of instruction for this course is English. The course material is available in print or CD formats, and also on the university website.

On your part, you will be expected to prepare ahead of time by studying the relevant Study Units, write your questions so as to gain maximum benefit from facilitation.

Information about the location and time schedule for facilitation will be available at your study centre. Time of facilitation is a flexible arrangement between you and your tutorial facilitator. You should contact your tutorial facilitator if:

- you do not understand any part of the Study Units
- you have difficulty with the Self Assessment Exercises

- you have a question or a problem with an assignment, with your tutorial facilitator‟s comments on a assignment or with the grading of an assignment.

Counseling

Counselling forms a part of your learning because it is provided to make your learning experience easier. Counselling is available to you at two levels, academic and personal counselling. Student counsellors are available at the study centre to provide guidance for personal issues that may affect your studies. Your study centre manager and tutorial facilitators can assist you with questions on academic matters such as course materials, facilitation, grades and so on. Make sure that you have the phone numbers and email addresses of your study centre and the various individuals.

Assessment

There are three components of assessment for this course: the self assessment exercises and assignments that are design for you at the end of each study unit; the Tutor-Marked Assignments; and a written examination. In doing these assignments, you are expected to use the information gathered during your study of the course. The detailed explanations on how to do each assignment has been provided you.

Self Assessment Exercises (SAEs)

There are Self Assessment Exercises spread out through your course material. You should attempt each exercise immediately after reading the section that precedes it. Possible answers to the exercises are provided at the end of the course book, however, you should check the answers *only after* you must have attempted the exercises. The exercises are for you to evaluate your learning; they are not to be submitted. There are also questions spread through each study unit. You are required to attempt these questions after you have read a study unit. Again, the questions are to help you assess your knowledge of the contents of the unit. You are not required to submit the answers for SAEs.

Tutor – Marked Assignments (TMAs)

There are four Tutor-Marked Assignments for this course. The assignments are designed to cover all areas treated in the course. You will be given your assignments and the dates for submission at your study centre. You will be assessed on all four, but the best three performances will be used for your continuous assessment.

Each assignment carries 10% and together will count for 30% of your total score for the course. The assignments must be submitted to your tutorial facilitator for formal assessment on or before the stipulated dates for submission. The work that you submit to your tutorial facilitator for assessment will count for 30% of your total course score.

Guidelines for writing Tutor – marked Assignments

1. On the cover page of your assignment, write the course code and title, assignment number (TMA 1, TMA 2, TMA 3, TMA 4), and date of submission, your name and matriculation number. It should look like this:
   Course Code:
   Course Title
   Tutor-Marked Assignment
   Date of Submission
   School and Programme
   Matriculation Number
2. You should endeavour to be concise and to the point in your answers and adhere to word limit where given. Your answer should be based on your course material, further readings and experience. However, do not copy from any of these materials. If you do, you will be penalized. Remember to give relevant examples and illustrations.
3. Use ruled foolscap sized paper for writing answers. Make and keep a copy of your assignments.
4. Your answers should be hand-written by you. Leave a margin of about 1.5 inches of the left side and about 5 lines before the answer to the next question for your tutorial facilitator‟s comments.
5. For assignments involving laboratory reports of experiments, the following format is required for submission in addition to 1 above:

Experiment Report Sheet

a. Observations ……
b. Readings ……..
c. Diagrams ……..
d. Graphs ……..
e. Precautions …….
f. Results ……...
g. Calculations ……..
h. Sources of errors ……

Conclusions …….

6. When you have completed each assignment, make sure that it reaches your tutorial facilitator on or before the deadline. If for any reason you cannot complete your work on time, contact your study centre manager and tutorial facilitator before the assignment is due, to discuss the possibility of an extension. Extensions will not be granted after the due date unless under exceptional circumstances.

Final Examination and Grading

The final examination for EDT 823. Research and Media will be of three hours duration and will carry 70% of the total course grades. The examination will consist of questions which reflect the kinds of Self Assessment Exercises and questions in the Tutor – marked Assignments which your have previously encountered. All areas of the course will be assessed. You should use the time between finishing the last unit and taking the examination to revise the entire course. You will find it useful to review your answers to self Assessment Exercises and Tutor marked Assignments before the examination. For your to be eligible to sit for the final examinations, you must have done the following:

1. You should have submitted all the seven Tutor-Marked Assignments for the course
2. You should have registered to sit for the examination. The deadline for examination registration will be available at your study centre. Failure to submit your assignments or to register for the examination (even if you sit for the examination) means that you will not have a score for the course.

Course Marking Scheme

The following table lays out the marks that constitute the total course score.

Assessment	**Marks**
Assignments 1 – 4 (four submitted, but the best three of all the assignments selected)	Three assignments, marked out of 10% totaling 30%
Final examination	70%f overall course score
Total	100% of course score

Conclusion

In conclusion, all the features of this course guide have been designed to facilitate your learning in order that you achieve the aims and objectives of the course. They include the aims and objectives, course summary, course overview, SELF Assessment Exercises and study questions. You should ensure that you make maximum use of them in your study to achieve maximum results.

Summary

EDT 823: Research and Media: Provides you with a theoretical foundation upon which you develop mastery in the design and conduct of research in educational media. It is aimed at equipping you with the analytical skills for examining the what, why and how questions on issues relating to research in educational media. It introduces you to the basic issues and concepts, trends, theoretical frame, designs and statistical tools for analysis in educational media research with emphasis in experimental and non-experimental research designs and

the procedures. Upon completing the course you should be able to identify a research problem, choose a topic at the various categories and various researchable aspects in educational media and carry out the study successfully and write and submit a report for assessment.

I wish you success with the course and hope that you will find both the course guide and course material interesting and useful.

Best wishes!

EDT 823: Research And Media

NATIONAL OPEN UNIVERSITY OF NIGERIA

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Course Coordinator	Dr. Ibrahim O. Salawu School of Education National Open University of Nigeria Lagos.

MODULE 1 BASIC ISSUES AND CONCEPTS IN RESEARCH IN EDUCATIONAL MEDIA

Unit 1. THE MEANING OF THE TERM "MEDIA", THE BRIEF HISTORICAL DEVELOPMENT AND THE IMPACT.

1.0 INTRODUCTION

I believe strongly that you have read the course guide and now you have a general understanding of what this unit is all about and how it fits into this course research and media as a whole. In this unit, you will learn the various definitions of media, the brief historical development and the impact the uses have had on the transformation of society and human welfare. This unit, is important to you because it will help you to understand the subsequent units. The objectives stated below specify what you will learn after going through this unit.

2.0 OBJECTIVES

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

1. Define media.
2. Explain the meaning of media in your own words.
3. Discuss the history of media development.
4. Identify and explain three ways by which the use of media has influenced the transformation of the society and enhanced human welfare.

3.0 MAIN CONTENT

3.1 What are Media?

Media is the plural of medium, Ironically, there is no general agreement on the definition of the term "Media". In literature, media have been variously defined by many authors; this section presents to you some definitions of media.

3.1.1 Definition of media.

Solomon (1974), states that "media refers to films, television, teaching machines, computers, prints, graphic displays, audiotapes, etc, or all such devices or instruments which transmit information between persons" (P.367). The Glossary of Educational Technology Terms (1987) defines media as "generic term for all the forms and channels used in the transformation of information" (P.76).

Beyond these machine-listening and source category definitions of media, Heinich, Molenda, Russel and Smaldino (2002), posit that "media plural of medium is a channel of communication, derived from the Latin word meaning "between", the term refers to anything that carries information between a source and a receiver.

Examples include video, television, printed materials, computers and instructors" (PP.9-10) KirkPatrick (2007) also was of the same opinion when he said that "Media is the plural of medium, something by or through which an effect is produced: Air is the medium through which sound is carried". (P.447).

You will notice that these definitions have one common feature of explaining the meaning of media as channel of communication. You will also observe that from the definitions, media are not means of communication. According to Coppen, (1974) "means of communication are spoken words, gestures, pictures, diagrams and written words, while media are the several different channels that can carry these means of communication". (P.28). spoken word for example is a means of communication that can be conveyed by different channels or media like air, radio, telephone, tape recorders to mention but these. Similarly, still pictures and diagrams are means of communication that can be channeled by book illustrations, photographs, chalkboard, flannel board and charts. Moving pictures can be carried by media such as cinefilm and television. These consist of visual materials enriched by commentary, moving slowly or quickly, enlarged or reduced in scale. These definitions and explanations of media presented to you will remove all the misconception and misunderstanding of the term media. You are given a chance to check your own progress in learning this unit with this self assessment exercise below.

SELF ASSESSMENT EXERCISE 1

* Can you identify some common features in the definitions of media?

3.1.2 A Brief. History of Media Development

In the last section, you learnt the various meaning of the term "media". In this section, you will be exposed to the historical development of media and the impact the uses have had on the transformation of society and human welfare over the years.

3.1.3 Development of Media

Agun and Imogie (1988) traced the beginning of media development to the ancient times even to the stone age man and noted that:

During the stone age, rocks and stones served as media for human expression and communication. Man scratched figures and symbols on the rocks with stones to express himself and to send messages to others. The rocks on which these figures and symbols were scratched thus became the earliest form of visual aids. Similarly, in some traditional African societies, sounds produced by gun shorts or cannon explosion as well as the dry sound from the wooden or metallic gong and talking drums when struck with a stick served as means of communicating important messages like announcement of emergencies, death and funerals of important

persons, summoning young men to communal labour and even arrival of new born babies and periods of new yam festivals in the community. Air served as the medium through which the sound of the gun and of the drum were channeled (p. 5).

A completely new dimension in media development occurred with the developments and unfolding achievements of science and technology. Taking the lead was the inventions of the printing press by a German called Johann Gutenberg in 1445 A.D. He invented movable metal blocks in Germany which replaced the tedious and laborious process of copying manuscripts and books by hand. Consequently books including the bible were readily mass produced. Later refined retrogravure and offset printing were introduced. With application of photograph to printing, a variety of printed media like textbooks, journals, magazines, newspapers were produced. The arrival of the electronic media like film, radio, television, tape recorders, video tape equipment, cassette tape recorders, motion pictures, orbiting satellites and lately, Cd Rom, DVD-Rom, Digital cameras, Internet and Worldwide Web increased the variety of media. (Emery, 1968), (Seattler, 1968) and (Heinich, Molenda, Russell and Smaldino, 2002).

SELF ASSESSMENT 2

List 1 visual medium and 2 mass media that accrued from media development.

3.2 The Impact of media Use

In the last section, you learnt the brief historical development of media. In this section, you will learn the impact of media use and the important influences on the transformation of the society and enhancement of human welfare. Rossi and Biddle (1966) observed that "media contributed significant turning points in human history". (P.8). Prior to the development of the print media, literacy was the preserve of the elites, the selected few, sons of aristocrats, teachers, priests and merchants. But with the appearance of books, journals, newspapers, etc, men for the first time, had the opportunity to communicate their thought to others at a distance and to supplement memory with relatively imperishable records. As a result, knowledge available to the common man increased and provided the impetus for universal literacy.

Similarly, the print media put the Bible into the hands of every man who wished to ponder his own interpretation of its meaning. Consequently, literate laymen were no longer satisfied with interpretation of Holy Writ provided by the clergy. Historians

in literature perceived this as a major factor that led to the protestant reformation in Europe and the rest of the world.

Again, with the help of the print media, the literate citizens‟ awareness increased and they were no longer satisfied with divine rights of kings. They later resisted their economic bondage, hence the French, Russian and later the Cuban revolution (Rossi and Biddle, 1966).

The combination of the print and electronic media gave rise to the concept of mass media which Ekwelie (1978) said “are known channels for news, information, entertainment, education, leadership, conferring status and symbolism among other things. These represent the general functions of the media no matter what the locale” (P.208).

The statement implied that mass media comprising newspapers, journals, magazine, radio and television, etc. serve several unique functions. For example, they operate to enable people enjoy news output that help to maintain a sense of connectedness and familiarity with the people outside one‟s neighbourhood. The mass media too, are known channels of your entertainment in a therapeutic sense, since they provide enormous amount of entertainment information for tension release. For instance, readers of newspapers enjoy cartoons, comics and articles, and radio audiences and television viewers enjoy jokes and plays capable of causing laughter to reduce tension in you. Beyond these, the mass media perform economic function of advertisement and announcements.

In politics, mass media is one of the principal source of the citizens‟ conceptions of national and world events. The mass media operate in gathering and delivering information about the actions of government. And help society to develop an informed citizenry by instilling political awareness among the masses. As they provide the channels through which the masses see what their leaders are doing and hear what they are saying. This equips the silent majority to pass informed and objective judgments on such leaders with their voters‟ card at the appropriate voting occasion they are permitted to pass such verdict. Finally, the mass media and orbiting satellites which transmit information and insight endlessly have made the world one place in which mankind appear to be unified into one family. (Ekwelia, 1978).

You have noticed the extent in which media transformed societies and enhanced and elevated the welfare of man.

SELF ASSESSMENT EXERCISE 3.

Discuss one of the areas where media have impacted positively on society.

4.0 CONCLUSION

In this unit, you have been exposed to the definitions of media. The historical development of media was discussed. The final discussion was on the impact of media on society. From these discussions, you are expected to understand sharp and clear that a striking variety of media have evolved and impacted positively on the welfare of man in societies.

5.0 SUMMARY

In this unit, a summary of the points is that:

1. Media refers to several different channels like air, books, chants, graphs, chalkboards, computer, films, television set, radio set, etc for conveying means of communication such as spoken and written words, pictures, sounds, and gestures from sender to receiver of messages.

Through evolutionary processes a striking variety of media accrued as channels of means of human communication.

The media variety served as channels for news, information, entertainment, and announcements. You will learn more about how media served the purposes of education in the next unit.

ANSWER TO SELF-ASSESSMENT EXERCISE 1.

One common feature in the definitions of media is that media is the plural of medium. In addition, media are channels of communication.

ANSWER TO SELF-ASSESSMENT EXERCISE 2

(a) (i) Book (ii) Rock (b)(i) Radio set (ii) television set

ANSWER TO SELF-ASSESSMENT EXERCISE 3

One of the areas where media have impacted positively on society is politics. Mass media operate in gathering and delivering information about the actions of government. It creates political awareness among the masses and helps them to pass informed and objective judgements on their leaders.

6.0 TUTOR-MARKED ASSIGNMENT

Answer the following questions:

1. What are media?
2. Distinguish media from means of communication.
3. Identify any two media that were developed and have had positive impact on the society.

7.0 REFERENCES/FURTHER READING

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Kirk Patrick, E.M. (Eds.). (2007). Chambers Universal Learners‟ Dictionary. Ibadan Nigeria: Spectrum Books Limited.

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UNIT 2 THE PROBLEMS OF MEDIA USE IN THE INSTRUCTIONAL PROCESS THAT SPARKED MUCH RESEARCH IN EDUCATIONAL MEDIA

1.0 INTRODUCTION

In Unit one, you learnt the meaning of the term “media”, the brief historical development and the impact that the use of media have had on societies and the elevation of human welfare. In this Unit, the problems of media use in the instructional process that sparked much research in Educational media will be discussed. This Unit promises to be exciting because you will learn the reason why the fire media use sparked to transform the society and enhance human welfare extinguished in the Educative process. Thus, in spite of a striking variety of educational media that evolved and has had significant influence on the

improvement of the instructional practices, visitors to the classrooms rarely see media varieties in use to convey instructional messages to the learner. You can see that it is going to be an interesting unit, and what you are going to achieve after studying the unit are listed in the objectives that follow.

2.0 OBJECTIVES

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

- Define educational media
- Identify three main claims made for the use of educational media in the instructional process, in the mid fifties.
- Identify three problems of media use in the educative process that led to interest in research in educational media in the mid fifties.

3.0 MAIN CONTENT

3.1 What are Educational Media?

There is no solid agreement among educators today concerning a precise definition for the term educational media (kieffer, 1965). Since the early 1960ˇs other terms such as visual aids, Audio visual media, Audio Visual materials, instructional materials, teaching aids, communication media and many more have been used interchangeably with educational media. Consequently, educational media has been variously defined in literature by many authors. This section presents to you some definitions of educational media.

3.1.1 Definition of Educational media

The word, educational media is a composite term derived from educational and media meaning any medium of communication used by teacher and pupil to advance learning. Under this definition, all teaching tools are educational media: library books, audios-visual aids, television and radio, glass slides, filmstrips, flat pictures and maps, real objects, and community resources (Shores, 1960).

According to the Glossary of Educational Technology Terms (1987). Educational Media are the devices and materials used in the teaching-learning process. The term is often used as opposed to instructional aids to denote those media which present a complete body of information and are largely self-supporting rather than supplementary in the teaching-learning process. (p.46). Heinich, Molenda, Russell and Smaldino (2002) state that “the term media refers to anything that carries information between a source and a receiver. Examples include video, television, diagrams, printed material, and computers. They are considered educational media when they carry messages with an instructional purpose” (p. 10).

SELF ASSESSMENT EXERCISE 1

What is your own definition of educational media?

3.1.2 The Evolution of Media use in the Instructional Process.

In the last section, you learnt the definitions of educational media. In this section, you will learn the evolution of media as used in the instructional process of the education system.

The genesis of media use in the educative process was one of evolution. Boyd and King (1980) traced the beginning back to the time of elitist education in the ancient Greek and said that:

> whenever for any reason an education beyond the powers of the home was required, it was given by some men of recognized wisdom to a disciple. The essential fact of the situation was not an institution like school, but a personal relationship between the teacher and learner. (p.3)

The above statements implied that the teacher was the educational medium in this instructional process. It appears however, that improved mobility made it possible for many students to converge at a spot called a classroom to meet a teacher who no more desires to go in search of a student in their home. For demonstration purposes the blackboard emerged to create a focus for the class. There was also the use of books by teachers and students. Consequently, more people were learning through the books, and through the teacher‟s use of the blackboard and the accompanying chalk. The coming of more books and their use as well as blackboard as educational media broke the teacher‟s monopoly of knowledge and also broke the back of the primitive classical elitist educational system. (Ogunranti;1981). The intensive use made of the blackboard and chalk, and the book then made them acquire the prominence and dominance they enjoy among teachers today. Even today the book, the chalkboard, and chalk still hold sway as main teaching and learning tools, leading to the much criticized talk and chalk approach and verbalism in our education system. (Agun and Imogie, 1988).

While the age of books and chalkboard drag on over the centuries, development in science and technology of electronics ushered in educational media like radio, television, cassette tape recorders, video equipment, films, computers, teaching machines, etc., to increase a variety of media that can be used in the instructional process. Added to these are simple variety such as posters, charts, flannel graphs, models, dioramas, etc., which could be made by teachers. This is the reason perhaps why Eli (1972) said “some media are designed specifically to facilitate learning while others exist through technological inventions and discoveries and become educational media by utilization”. (P.39).

Through these evolutionary processes, a striking variety of media accrued for the education system. The main claims made for the use of the educational media in the instructional process are that:

- Greater learning results when media are integrated into the traditional learning process of teacher talk and chalk
- Equal amounts of learning are often accomplished in less time using educational media; and
- Media generally facilitate learning and are preferred by students when compared with traditional instruction.

This assumption, that media can increase interest, comprehension and retention was based on the hypothesis that the more abstract the content of a message the more difficult it is to comprehend. Thus the theoretical rationale for media lies in their ability to add concreteness to any learning situation. The judicious use of selected media will allow the student to interpret more easily through the channels of more than one of his senses the facts that he/she needs to know. Motivation is essential to all learning and with most individuals it is necessary to vary the pace and source of information to be assimilated. Educational media are therefore used to increase learning and encourage motivation (Seattle, 1968). In the light of these claims, a surge of excitement prevailed with the advent of media integration in the traditional educational system. But this surge of excitement in media use dried up as teachers and students rejected the media and matched on teaching and learning with talk and chalk traditional approach. (Obi, 1992).

SELF ASSESSMENT EXERCISE 2

Identify one main claim made for the use of educational media in the instructional process in the mid fifties.

3.1.3 The Nigeria's position.

In the last section, you were exposed to the evolution of media as used in the instructional process. In this section, you will learn Nigeria‟s position in media use in the instructional process.

In Nigerian formal educational system, the use of educational media to improve the quality of education is nothing new but dates back to the Colonial times when the inspectorate Division of ministries of Education started laying strong emphasis on the place of pieces of apparatus in teaching practice and classroom activities. In this period, "pieces of apparatus" represented all the educational media categories used in the nation‟s educational system. Later pieces of apparatus assumed a new status of teaching aids with emphasis on audio-visual aids. All through these periods the use of media in Nigeria educational system could not be said to be effective (Ogunranti;, 1981). In most cases our use of educational media had been as aids to

the teachers to supplement his instructional presentational functions. When media are used as aids to the teacher in this way there is relatively little measurable effects on the kind or amount of learning that takes place (Hyer, 1972). Rodwell (1978) noted that the use of media "tended to be an ad hoc process determine more by cost and availability than any theoretical rationale" (p.58). Oguranti (1981) explained that: the cost of equipping a secondary school class for demonstration work in science in the most of Nigerian schools was so prohibitive that the alternative was to teach the pupils with the help of the blackboard only and a dependence on the retentive memory of the pupils. (p. 10).

The above implied a reliance on learning by rote. This meant that the years for effective use of media were in the future. The activities that set the educational scene for the effective use of media began with the publication of the National policy on Education in 1977 but twice revised in 1981 and in 2004. The document devoted section 10, pages 42-43, to enshrine educational media under the heading "educational services", and stated the objectives as follows; to

- develop, assess and improve educational programme;
- enhance teaching and improve the competence of teachers;
- make learning meaningful for children;
- reduce costs;
- promote in-service education;
- develop and promote an effective use of innovative materials in schools.

To achieve these objectives, government proposed and implemented various measures. One of the measures was the establishment of a National Educational Technology Centre (NETC) in Kaduna now collapsed into National Open University of Nigeria (NOUN), charged with the responsibility among other duties to provide educational media for schools using local materials (Obi, 1992).

In some state of the Federation, the efforts of the National Educational Technology Centre then was supplemented by that of Curriculum Development Centre, in providing schools with a variety of educational media. In effect, the demonstrated efforts and interests increased more activities in the provisions of a variety of media especially for secondary schools. Onyejemezi (1988) confirmed this fact from her research findings that: "Post primary institutions have acquired a large quantity of educational technology resources and some in excess. She concluded that "a large majority of the educational technology resources are neither assembled nor utilized for teaching and learning". (p. 281).

It appears that at that period, the emphasis for improving teaching and learning was on the provision of the media products-tools which existed, the concern for the effective use was secondary. As a consequence, available educational media were left to lie gathering dust in most school cupboards or school corners, while teachers

went ahead teaching predominantly with the chalk and talk verbalistic traditional approach. However, with the increasing desire to improve teaching and learning and Teacher Education, the questions arose as to the problems responsible for slow acceptance of educational media and rejection of their integration with the instructional process either as an integral part of classroom instruction or as the principal means of direct instruction (Kemp, and Dayton, 1985). In the next section, the critical problems will be discussed briefly in answer to the above question. But before then, answer the self-assessment below.

SELF ASSESSMENT EXERCISE 3 State two objectives for use of Educational media in Nigerian Education system.

3.2 Critical problems of media use in the instructional process that led to increased Research in educational media.

In the last section, you leant what the Nigeria‟s position in media use in the educative process was. In this section you will learn the critical problems implicit in media, use in the instructional process which led to increased research in educational media, over the years.

According to Obi (1992) “the critical problem was the unsystematic planning for and the non-integrated use of the variety of educational media that would be most effective in enhancing the quality of teaching and learning”. (P.5). It appears, that the emphasis for improving teaching and learning was on the media, already in existence while the concern for the effective utilization was secondary. The end has been to provide schools with media without considering the needs of the learner who should be at the centre of the instructional process; the performance objectives he or she is to achieve, the method and the evaluation plan for achieving the set objectives. (Agun and Imogie, 1988). Despite this, however, historically the use of the media has been little influenced by theory oriented research. And for want of sufficient empirical evidence of their instructional effectiveness designers and producers relied very largely on intuition and experience in deciding how to design and produce media. The teachers used the media more on criteria of availability and cost than efficiency (Rod well, 1978):

Additionally, the new media formats were introduced into the classroom lessons, without evaluating their instructional effectiveness. The new media were commercial media not developed to serve the needs of particular students and their teachers. Kemp and Deyton, (1985) noted that “commercial media” will usually not be suitable, since in the main they are too generalized and too broad in treatment of subjects (P. 7). It was in this light that available media in the instructional process

were left to lie in school corners while teachers resorted to verbalizing their instructional presentations to learners, relying heavily on the use of only the chalkboard otherwise called the "talk and chalk" traditional method of teaching.

The problem of under – utilization, misuse or abuse of educational media in the instructional process has attracted the attention of many Educators, Audiovisualists and Educational Technologist. One of them, Rodwell (1978) observed that "it is not enough to look at the media and devise uses for them. To work fully, they must be used at the right time, in the right place and in the right way" (p.58). One of the ways Corper and Johoda (1947) advocated for identifying the right areas to use educational media was "through empirical researches" (P.25). It was in this problematic probing situation that very many researches were undertaken to study various aspects of educational media to provide empirical hard data or objective information or evidence to guide the most effective use of educational media in the teaching and learning process. Let us quickly go over to the next unit where you will learn what research means. But before then, answer the self-assessment question that follows

SELF-ASSESSMENT EXERCISE 4

Identify one problem that contributed to the rejection of media use in the instructional process in the mid fifties.

4.0 CONCLUSION

In this unit, you have learned about educational media, the genesis of media use in the instructional process and the Nigeria‟s position. You also learned the critical problems that led to the use, misuse, abuse and under-utilization of media in the instructional process which stimulated interest in conducting research in educational media.

5.0. SUMMARY

In this unit, a summary of the points is that.

- Media are considered as educational media when they carry messages with an instructional purpose.
- The genesis of media use in the instructional process was one of evolution in both industrialized countries and Nigeria.
- Media use in the instructional process during the mid fifties were based on cost and availability and not on efficiency. Besides, media use was not guided by sufficient empirical evidence of effectiveness
- In addiction, media use was not systematically planned to satisfy the requirements of students, teachers, lesson objectives, content and teaching methods.
- Consequently, the media in the instructional process were left by teachers to gather dust in school corners and cupboard. The use, misuse, abuse and under-

utilization problems that arose stimulated much interest in research in educational media. You will learn in the next unit about research in educational media.

ANSWER TO SELF-ASSESSMENT EXERCISE 1

Media are considered as educational media when they carry messages with instructional purposes.

ANSWER TO SELF-ASSESSMENT EXERCISE 2

Greater learning results when media are used to increase students‟ interest motivation, comprehension and retention.

ANSWER TO SELF-ASSESSMENT EXERCISE 3

1. To make learning meaningful for children.
2. To enhance teaching and improve the competence of teachers.

ANSWER TO SELF-ASSESSMENT EXERCISE 4

Media use was unsystematised and unplanned, consequently the needs of students, teachers, teaching objectives and methods were not met.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss any two factors that influenced media use, misuse, abuse and underutilization that led to much research in Educational media.

7.0 REFERENCES/ FURTHER READINGS

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UNIT 3 CONCEPTS AND BACKGROUND OF RESEARCH IN EDUCATIONAL MEDIA

1.0 Introduction

In unit 2, you studied the problems of media utilization in the instructional process that led to increased research in educational media. You learnt that the critical problem was that the new media were being introduced into the instructional process and there was unmet demand for their evaluation for effectiveness. Despite this, however, the use of the media had been little influenced by theory oriented research and for want of empirical evidence teachers used the media more on criteria of cost, availability, intuition and experience than efficiency. In addition, there was unsystematic planning for and the non-integrated use of the variety of media. The problems of use, misuse, abuse and underutilization of media that arose in the instructional process led to much researches in educational media to find out the answers of these problems. In this unit, you will study the concepts and background to research in educational media, the general classifications and the importance. After studying this unit, certain things will be required of you. They are listed in the set objectives that follow.

2.0 OBJECTIVES

At the end of this unit, you should be able to define research and educational media research

- ⇧ identify the general classification of media research
- ⇧ explain various researchable aspects in educational media

⇧ discuss the important of research in educational media to Teachers, School Administrators, Educational Technologists, media specialist and Teachers Trainers‟ institutions.

3.0 MAIN CONTENT

3.1 What is Research?

Research as a concept has received so many definitions from many authors over the years. This section presents you some definitions of research. It also gives you some characteristics of research.

3.1.1 Definitions

According to Olaitan and Nwoke (1988) “Research generally is a process of findings out the answer to a problem” (P.I). Nwana (1990) also states that research broadly defined “is a process of finding out the solution to a problem” (P.I) Additionally Akuezuilo (1993) defines research “as a systematic and objective search for new knowledge of the subject of study and/or application of knowledge to the solution of a novel problem “(P.L).While Nkemakolam (1995) said that is a process of finding out or generating information for the solution of problems such that we could acquire new knowledge and skills which would place us in better positions to control over lives and the environment (P,4).

The above definitions have some common features which characterize research. These are: First, research is problem base. Without the existence of a problem situation there will be no research. Indeed, the motivation force in all research is the existence of a problem and the desire to engage in activities to search for or find out the solutions to the problem. Thus, research aims at solving problems. It is the existence of a problem that elicits and motivates the search for solution. Second, research is conducted in a systematic, objective and scientific manner using the method of inquiry. It implies that research is self correcting. The procedures, quantitative data, analysis and results obtained by a researcher are wide open to the serious close examination and objective scrutinization of other researchers; so that incorrect aspects could be discovered and corrected. Thus, research is based on accurate observable experience, descriptions and records. And objective evidence not personal opinion is the criteria for accepting what is correct. These common features and characteristics of research have a far reaching implication for you. You must be well educated and trained in research methodology to cope with the demands of research, therefore you must be painstaking and imaginative in your research activities, like observing, questioning, predicting, formulating hypothesis, measuring, counting, making operational definitions, making mental models, manipulating instruments and equipments, experimenting, controlling and manipulating variables and concluding. It is these activities that typify you as a scientific researcher. Your research attitude too must be a scientific attitude namely:

- Belief that your rational mind is capable of finding solutions to human problems provided one allows enough time.
- Belief in the value of evidence or data. So that objective evidence is the basis of rational decision making.
- Open – mindedness regarding the out – comes of empirical evidence. This implies that you are not being committed one way or the other before hand.
- Patience. It implies you should give enough time for events to prove themselves.
- With holding your judgment or conclusions to the very end.
- Admitting of the possibility of other explanations than one‟s own of the same phenomenon.
- Realizing the tentative nature of facts, theories and explanations.
- Willingness to welcome the contributions of others in finding solutions to problems. (Nwana, 1980)

Beyond these, you must be men and women – students of integrity and must be willing to spend hours, when necessary, seeking to address your research problems. You must not be afraid of research. You should not think that research is a difficult and complex course or activity that must be avoided. You should not lift existing research reports, dissertations and theses from your study centres of NOUN or from other universities and reproduce the contents verbatim without acknowledging the author. This is plagiarism and a punishable crime unexpected of a NOUN student. The next unit is very interesting. It will make you aware of the various definitions of Educational media research. It is also important for you because it will help you understand the subsequent units as well as equip you with practical skill to conduct your own researches particularly, educational media research.

SELF – ASSESSMENT EXERCISE 1
Define research

3.1.2 What is Educational Media Research?

In the last section, you learnt the various meanings of the term “research.” In this section you will learn the meaning of educational media research. This will enable you to identify any time the type of research which qualifies to be called educational media research.

According to Kieffer (1965) “media research is the study of various aspects of educational media including self-instructional materials and educational television.” (P. 79). The key word in this definition is study. Research in educational media therefore, can be seen as the systematic planned, controlled, empirical and objective study of problems of educational media. The question of what constitutes research in educational media can refer to those empirical research activities which are focused on the solutions of an educational media problem. It is not the research

activities that solve the problems of educational media. It is the information or new knowledge of media that carry educational messages obtained from doing research that are used for solving educational media problems as well as improving educational media planning, production, evaluation and utilization effectiveness. From what has been stated, basically, research in educational media is a process of finding out or studying to generate information for solution of problems of educational media.

SELF – ASSESSMENT EXERCISE 2

When would you accept a research as an educational media research?

3.1.3 General Classification of Media Research

In the least section you learned the meaning of educational media research. In this section, you will learn research classification.

Research may generally differ according to the objective s of the research. Research can also be classified according to the underlying objectives or the use of which the end result is intended to be put. In this light, research is classified into three areas or types namely:

(1) Basic research
(2) Applied research
(3) Action research.

Let us go on and learn their meanings.

- Basic Research is referred as pure or scientific research. Basic research is carried out by identifying a problem, examining selected relevant variables constructing hypotheses where necessary, creating research design to investigate the problem, collecting and analyzing appropriate data and drawing conclusions about how the variables are related to generate principles and theories and for expansions of knowledge. (Nkemakolam, 1995). Basic research does not involve descriptive research in which person, objects, things, places, time, testing, and events are studied. The main aim is testing and developing theory and not for direct practical application or utilization. Such as in testing an instructional medium or media in the field. However, we may use findings of basic research to design and develop a teaching material or media but we cannot use it to test the effectiveness in the classroom of such a teaching material or media. The field testing must be for another type of research called Applied Research.

- **Applied Research**
  Applied research called field research also uses scientific method of enquiry as basic research to obtain empirical data that can be used to solve practical problems that occur in the field. Examples of Applied research are many: Media researches which compare the relative effectiveness of two or more

types of educational media or relative effectiveness of various types of educational media with more conventional teaching approach are applied research. Furthermore, Educational media researches that explore classroom utilization practices related to various types of media to determine the most effective methods of presentation under various conditions are applied research.

One thing you should bear in mind is that Basic research and Applied research are all open to same empirical inductive and theoretical deductive research processes. And both are mutually inclusive as basic research is conclusion oriented while applied research is decision oriented. For example, Basic research may discover the more general principles, laws and theories of learning which can be applied in media design and production. But applied research must be conducted to determine how these theories and laws applied in the media operation in the classroom. From this example, you will see that there is no sharp line of demarcation between basic and applied research. This is because applications are made from theory to help in proffering solutions of practical problems. Attempts are usually made to apply the theories of learning in the classroom. Basic research depends a great deal on the findings of applied research to complete its theoretical foundations. Because a classroom learning experiment could shed some light on learning theory. On the other hand, observations in a practical situation serve to test theories in the classroom and may lead to the formulation of new theories. (Olaitan and Nwoke, 1988).

♦ **Action Research**

Action research focuses on addressing a problem in a particular local setting. Its findings are to be validated in terms of its local applicability, not universal validity. Action research provides answer to the question: "what is". In providing this answers, events and situations are described as they appear to the researcher. Examples of action research are the investigation of: (1) types of audio media competencies which are needed by practicing teachers at various class levels and different subject matter areas. (2) role and contributions of the classroom teacher while using various media including radio and television.

We may conclude our discussion here and state that basic research is conclusion oriented, while applied research is decision oriented and action research is effective oriented in their approaches to provide information for problem solutions in research in Educational Media.

SELF – ASSESEMENT EXERCISE 3

To which type of research would you assign this topic: To investigate the interest and ability of Teachers to use educational media under optimal conditions.

3.2 Categories of Media Research

In the last section, you studied general classification of media research. In this section you will study categories of media research.

According to Allen (1960) "media research can be divided into six categories:

Comparative effectiveness
Classroom use
Teacher Education
Administration
Production design and
Testing (P. 19)

Comparative effectiveness:

This first category includes research which compares for example, the relative effectiveness of various types of educational media and more conventional teaching techniques or the relative effectiveness of two or more different types of educational media. Studies in the comparative effectiveness of various media are helpful in stimulating the thinking and in leading to new and different ways of improving instruction.

Classroom - Use Research

This is the second category of media research. Classroom – Use research explores utilization practices to various types of educational media to determine the most effective methods of presentation under various conditions. Information obtained from classroom – use research provide guidelines to teachers concerning the utilization of educational media in the instructional process.

Teacher Education Media Research

The third category of research in educational media is teacher education based researches. It evaluates various methods and media techniques in both the pre-service and in-service training of teachers. The findings will provide clues regarding the needs of teachers in the area of media design, production and use as well as lead to improvement of methods of imparting the necessary knowledge and techniques.

Administration Media Research

This is the fourth category of media research. It refers to studies conducted to determine the practical methods of conducting educational media programmes and other administrative decisions such as leadership, evaluation of media, budget and similar problems.

Production Design Media Research

This is the fifth category that refers to those research concerned with the physical characteristics of audio-visual media, such as the length of motion pictures, the

quality of still pictures, or the length, sequence and organization of filmstrips. It determines the best types of graph to use for maximum comprehension. It provides film planners and producers with very exact guidelines for film-making. Specific areas include camera angle, rate of development, succinct treatment, relevant information in introduction, summary of important points in the film, concentration of ideas, or concepts at a rate appropriate to ability of the audience commentary, special effects, colour, and music. Production research findings will provide film-makers with guidelines to improve the quality and effectiveness of instructional motion pictures. The findings also assist graphic artist and the researchers in designing audiovisual media which insure effective learning.

Testing Media Research

Testing is the sixth category of media research. The testing research aims at developing more accurate research instruments for use in media research (Kieffer, 1965).

Beyond these, let us discuss other aspects of educational media research, namely: economics of media utilization and information communication technologies.

Economics of Media Utilization

Research in this area provides Teachers and School Administrators guidelines on final media selection to produce or buy or use on external considerations such as cost, availability of media, the influence on learning outcomes the user preference.

The new Information Communication Technologies (ICT) Media Research

You will see it sharp and clear that today we are facing a revolution in the high rate of expansion of information communication technologies. They are so large and so influential to have brought changes in the ways news, historical information, practical skills, entertainment, leisure, culture are communicated and made accessible to us electronically through computer games, television, videogames, cassettes players to mention but these. We also receive a substantial amount of our historical information in the form of television drama and films etc. You will also notice that the electronic media of Information and Communication Technologies such as Cable, Videodisc, Celetext, Videotext, Computers, Internet, Intranet, World Wide Web, Multimedia, and Hypermedia are influencing and changing our traditional classroom teaching and learning practices.

Similarly, the information and communication technologies such as multimedia, the world wide web for delivery of instruction, computer, computer conferencing – Wide Area Net (W A N), and Local Area Net (LAN), Internet, on line technologies – e–books, e-learning, e-registration, e-examination, broadcast radio and television, Audio conferencing, one-way video, one way audio, one-way video, two way audio,

satellite transmission, micro waive, transmission, closed circuit television, cable television, fibre optics are being used in distance learning. Their integration into distance learning system has also brought about many changes.

The question that educational technology experts, education media specialist, educators and informed citizenry are asking are many. Some of the questions are: given these changes, what should our media research agenda be?. What questions should media research pose?. Which research question demands priority?. Which research question will have long term significance (White, 2008),

In the light of these questions, media researchers are urged to address questions such as these: What are the learner characteristics necessary to learn from these new information communication technologies? Again, what are the definitions of the characteristics of learners that will correlate with success for students learning with these new technologies?
Other questions are: What information will be available from the new technologies that can be communicated better, faster and cheaper than through the printed word?

- How does electronic learning differ from print learning? Are the two radically different modes of learning?
- What information is better or faster or uniquely available thorough the new technologies as compared with the print media? The related question is: Who learns better from which information source?
- What percentage of students find learning from computer, television, printed media, on line etc difficult?
- How will electronic learning be measured?.
- Who will be technologically disadvantaged?. What will be the public policy option to ensure equity?.
- As new technologies are integrated into schools, what changes will result in the schools? What will be the roles of the teachers and students?
- What will be the characteristics of those students who are successful in using the new technologies?. What will be the characteristics of those students who will not?

The information that will be provided by media research from these questions will improve the instructional effectiveness of the new Information and Communication Technologies in the educative process.

With your knowledge of what research in education media is, and the various categories and researchable aspects into which it falls, you can now better

understand why media research is important. You will learn the importance of research in educational media in the next section.

SELF – ASSESSMENT EXERCISE 4

Briefly discuss your role as a distant learner in the use of Information and Communication Technologies for your studies.

3.3 Importance of Research in Educational Media

In the last section, you studied categories of educational media research. In this section you will study the importance of educational media research addressing the question. Why is media research important?

Kieffer (1965), said. First, media research is important to educational improvement. Secondly, research is vital in developing new methods and techniques to meet the critical educational problems, Thirdly, research is important in determining the role of the teacher in the never – ending struggle for creativity in learning and teaching besides, education is a process, not an event, and with each passing generation research evidence adds to the knowledge necessary for its improvement. (P.90)

At a past audiovisual leadership conference, it was stated that the importance of media research to educational improvement was to operate more effectively in improving teaching and learning; define and give direction to the present and future role of programme, discover and uncover new facts and relationship about the educational process, techniques, materials, equipment and administration, evaluate present practices with respect to instructional media in our educational system (Allen, 1960)

You may agree with me that media research findings no matter how valid will be of little value until they find their way into actual classroom practice. Dissemination and utilization of media research findings are as important to educational improvement as is the conduct of media research itself. I believe you know that teachers administrators of schools, media centre directors or educational technologists are all neck deep in classroom activities in the school system. You are therefore, expected to learn the importance of educational media research to the Teacher, the School Administrators, and Educational Technologists/Audiovisual specialists, in the next section.

3.3.1 Importance of Media Research to Teachers

Educational media research findings are important to the teacher for it is only with such research information that he or she is able to make the most effective use of educational media in instructional presentation in the classroom. Furthermore, the current educational media researches can give the teachers of today insight into effective methods and techniques which will give positive direction to teacher‟s

creative energies. Educational media research findings will create awareness to teachers of the types of audiovisual competencies needed by practicing teachers at various school levels and different subject – matter areas. With such awareness practicing teachers will desire and go for in–service training to receive or reinforce their audiovisual competencies such as in television, computer, internet and language laboratory teaching to mention but these.

Additionally, media research findings will create awareness, the role and contribution expected of the teachers while using various educational media including teaching machines, television, computers, internet, cable, videodisc, taletext, videotext, multimedia and hypermedia to mention but these. Educational media research findings will help teachers to critically examine their rational (either real or imagined) concerning their use of educational media in teaching. Also evidence from educational media research will guide teachers to determine the particular knowledge, skills and abilities which need to be taught in specific subject – matter areas and to identify particular specific media which are most effective in teaching these knowledge, skills and ability via cross – media approach.

Again, educational media research findings will create awareness for teachers on the specific contributions of various media and their contribution when used in various combinations. Media research findings will guide teachers to examine the implications of class size, length of class period and sequence of contention in the extensive use of new media in various subject–matter areas.

And finally, to the classroom teacher the results of educational media research can be of great assistance in the selection of the most appropriate educational media for specific learning tasks. The media research evidence also provides a firm basis for developing media utilization techniques founded on proven learning theories. With a knowledge of media research findings and their application to teaching and learning, the teacher can use educational media with confidence. (Kieffer, 1965).

3.3.2 Importance of Educational Media Research to School Administrators

The School Administrators need up-to-date information on media research findings concerning the effectiveness of various educational media and the interest and ability of teachers to use them under optimal conditions. The school head must be aware of the media research findings concerning the most appropriate utilization techniques to enable him or her to give professional leadership to his/her faculty or departments for their adoption. He or she should be guided by media research evidence on the requirements of various media so that he or she can provide the physical facilities like electrical outlets, acoustical treatment and wiring that are

necessary in new or remodeled school plants. It is important that the School Administrator keep abreast of the latest teaching methods in such subjects areas as science, foreign languages and mathematics so that he or she can make administrative decisions concerning the cost and procurement of science equipment, language laboratories and other educational media. Finally, the school Administrator must be aware of media research findings and the trends which they have established concerning organization of the school curriculum and the impact of automation and technology on educational theory and practice, and on the role of teachers so as to motivate and empower teachers to go for in-service training for competencies in the use of the newer electronic educational media such as internet, computers, cable, videodisc, teletext, videotext, television, teaching machines, online programmes and so on.

Finally, knowledge of educational media research findings can direct the activities of the School Administrator in the development of improved facilities, administrative organization and school climate to ensure that the education system has the motivation and capabilities to utilize educational media and all the tools of the educational profession. Similarly, with knowledge of media research, the School Administrator will sponsor teachers for in-service training, to obtain media utilization skills that will cut across the subject areas.

Administrators of teacher in training institutions should be guided by media research information to include in their programmes those knowledge and skills that pre-service and in-service teachers should posses to make effective use of media for delivery of information (Heinich, Molenda, Russell, and Smaldino, 2002).

3.3.3 Importance of Research to media Design Specialist

To the producers of educational media, Administrators of Schools should provide them with educational media research findings dealing with media product design with a backlog of techniques on production of educational media. Such implementation can assure that real learning will result from their use in specific instructional situations. (Allen, 1960)

3.3.4 Importance of Research on Media to You

The last and the most important of all to benefit from educational media research is you. You are now the educational media researcher. As a consequence, a knowledge of the types and content of various educational media research findings will provide you an understanding of the state of the art. That is what the research findings in educational media had been, what the educational media research findings seem to you to be at the present time and your conclusions as to the most promising directions for future efforts in research in educational media.

Thus, your knowledge of the findings in educational media research studies will not only provide an understanding of the state of the art but will give you direction to conduct better and more comprehensive empirical researches in educational media now and in future. You should bear in mind that one of the major contributions your research in educational media will be the revision of accepted inimical conclusions, in the light of your newly discovered facts. This is because it is only by using research findings as they become available from your research efforts that new truth can be identified and present methods of teaching and learning improved. (Obi, 1992):

You should, however, note that for your research to accomplish what you hope to achieve, you need do have a tidy scientific thinking and systematic approach that would be necessary. And you will acquire these from learning from the remaining modules. The modules will involve you in activities rather than in passive learning and they have titles like trends in research in educational media, theoretical rationale for educational media research; types of research in educational media, basic statistics in educational media research, instrumentation in educational media research and how to conduct research in educational media.

It seems obvious that what is required of you is not just knowledge of the media use, but the kind of internalized understanding of them through practice which would give you a feeling for its relevance as well as the practical skill to design, conduct and write report of your own research in educational media. To sharpen your thinking and deepen your involvement in activities in research in educational media, you will need to begin the study of the remaining modules by first learning the trends in research in educational media in module 2. But before then, let me test your understanding of the importance of research in educational media as discussed here with the question that follows.

SELF – ASSESSMENT EXERCISE 5

Give any three reasons to justify inclusion of EDT 823 – Research and Media in your M.Ed programme

4.0 CONCLUSION

In this unit, you have learnt the meanings of research and educational media research, the general classification of media research; categories of media research and importance of educational media research. You now know that research in

educational media is very important to you as it will contribute to your success and survival in your field of study.

5.0 SUMMARY

The main points in this unit are:

1. Research is a process of objective and systematic finding out of information for the solution of a problem.
2. Research in educational media is the systematically planned, controlled, empirical and objective study of educational media to generate information for solution of educational media problems.
3. Generally, there are three types of research in educational media namely Basic, Applied, and Action researches, while the categories are many.
4. Educational media research is very important to the teacher, school Administrators, educational technology – media specialist, media designers, the media producers and to you.

6.0 TUTOR MARKED ASSIGNMENT

1. What are the three general classifications within which research in educational media can be conducted?

2. To which classification does each research topic belong?

   a. Identification of the types of educational media used by senior secondary school teachers in teaching Economics in Umunneochi Local Government Area of Abia State.
   b. The effects of Multi-Media Approach Versus Talk-Chalk Approach on Students Achievement and Retention in Senior Secondary School Chemistry in Abia State.

3. The effect of set induction and closure micro – teaching skills on Teaching activities of History Teachers in Imo State.

ANSWER TO SELF ASSESSMENT 1

Research is a process of objective and systematic generating of information for the solution of a problem.

ANSWER TO SELF – ASSESSMENT EXERCISE 2

When the objective set out for the research topic to achieve is in the area of educational media

ANSWER TO SELF ASSESSMENT 3

Action Research

ANSWER TO SELF ASSESSMENT EXERCISE 4

I need to know how to use the new technological media to communicate with the teacher and my fellow students. I should become more engaged with my learning with the new technological media. I must be able to interact with new electronic media, and use it to pay my fees, register my courses, and take my examination etc.

ANSWER TO SELF – ASSESSMENT EXERCISE 5

1. To learn all about research in educational media
2. To understand the state of the art
3. To be able to design, conduct and write report in educational media research

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UNIT 4 PAST TRENDS IN RESEARCH IN EDUCATIONAL MEDIA

1.0 INTRODUCTION

In the last unit, you learnt the importance of research in educational media to the teacher, school Administrators, Educational Technologist Media Experts, Teacher-Trainers Institutions, Media Designers and Producers and finally to you as a student researcher. In this unit, you will be introduced to research in educational media that have been done in the past. The research were illuminating in terms of their focused objectives, the strengths and weaknesses of their methodologies and problems which militated against their execution. Even for their lapses they are useful for our present research in educational media. After studying this unit you are expected to have achieved the objectives listed for the unit.

2.0 OBJECTIVES

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

1. Explain briefly the focus and the findings of previous research in educational media.
2. Identify five of the strengths and weaknesses of the critical variables of the previous research in educational media.
3. Discuss four of the problems which militated against execution of previous research in educational media.

3.0 MAIN CONTENT

3.1 Review of previous Research in Educational Media.

Many research studies in educational media have been conducted over the past decades. Numerous reviews and compilations of these researches appear in literature (Allen, 1971; Coppen, 1972; Compeau, 1972; Travers, 1973; Rodwell, 1974, Razde and Romroth, 1974, Moldstard, 1974, and Jamison, 1974) to mention but few. This section does not intend to exposure you to the comprehensive review of the previous research in educational media, rather it will draw your attention to the review of selected studies and the findings relating to the effectiveness of certain media. This is because it is impossible to consider all these studies in this section. Only a few of the most important examples will be cited for you around the media research categories namely comparative effectiveness, classroom use, teacher education, School Administration, production design and testing, economics of media utilization and Information Communication Technologies and education.

3.1.1 Comparative Effectiveness

The first category of experimental research studies in comparative effectiveness include those which compared for example, the relative effectiveness of various audio visual media and more conventional teaching technique or the relative effectiveness of two or more types of audiovisual media. These comparative studies were generally made to determine whether there are better ways of teaching a given subject or unit. Considerable study has been made on the effectiveness of sound motion pictures in teaching versus talk-chalk conventional instruction. For example,

experimenting on teaching tumbling with or without motion pictures Brown and Messersmith (1948) found motion pictures to be at least as effective as conventional talk-chalk instruction and in some cases, more effective. (Kieffer, 1965).

Dworkin and Holden (1959) in their experimental evaluative study of sound filmstrips versus classroom lecture found that, although there was no statistical difference between the effectiveness of sound filmstrip motion pictures and that of classroom lectures in one section of a graduate engineering course where 75 per cent of the students were willing to view sound films as a substitute to lectures. They concluded that filmstrips might save considerable teaching time.

Chance (1960) in an experimental study compared the instructional effectiveness of the overhead projector and cell transparences with that of the chalkboard in descriptive geometry course. Two hundred transparencies and eight hundred overlays were used. Although the grades on short quizzes showed no great difference between the two groups, the final grades for the students who had been taught with transparencies were significantly higher. In addition, the researcher found that approximately fifteen minutes of each sixty-minute class period could be saved with the use of transparencies. The students not only preferred transparencies to chalkboard instructional presentations but appeared more attentive. Students taught with transparencies asked 70 per cent of the questions raised in both groups.

At the primary school level, Ferguson (1957) studied verbal behaviour and language responses of nursery school and kindergarten children to the action stimuli of photos depicting action as compared to responses to similar pictures which contained no action. Research findings indicated that action pictures significantly stimulated the use of nouns, verbs, and complete sentences than those in which there was no action.

Other studies that reported on media research compared the effectiveness of two or more different media were those of Edjerton (1952), Ray & Evans (1954), and McBeath (1961), indicate that although one type of medium may have a slight edge over another, the difference will depend to a large extent upon the subject matter, the age of the students, and the grade level. Furthermore, each medium has its own advantages and limitations, which must also be considered.

Saettler. (1968) appears to have recognized the limitations of these earlier comparative effectiveness media research and observed that:

> The problem lies with the inconclusiveness of the many research findings. The non-generalisability of research and the many interactions involved which render interpretation of research findings so complex. In many studies the researcher seems to be left with more questions than he had when he initiated the project. In any learning or teaching there

> are of course, a multitude of factors interacting. These are specific learning objectives, the learning characteristics, the subject-matter, costs and other practical constraints – considered together with the basic media characteristics combined to make media use unique (p. 46).

Nevertheless, however valid the limitations of these earlier comparative effectiveness media research may be, such evaluative studies can not be ignored. (Rodwell, 1976).

Kieffer (1965) had stated that:

> "studies in the comparative effectiveness of various media are helpful in stimulating thinking and in leading to new and different ways of improving instruction" (p. 81).

Again, as Moldstad (1974) pointed out, "they are doubtless useful in assisting educators to prove to themselves that newly developed educational media actually work and provide valuable data to assist educators in making media decisions" (p 46).Roebuck (1975) fumed that "much of this type of research tends to be far removed from the conventional classroom situation" (p. 16). He suggested that "a switch from gross comparisons of media to specific effects is desirable". (p. 17) –. It is against the foregoing, that you will go over to the next section to be exposed to the findings of the researches on classroom media use. But before then test your understanding of this section by answering the question on self-assessment.

SELF – ASSESSMENT EXERCISE 1

Can you accept sound films be a substitute for lectures in this course on research and media. Give five reasons to back your answer.

3.1.2 Classroom Media use Research

The classroom media use research is the second category of research in educational media which explores utilization practices related to various media. It is written for you to determine the most effective methods of media presentation under various conditions. By far the greatest number of research in classroom utilization on audiovisual media has been conducted with motion pictures (Kieffer, 1965).

Scot (1949), Meierhenry (1952) and Macoby (1957) studied the specific effects of motion pictures on students" educational achievements. The general conclusions reached in these studies seem to indicate that:

- ❖ Well produced films, either used singly or in series, can be employed as the sole means of teaching some types of performance skills and conveying some kinds of factual data.
- ❖ Post viewing tests will increase learning when students have been told what to look for in the film and that a test on the film content would be given.
- ❖ Students will learn more if they are given study guides for each film used.

- ❖ Note-taking by students during the showing of a film should be discouraged because it distracts them from the film itself.
- ❖ Successive throwings of a given film can increase learning.
- ❖ Short films can be spliced end to end in a loop and are beneficial in practice or drill situation.
- ❖ Students can watch motion pictures for one hour without reduction to training effectiveness.
- ❖ The effectiveness of film learning should be evaluated by tests.
- ❖ After a film has been shown, its major points should be summarized and discussed lest students form misconceptions.
- ❖ Follow-up activities should be encouraged to provide carry over of generalizations (p. 82).

Experiments in the classroom have also been made with media other than motion pictures. Witty and Fitzwater (1953), Romano (1955) explored the use of a variety of media in the elementary grades. They found that, with proper utilization of these media, the students‟ vocabularies were significantly increased. Sight-reading improved, as did oral and written expression, and voluntary reading increased.

Similarly, Cline (1962) experimented with the use of a variety of media including motion pictures, film strips, slides, still pictures, and recordings to help bilingual, Spanish-speaking children to improve their language arts skills. The media were used with 289 fourth grade students in a daily half-hour programme. A control group was taught in conventional fashion. The California Achievement Test, the complete Battery Series E, was administered at the beginning and end of the school year. The experimental group achieved 100 per cent expectancy in reading comprehension, total reading ability, total language ability, total arithmetic ability, and total ability in mechanics of English. The control group achieved only 100 per cent expectancy in the mechanics of English.

These studies cited along with many others, have provided guidelines to teachers concerning the utilization of audiovisual media in the classroom.

SELF – ASSESSMENT EXERCISE 2

When you use a film to teach a lesson, what particular activity should learners avoid, and why?

3.1.3 Teacher Education Media Research

This is the third category of media research. It evaluates various media and methods used in both the preservice and in-service training of teachers by teacher – trainer institutions (Keiffar, 1965) Beyond this, it explores teachers attitude towards media utilization which frequently occurs in the context of concern expressed at under-

utilization, misuse, abuse and unrealized potentials of educational media in the educative process. The media research literature reviewed was often critical of teachers resistance to audiomedia use. It appears, there are personality differences between acceptors and rejectors of media use among teachers.

In their discussion of media utilization by teachers, Walton and Ruck (1975) emphasize the need to "Comprehend more clearly the processes by which media and curriculum become increasingly closely identified with one another in the consciousness and practice of teachers". (p. 57).
This point is also made by Wilkes (1977) who further stresses that "underutilization is often operational in terms of the practical factors inhibiting would be media users such as lack of skill, lack of software and technical factors" (p. 22). It looks like the solution to the under-use of media may well lie within how educational media are perceived by teachers and how they feature in their thinking and how teacher plan for the lesson they teach. It appears, that for attitudinal change and improved use of the media, both educational technology, curriculum reform, and extensive in-service training for teachers are essential. Teachers need to be encouraged to look at the structure of the body of knowledge to be taught as expressed through the media and not illustrated by the media. That is for the media to achieve their full potential, what is needed is teachers to see the use of media in teaching and learning process as the sine qua non. One way to achieve this is through the use of empirical media research evidence by teachers (Wilks, 1977).

Some studies have concerned themselves with researches in the area of teacher education and teacher media utilization problems. For example, De Bernardis and Brown (1946), Hite (1951) and Zimmerman (1958) studied the problems of knowledge and skill needed by teachers to use audiovisual media effectively and the content of courses designed to provide such knowledge and skill. Most of these researchers agree on the basic knowledge and skills necessary to make the fullest use of audiovisual media. They reported however, that many teachers are unprepared to make such use because they lack the necessary training. In his own study Kieffer (1958) concluded that the greatest deterrent to the use of audiovisual media in the classroom seemed to be the lack of funds, while the next greatest deterrent was reported to be apathy or indifferent on the part of teachers.

Schenburg (1960) studies the feasibility of using a set of Chemistry films for in-service education of inexperience and experienced teachers. He found that these films were of particular value to the inexperienced teachers in conveying content and methodology and of equal value to the experienced teachers in keeping them informed of the latest technique. Furthermore, the films contributed materially to both groups in raising the level of science instruction in a very short time.

It is very likely that these and additional studies related to teacher education research provided clues regarding the needs of teachers in affective media use and led to improvement in methods of imparting the necessary knowledge and techniques to teachers.

SELF ASSESSMENT EXERCISE 3

State one problem media research in teacher education solves.

3.1.4 School Administration Media Research

Brumbaugh (1942) and Wait (1953) studied audiovisual programmes in selected Teacher Colleges and concluded that leadership was the most important characteristic necessary to carry out an effective audio visual programme at the local and state level. Hamilton (1958), Hass (1958) and McCarthy and Hartsell (1959) studied the problems of country and cooperative audiovisual programme and made specific recommendations for the administration of such programmes and their most successful execution.

Guss (1952) and Gillingham (1958) studied procedures for evaluation and selection of audiovisual media and made recommendation for improving such procedures. While Murnin and Meer (1955) reported a form designed for use in selection of training media. And Greenhill (1955) developed a film analysis form for use in selection of motion pictures. He also reported that the inertia of Faculty and Administration was the greatest deterrent and reason why teachers do not make more use of audio visual media in their teaching. Hubbard (1960) founded additional obstacles such as lack of equipment, lack of funds for the purchase of materials, lack of building space, including adequate classroom facilities in which to use audiovisual media and equipment, lack of trained audiovisual personnel to assist faculty members in utilizing and producing materials, shortage of materials appropriate for the given grade level and subject – matter, problems of obtaining the correct media at the time when needed and lack of information about sources of media and services.

SELF – ASSESSMENT EXERCISE 4

When media are not used in teaching and learning who should be blamed and why?

3.1.5 Media Production Research

Silverman (1958) carried out a study to determine whether transparencies were more effective in teaching the operation of various weapons to 150 male college students. It was found that, there was no statistically significant difference between the two types of transparencies as revealed in a test performance.

Scarbaugh (1961) conducted a study to determine the best types of graph to use for maximum comprehension, using 25 pairs of graphs and 650 students. It was concluded that bar graphs were easier to understand than line graphs and that figures on the bar elements were easier to read than those on a grid.

The finding of these studies is of assistance to the graphic artists and researchers in designing audiovisual media for effective learning.

SELF ASSESEMENT EXERCISE 5

State the main concern of production design media research.

3.1.6 Testing Instrument for use in media Research

Merrill (1959) evaluated various types of training media. Using different media with 418 students and applied a student response system to plot the results. It was concluded that graphic training media properly used, for presenting instruction helped students respond to the media in descending order in relationship to (1) Information, 2) repetition or restatement of information, 3) questions asked by the instructor, and 4) questions asked by members of the class. In addition Merrill commented on testing procedure for new film research and said that:

1. an adequate criterion for evaluation may be a performance test;
2. results may be baised because of the novelty of the method or the media;
3. considerations should be given to many of the testing methods already established;
4. no statistical significance may be found when comparing various methods or techniques.

SELF – ASSESSMENT EXERCISE 6

What is the value of the past media research?

3.1.7 Economics of Media Utilization Research.

Literature has shown that over the years, not so much empirical studies have been carried out in this area. For instance, based on his study Tosti and Ball (1969) have suggested there is no one best medium and as several media may be equally effective. The final selection between media should be based on external considerations such as cost, availability of media and user preference. On user preference Miller (1969) and Becker (1963) from their findings concluded that strong user preferences for media do not appear to influence learning outcomes and learning situations.

Palmer (1975) in his study on attitudes to learning method in first year undergraduate chemistry suggests that although media comparisons might give no

significant difference in cognitive gain or attitude change to content, the learner‟s attitude to method of instruction may in fact influence learning outcomes over longer periods of time.

According to Rodwell (1978) “Economics of media utilization or cost-effectiveness research of the media have provided very few guidelines for the educator and administrator”. (p. 75). There is therefore the great need of additional research to be conducted in this area in the future.

SELF – ASSESSMENT EXERCISE 7.

Explain in your words your understanding of the economics of media utilization or cost effectiveness that media research seeks to determine?

3.1.8 Media Research on Information

Communication Technology (ICT) literature revealed many questions that research in (ICT) need to investigate and give answer with hard data. These questions were not answered by the past media research.

- What are the learner characteristics that would make learning possible from the new information communication technology media?
- What information is or will be available from the new information. communication technology media that can be communicated better or faster or cheaper than through the printed word?
- From which of the information communication technology source do learners learn better?
- How does electronic learning differ from print learning? Are the two radically different modes of learning?
- What are the conditions for successful teaching and learning with the Information and communication technology media?
- How will (ICT) learning achievements be measured.
- What public policy issues will arise to answer the questions:
    - Who will be ICT disadvantaged?
    - What will lack of knowledge of ICT media mean in this new information age?
    - Can a person be cut off from access to important information?
    - Will our personal identities change with the ability to communicate from our homes, and offices with people from all over the world?
    - Will workforce, workplace, nature of work, nature of training and education change?
    - Will the role of teacher and students change in future? (White, 2008).

Insufficient research evidence on information and communication technologies with hard data based answers to the questions raised suggest that more research needs to be conducted on ICT in future.

SELF ASSESSMENT EXERCISE 8

Identify one area in your mode of learning in NOUN that has changed as a result of your access to ICT media.

3.2 Summary of Review of Previous Media Research

The review of the early research in educational media revealed that experimental media research studies existed in abundance. Indeed, there are over 500 experimental studies of educational media in the media literature. Most of them compared two or more media in order to assess their relative effectiveness. A large percentage dealt with instructional television, the next with film; a considerable number with programmed instruction particularly in the 1950‟s and early 1960‟s; relatively with radio; almost more with textbook and more recently on increasing number with computer assisted instruction. Typically, these studies compared learning from media with learning from conventional teaching without media. The overwhelming conclusion from these studies was that no statistical significant differences were found. When significant differences were found, they seldom agree with other findings on the same problem. Consequently, attempts, to extract generalisable conclusions from these studies failed. The review further showed that a high proportion of the previous studies are not entirely satisfactory in terms of scientific research design, often reflecting inadequate methods, irrelevant hypotheses and wrong questions that dealt with trivial matters. The review in addition revealed a paucity of the theoretical foundation or lack of it. This led to such a haphazard selection of variables in the investigation of possible correlations that are confronted with a mass of fragmentary and isolated research results that can not be interpreted on their own and from which it is impossible to draw any valid generalizations. What is needed therefore, is that tentative theory about the functions that media may fulfill in the instructional process, especially how they may influence human learning. Such a theoretical framework is a necessary prerequisite for the definition of the most promising variables, the generation of sound and relevant hypotheses, and the subsequent interpretation of research result.

Furthermore, the review of previous research in educational media showed that hundreds of the previous studies have been conducted to compare the effectiveness of one medium with another without carefully defining what is being compared. The critical variables like the independent variables were wrongly selected. For example, most research studies used terms like film, television audiotape and slide to mention but these to specify the different media they compared as to their instructional effectiveness. Without defining the media variables in terms of specific attributes which describe in detail the capabilities of that medium. (Rodwell, 1978).

According to Solomon and Snowbery, (1973). The attribute of a medium is “any structural component which has an influence on the kind of media one can present, the arrangement of the media with relation to other media, or the way the media is presented” (p. 230). Examples of these analytical variables are the capacity to show motion, to present separate or simultaneous visual and auditory stimuli, to manipulate temporal and spatial dimensions. etc. These attributes, then, should be taken as variables for experimental studies so that different learning results, for example, are no longer ascribed to the medium “film” but to the media attribute „presentation of a continual motion“. Such a result gives as yet no information about the technical realisation of this attribute. In this case, it could be a film as well as a videotape, a transparency with special effects, such a definition of media in terms of their attributes, however, is a first step only towards a more appropriate specification of relevant variables, like motion against visuals, colour as against black and white or any other attribute.

They may enhance learning only when they are not just an additional embellishment of the lesson presentation but when they serve an instructional function with regard to the specific learning task. For example, the use of motion appears to be effective only when the particular content to be learnt consists of the movement itself and its characteristics or where the content is enhanced and differentiated by the cues provided in the action of the movement (Snowberg, 1973).

It was also revealed that in the majority of the previous media research the individual differences of the learners were not taken into account by choosing appropriate educational and instructional measures. Instead, collective manifestations of cognitive principles were studied. Thus, through the use of undifferentiated average, a virtually heterogeneous group was treated as a homogeneous entity, all eventual differences between individuals are cancelled out in the overall results. This explains the main reason for the overall result of no significant differences, between the learner and the group of learners taking part in the experiment.

In order to make media research more relevant and its result applicable to instructional practice it becomes apparently necessary to acknowledge the importance of individual differences in the conception and design of experiment. Since different students react differently to the same instruction, the use of a specific item of instructional media may be effective for a certain type of learner but ineffective for another leaner with other characteristics. Researchers in educational media should therefore, concentrate on investigating the effectiveness of different kinds of media for different individuals or well defined types of students. Consequently, the learners in media studies must be carefully specified with regard to their aptitudes namely: their special intellectual abilities, learning styles, motivation, age, prior knowledge and situation in which he/she will be doing the

learning. What the leaner must hear and see, and what he/she is expected to understand and remember and the component in the message the media convey and the constraints. This is because each medium places its own form and characteristics round the message, modifying it, often unnoticed, to a surprising extent. The individual learner places his/her own preconceptions and constructs on the message, and interpretes within the conditions of the audience groupings and presentation situation. It is therefore not enough to look at the media and devise uses for them ignoring the individual differences in the users.

It is suggested that gross comparison media research should be replaced with studies considering what media attributes are relevant for learners with what personality characteristics for what kind of learning tasks. This reorientation means that a more precise specification of relevant variables that are suppose to interact, be taken into account in the theoretical framework which should serve as a basis for the design and interpretation of media research. This development is in line with a general shift of emphasis from research into main effects of isolated sets of variables to research into the complex totality of the teaching – learning process. It would then be necessary in future research to analyse media within a coherent theoretical framework in terms of those attributes that can fulfill an instructional function with regard to specific learning tasks and specific learners. (Levie and Dickie, 1973).

SELF ASSESSMENT EXERCISE 9

State one import value of theoretical framework in media research.

4.0 CONCLUSION

In this unit, you learnt about how previous research in educational media was conducted. You have also learnt the short comings of the previous research in educational media and suggestions for their correction in future media research. You also noted that research in educational media is an on going process. You should therefore, think about the suggestions concerning selecting appropriate critical analytical variables; considering media attributes and their relevance to individual differences in the learner and the learning tasks. It is important to allow the variables to interact based on a theoretical framework which serves as basis for correct design and interpretation of the findings. The state of the art in the implementation of all these suggestions in our present research in educational media will form part of our discussion in the next unit.

5.0 SUMMARY

The main points in this unit include the following.

1. The review of previous research in educational media revealed that experimental research studies on media effectiveness existed in abundance. These studies compared learning from media with learning from conventional teaching without media.

2. The overwhelming conclusion from these studies was that no statistical significant differences were found. When it was found; they seldom agree with other findings on the same problem as a consequence, generalization from these studies often times are inconclusive.
3. A high proportion of the previous studies are not entirely satisfactory in terms of scientific research design, often reflecting inadequate methodology, hypotheses and wrong questions. Little attention was paid to individual differences in the learners.
4. The previous media research lack theoretical framework to provide important rationale for research design. Educational media research should select adequate variables, relevant methodology, questions and hypotheses for valid interpretation of results.
5. The shortcoming of the previous media research suggests a replacement of the old methods with new scientific designs.

ANSWERS TO SELF ASSESSMENT EXERCISE 1

No, my choice of medium should be decided by the set objectives for my learning.

ANSWER TO EXERCISE 2

Note taking will distract my attention while learning from film.

EXERCISE 3

It provides clues regarding the needs of teachers effective use of the media

EXERCISE 4

School Administrator should be blamed. Every other obstacle would be removed if School Administrators encourage media use by teachers with effective funding and motivation.

EXERCISE 5

To use new techniques for in media production

EXERCISE 6

It identified areas in which research is needed to be conducted in future.

EXERCISE 7

It determines cost effectiveness in media use.

EXERCISE 8

e – Learning and e-examination

EXERCISE 9

It guides the research and helps in the design of the study and in interpretation of the result.

6.0 TUTOR MARKED ASSIGNMENT

Discuss two shortcomings of the previous research in educational media and their implications

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UNIT 5 PRESENT TREND IN RESEARCH IN EDUCATIONAL MEDIA

1.0 INTRODUCTION

In unit 1, you were exposed to previous research findings in educational media. You now know that in the past decades, several media research studies were conducted. While some of the studies compared the effectiveness of various media in different situations, others determined the best utilization methods for insuring greater learning and retention.

Again, some other researches were aimed at the improvement of teacher education and training, administrative practices and media production which could encourage media uses and its accessibility to the classroom teacher. Still other studies were carried out to improve the design of media that appeared to increase comprehension of facts, concepts and ideas. Finally, some previous research were conducted to determine the best method of designing tests which would accurately reflect the validity and reliability of the instruments in media research.

Without doubt, most of the previous research in educational media were criticized for, lack of theoretical framework, unscientific experimental methodologies and designs that disregarded learner‟s individual differences. Most findings had no significance difference. To correct these lapses, many researches have been conducted.

In the last unit, you had a look into what the previous media research has reported. In this unit, you will be exposed to what the present research in educational media is out to say. It aims at providing you an understanding of the state of the art. After studying this interesting unit, you are expected to have achieved the objectives listed as follows;

2.0 OBJECTIVES

1. Explain briefly the similarities between the previous and present research in educational media.
2 Identify the limitations of present research in educational media.

MAIN CONTENT

3.1 Historical Background of the present Research in Educational Media.

A useful review of the background of the present research in educational media has been given by Balogun (1988). He observes that:

Throughout the world, there are at least four major cotemporary concerns of education. One, the number of people to be educated is increasing and every country struggles to get every child educated. This is the reason for the introduction of Universal Primary Education (UPE) in Nigeria. In most countries, a substantial portion of education is free and compulsory. Also, schooling is continuous even in Nigeria where vacation courses are becoming more and more popular. Yet, there is a dearth of teachers, insufficient buildings and other facilities. The size of the educational industry is widening and it is very much sluggish and resistant to change. A second concern is the fact that more knowledge is required to live a reasonable life today and this knowledge must be accumulated very fast. Apart from this basic knowledge, specialization has become essential. How to acquire all the necessary knowledge and skills in good time and in a usable form is very serious issue that needs to be resolved. A third concern is the survival of the society. Social, cultural and physical survivals of the society compete with the survival of the individual freedom and initiative. Educational institution‟s have the problem of combining a degree of individual freedom and initiative with a degree of social cohesion for survival. Added to this are the world wide influences impinging on the individual and the society, automation and technological advancement that may render one obsolete in his lifetime unless he continues to learn and unlearn.

A fourth concern is finance. Educational system is larger and more complex. Therefore, a large percentage of Federal State, Local Community resources are going into education. The financial plight of those in the free educational state can only be imagined and yet all states have to move towards free education. They have no choice. Throughout the Federation, education ranks second or third and, in some states, first in the allocation of the state funds. Yet it is far from being sufficient to

cope with the problems. The responses to these concerns determine the directions to which the nation is moving. As formal schooling is now a beginning, to inculcate the skills, attitudes and habits of continuous education to enrich life not a terminus. Educationalist and agents of education also lack effectiveness in our education which means the presentation of facts and experiences should lead to valuable and rewarding learning. It means that those concerns must be taken care of by the system of education that is adopted. It also means that the instructional process must be more efficient to bring more education to a greater number of people. Individualization of education has become a very vital part of the responses to the concerns. It is not just mass education but the education of the individual so that he can develop his potentials for his social roles. (pp.77 - 78)

One of the many identified ways of achieving solutions to these concerns is through effective utilization of a variety of educational media. But the critical problem particularly in these days of an increased emphasis on quality education is the unsystematic planning and the non-integrated use of the variety of educational media that would be most effective in enhancing the quality of teaching and learning. It appears that emphasis for improving teaching and learning was on the media while concern for the effective utilization was secondary. The end has been to provide schools with media without considering the needs of the learner who is at the centre of instructional process; performance objectives he/she is to achieve, the method and evaluation plan for achieving the objectives. As a consequence, available educational media were left to lie gathering dust in most school corners, while teachers went ahead teaching, with the chalk and talk verbalitic approach. (Obi, 1992)

The problem of under utilization and unrealized potentials of the educational media has stimulated attention towards the methods for effective use of media rather than on the media themselves. Reflections on appropriate methods for effective utilization of the media has led to the adoption of the systems approach. The systems concepts provides effective ways of utilizing educational media focusing on the individual learner and in the instructional process. It decries the practice whereby teachers make unplanned, unsystematic and unrealistic use of media relying on intuition and experience, but favours effective media use as a planned component of educational technology.

At this stage, it has become necessary to state that educational technology is not only educational media – teaching and learning materials of all sorts. Educational technology is not merely a question of skill in handling tools or gadgets used in teaching and learning, though these are important.

More correctly the Association for Educational Communication and Technology in the United States of America (A.E.C.T.) in 1973 stated that educational Technology is;

A complex integrated process involving people, ideas, procedures, devices and organizations for analyzing problems and devising, implementing, evaluating, managing solutions to these problems involved in all aspects of human learning "(p.6) the purpose of educational technology is to facilitate and improve human learning. The uniqueness and therefore its reason for being lies in the philosophical and practical approach it takes towards improving human learning. In this approach educational Technology synthesizes three concepts namely:

1. The use of a broad range of educational media for learning.
2. The emphasis on individualized and personalized as a focus.
3. The use of systems approach as an intellectual and operational tool to facilitate and improve human learning.

Implicit in the systems approach are:

1. Assessing the needs of the learner, identifying his or her age, ability, experiential background, learning style, numeracy `level, literacy level, motivation and the situation in which he will be doing the learning.
2. Identification of the lesson topics, analyze subject content tasks relating to the selected topics stating measurable learning objectives in terms of the subject content tasks.;
3. Specifications of the conditions for the achievement of the set objectives, indicating appropriate methods and media in the light of the components in subject contents message to communicate, analyzing what the learner must hear, see, touch, and feel, what he or she is expected to understand and remember.
4. Considering the constraints and alternative solutions, selecting from among the alternatives.
5. Implementation of the chosen solution.
6. Evaluation of the result against stated objectives and.
7. Modifications of the system utilizing feedback to correct deficiencies (Ely, 1972) (Heyer, 1972)

When educational media are used in these systems steps or educational technology principles, (Brown, Levis and Hardcleroad, 1973) assert that "such use of media will increase the probability that students will learn more and improve the performance of the skills they are expected to develop." (P. 18). (Rockwell, 1978) observed; by using educational media within theoretical rationale media values and abilities interact and intensify each other to integrate the support that learning must have within the whole area of communication which emerged fully resulting in increases in the depth and quality of learning" (P. 58).

Educators with a growing lack of confidence in large group instruction have begun to experiment with applying the systems approach or educational technology to teaching and learning. As they do so they have the growing faith that individualization of instruction is the sine qua non for effective learning.

Edling (1968) posited that: the major purpose of individual and small group of learning must be in the development of the individual to pursue his own paths to learning, to develop a critical and analytical mind, and to evolve a confident, balanced personality able to adjust or adapt to changing circumstances. (P. 48). In view of this, media use has shifted from a product to a process approach. Emphasis is no more on just providing a broad range of media to schools as aids to teachers but also the increased learning and retention derived from their use by learners. The onus of instruction has visibly tended to shift away from larger class group of learners to individual learners. It was in this probing situation that individualization of instruction has brought a new era of media research and development, otherwise, called achievement treatment interactions and trait treatment interactions, which concentrates on the effects of the interactions between learner characteristics and media variables.

In the light of the foregoing, several research in educational media have been conducted within and outside Nigeria. In the next section you will be exposed to some of the present research in educational media conducted outside Nigeria.

SELF – ASSESSMENT EXERCISE 1

State one concern of education that led to the present research in educational media.

3.1.1 A review of present Research in Educational media outside Nigeria.

A number of investigations reflect the present trend in research in educational media. The flaws in all the experiments in the previous research were a failure to ask appropriate research questions and to use the correct experimental research designs, and any tests of statistical significance. The defects also included lack of provision for the individual differences in learners, the absence of control of variables administratively and statistically, and lack of a theoretical framework.

The present trend in research in educational media is using improved scientific experimental design, a test of significance, posing the right research questions and formulating correct hypothesis, accounting for individual differences in learners, adequate control of variables and having the study to be guided by a theoretical framework. To avoid lengthy review we shall deal only with the conclusions derived from these present researches in educational media by relating to any of the components of media research reported in media research literature.

Power (1971) noted that the use of charts, filmstrips, motion pictures and television in schools was based on a number plausible assumptions such as: the superiority pictures over words, the value of realistic representations, the effectiveness of transmitting information to students through many channels, and the positive relationship between media and learning. You will be exposed to media researchers endeavours which suggest some of the limitations of these assumptions that can encourage research in future.

The view that visual illustration is superior to verbal description finds its commonest expression in the statement "a picture is worth 1000 words." To test the validity of this statement and answer the question of whether a picture evoked more "sense impression than a word. OHO and Briton (1965) conducted an experiment on sense impression responses in a rural area in the United States and concluded that pictures were less effective than words for children involved in the study".

Bourisseau, (1965) replicated this study in some schools in urban Cleveland in USA and concludes that pictures may in some circumstances be more restrictive than words in eliciting sense impressions. He asserted therefore, that a recommendation to use pictures as teaching aids on the grounds that they have some superiority over words was based more on faith than on facts.

In addition, support for the use of visual media has frequently been based on the assumption that the more realism there was in the learning situation the greater the probability that learning would be facilitated. Some textbooks publishers and film producers have been prominent in its application to their products. However, the gap between practice and the findings of research is so wide that empirical clarification is essentially needed. To address their problem, Dwyer (1968) in his experimental study entitled "The effectiveness of selected illustrations on physiology of the heart." tested the value of realism as an aid to learning. Results on his post-test showed that the third group which viewed the abstract line drawings learned more from the presentation than any of the other groups. He then concluded that the effectiveness of different types of pictures depend on the teaching objectives.

In a later experiment that used same subject matter and a similar sample size, Dwyer (1969) measured the effectiveness of eight types of visual illustration in improving student achievement of five different objectives. The illustrations varied along a continuum from abstract to realistic and each was produced in black and white colour. Achievement of the teaching objectives was measured by

1. A drawing test which evaluated the ability to locate different patterns, structure and positions of parts of the heart.
2. An identification test which measured the ability to identify numbered parts on a diagram of the heart.

3. A terminology test which measured knowledge of the terms for specific symbols.
4. A comprehension test to measure understanding of the parts and internal operations of the heart.
5. A total criterion test to measure "full understanding" of the concepts taught.

The post test result showed that no one type of illustration was most effective for all five objectives. An abstract line presentation was most effective in promoting achievement on the drawing test; while a coloured photograph of a model of the heart was best for facilitating learning of the objective measured by identification and total criterion tests. The most realistic illustration coloured photographs of the heart, did not promote significantly higher scores on four of the five tests, the drawing test being the exception than a control group which merely read a test.

Dwyer concluded that failure of the more realistic picture was based on the amount of detail in the pictures distracted attention from the cues that were relevant learning. This conclusion is interesting but not surprising. The relationship between this finding and the views of Gestalt psychologists on the ways we perceive is important and deserves to be investigated in failure. Furthermore, these conclusions ought to bring relief to teachers who feel that the time and standard of drawing skill required to produce effective visual media is beyond their sources. Simple line drawings appear to be powerful media to learning in appropriate situations. Line drawing is considerably superior to much commercially produced media.

Later, Dyer (1978) experimented on strategies for improving visual learning and assert that there was an increasing amount of empirical evidence to support the use of colour in visual illustrations as evidenced by improved achievement of specific educational objectives.

Wilson (1981) in his work design of printed educational media indicated that the generous use of open space in printed educational media is a necessity for aiding comprehension. He also added that there is reader preference for double column format on a page.

Levin (1983) studied pictorial strategies for school learning and observed that inclusion of pictures in printed material can substantially improve learning.

Wilkes (1977) studied under-utilization of audio visual aids. Evidence from History Teachers in Northern Ireland revealed that operational technical constraints on using audio-visual media appear to have diminished over recent years. Nevertheless it is clear that training in techniques of operation is still desirable. He also noted that the variety of types of audio visual media available remained unexploited. Stating further the author stated that many teachers are reluctant to use educational media

and many desired to train. He asserted that teachers will not use media frequently unless they can see a clear return, in terms of greater examination success and more interested controllable students. He observed that the pedagogy of any subject is governed by teachers convictions about how it can be taught to meet those criteria for success. Therefore, he said that the breakthrough will come, from a conviction among teachers that history is to be taught and examined on new bases, for which the use of media is a sine qua non. He reasoned that it is the thinking teacher who will be instrumental in changing the pedagogical paradigm which now shuts out media in the instructional process.

The removal of technical and organizational barrier is important, but subordinate to a change of thinking about the subject. Educational Technologist will be needed to work closely with subject specialist, first to make plain the pattern of relationships between historical study, historical teaching and audio-visual media and then to guide teachers into the practicalities of using media more extensively.

At this stage, we will extend our media research review to the next section. But before then answer this question.

SELF ASSESSMENT EXERCISE 2

Give a reason why NOUN invest on the technique of producing a study guide with lines of same length.

3.1.2 A Review of Present Research in Educational Media within Nigeria.

Iwo (1978) investigated the physical facilities including storage availability of materials and equipment, financial issues, skills of the teachers, teachers‟ perception of student‟s attitudes to the use of audio visual materials in their lessons and other aspects in some selected teachers‟ colleges in Kano city. He found that the teachers were aware of the importance and value of audiovisual materials in their teaching but basic problems constituted obstacles to their use of such materials. Some colleges were on temporary sites, where facilities and space were extremely limited.

Ibiwoye (1980) on an exploratory study of the learning environment: A case study of the Zaria local Government Education Authority Schools found that most of the schools were overcrowded, seats were not enough; medical care was far from being sufficient and there were no instructional materials.

Ike (1980) did a survey of factors affecting the use of instructional materials in the classroom. Teaching in schools and found that the teachers did not have the skills and instructional materials were available. Where there was a media specialist, there may be no money or the specialist is told what to do.

Obi, (1992) determined experimentally the effectiveness of multimedia approach on students achievement and retention in secondary school economics in Enugu State and found that there was a statistically significant difference(P φ 0.05) in the post – test achievement and retention scores of the group exposed to multimedia approach economics instruction with the experimental group performing better than the control group. There was a statistically significant difference (p φ 0.05) in the post test achievement scores of high, middle and low ability students exposed to multi-media economics instructions with experimental group performing better than the control group. For retention test scores, however, there was no significant difference. There was no significant interaction effect between media of instruction and ability of students for both achievement and retention test scores.

Onuebunwa (1999) studied instructional media in environmental education and concluded that instructional media can be successfully used in improving environmental education. The silent point is that the role of instructional media in environmental education hinges on presenting as vividly as possible the inherent dangers of unfriendly environmental practices while encouraging practices that are environment friendly taking into consideration the diversity and peculiarities of the target audience.

Orji (1999) studied the internet and its educational implications and found that information dissemination is moving rapidly from printedbased materials to digital formats such as CD-ROMS, diskettes and the internet. The internet makes it possible to obtain information quickly, efficiently and cheaply by removing the time, cost and distribution restrictions inherent to printed matters. Although relatively new, the impact of the internet in the education sector is onerous. Millions of lecturers and students log on to the internet daily searching for books, academic journals, magazine and general information of interest to update their knowledge. To connect to the internet, one needs the PC that is internet ready, a telephone line and an internet service provider (ISP). The future use of the internet is limitless. Evolving areas include the virtual classroom, distance learning and flexible learning where a student can decide not to be physically present in an institution and yet receive lectures. At this time of dearth of books, current journals, other non-print materials and the decaying infrastructures in our institutions, the need for internet services is very important for you and me.

It should now be clear to you that research studies such as these emphasize the numerous factors which are pertinent to all those involved in the use of media in teaching and learning situations.

SELF – ASSESSMENT EXERCISE 3

Identify one factor that is relevant to you as a user of media in learning situations.

3.2 Summary of Review of Research in Educational Media.

What does become clear from a consideration of the educational media research evidence pertaining to the use of educational media is that it is a very complex field. It is not only complex in terms of the equipment which one must master or the processes one must understand, the choices and decisions one must make for the benefit of the learner, but also in terms of one‟s own approach to education and one‟s own role as a teacher. By using educational media within a theoretical rationale, their abilities to interact and intensify each other, to integrate the support that learning must have within the whole area of communication can emerge fully. The resulting increases in the depth and quality to the greater efficiency that educational media offer, but also to the enrichment and variety that they bring to the learning situation.

You can understand that in the research in educational media we reviewed, the question so characteristic of most previous research was which medium was more effective than the other. Later research in educational media were replaced with studies considering what media attributes are relevant for what kind of learning tasks.

This reorientation did not just mean a more precise specification of relevant variables. Different variables rather interacted and these were taken into account in the theoretical framework which served as a basis for the design and interpretation of research in educational media. It was then necessary to analyze media within a clear theoretical framework in terms of those attributes that fulfilled an instructional function with regard to specific learning task for specific learner. On the basis of the results of educational media research reviewed, the next module which is module 3 will deal more directly with the theoretical framework for research in educational media to give validity and meaningful results as well as serve as the important rationale for use of a variety of educational media in the instructional process. But before then let us discuss the future trend in Research in Educational Media in the next unit.

SELF – ASSESSMENT EXERCISE 4

Which research evidence is applied in the use of colour in Noun study course materials?

4.0 Conclusion.

In this unit, you learnt the state of the art in the present research in educational media outside and within Nigeria. You have also learnt that the flaws that characterized previous research such as: which medium or media attributes were better than the other were replaced by studies considering what media attributes are relevant for what kind of learning tasks, interaction of various variables within a theoretical framework as basis for valid design and results. Consequently, the

greater efficiency that educational media offer and the variety that they bring to the learning situation interacted and resulted into increase in the depth and quality of learning maximized by the learner.

5.0 SUMMARY

The main points in this unit include the following:

1. The short comings of the previous research in educational media have been replaced with satisfactory research designs.
2. The present research in educational media considers what media attributes are necessary for meeting learning tasks for specific learner.
3. The conclusions from the present study are characterized by statistically significant differences indicating existence of individual differences and directions of effects of treatment.
4. All the educational media research categories seemed to need additional research emphasis in future particularly the newer electronic information communication media. It is the future needs of research in educational media that we shall turn our attention to discuss in the next unit.

ANSWERS TO SELF ASSESSMENT EXERCISES

EXERCISE 1

Individualization of instruction utilizing a variety of educational media.

EXERCISE 2

Educational media research evidence supported the effectiveness using all text tines of same length in print media.

EXERCISE 3

Cost. Without paying for the cost I will be denied access to media use in the learning situations.

EXERCISE 4

The effectiveness of visual illustrations experimentation support the use of colour in visual illustrations as evidence by improved achievement of specific educational objectives.

6.0 TUTOR – MARKED ASSIGMENT

Go through this unit again critically and clearly indicate those areas already well researched and those needing further study.

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UNIT 6 FUTURE TRENDS IN RESEARCH IN EDUCATIONAL MEDIA

CONTENTS

.

1.0 INTRODUCTION

In unit 2, the present trend in research in Educational media was discussed. We agreed that the characteristics of most previous research concern which medium or the media attributes that are better and more efficient than the other. This proved unproductive and therefore the present research in educational media replaced it by studies considering media attributes relevant for learner personality and characteristics for different kinds of learning tasks?

It is hoped that you gathered that great strides have been taken in educational media research field. You may recall that our review of media research literature revealed that research in educational media seem to cluster around specific areas. The present research in educational media indicated those areas already well researched, they are comparative effectiveness, classroom use, teacher education, testing, and administration. In this unit, you will learn those areas in media research that need further study. If experience should teach you anything, it is that progress in media research comes in relatively modest increment and usually through handwork and dedication. As a corollary to this observation, you are expected to be motivated to incorporate dedication and hard work in your study of this course material so that you will be guided to make effective choice of your future research topics.

2.0 OBJECTIVES

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

1. Explain the future trend in research in educational media.
2. Discus the steps to ensure effective expansion of the media to be used in school in future.

3.0 MAIN CONTENT

3.1 Future Needs in Research in Educational Media.

Media literature revealed that many studies were carried out some years ago within and outside Nigeria. A large portion of the research on educational media has treated comparative studies relating to the use of specific media as compared with conventional teaching methods. In a small number of studies, a particular aspect of media presentation has been controlled or varied in order to determine the effect on learning of that particular factor. (Kemp and Dayton, 1985). The majority of the

media research conducted were concerned with variables relating to motion pictures design and production factors. These include such topics as format, camera angles, use of colour, and special effects, narration and music. Many of the results apply to video recordings, sound-slide, filmstrip presentations and to multi-image programmes.

In addition there has been a sizeable research effort concerning preparation of printed media. Only a few of the conclusions reached were questioned or restated in recent years. It is noted that the reports provided evidence that serve as guidelines for most media design situations. Similarly, majority of the research was directed at classroom use of a variety of educational media.

Summaries of the research findings were prepared by a number of writers. However, from the earlier writings and the more recent ones, there seemed to be adequate media research dealing with motion pictures in the areas of comparative effectiveness, classroom use, and product design.

All other areas in the media research categories need additional research as emphasized in (Kieffer, 1965; Carton and Erickson, 1959; Kemp and Dayton, 1985 and Heininch, Molenda, Russel and Smaldino, 2002). The reviewed media research literature in addition showed that more research should be conducted in the following areas:

A. Comparative Effectiveness

- To determine the relative effectiveness of self-instructional media as compared with other types of media, used singly or in combination.
- To investigate the difference in perception between a still picture shown to students, and projection of the same picture as a slide and/or via television, computer etc.
- To analyze the comparative effectiveness of language laboratories having listen – only, listen – respond, or listen – respond – record features.
- To identify the specific contribution of various media and evaluate their effectiveness when used in various combination such as in multimedia approach.

B. Classroom Use

- To determine the particular knowledge, skills and abilities which need to be taught in specific subject-matter areas and to identity particular media that are most effective in teaching these knowledge, skills and abilities (cross-media approach.
- To investigate the relative effectiveness of continuous teaching – learning situations. It is essential to discover how media, environment and the human factor blend into learning experience for the learner. This is even more important than the concern for whether the course content is channel by any

medium like tape recordings, television, computer, internet, films which seem to make little essential difference to learning.

- ❖ To examine the role and contribution of the classroom teacher while using various media including teaching machines, television, radio, computer, internet, multimedia, gross media approaches and the web etc.

Similarly, future research should also find ways in which educational media can relieve some of the pressures from the functions of the teacher such as in presenting a logically developing sequence information; reinforcement of information either by repetition or by presenting information in alternative forms; establish a healthy relationship with the learner and class; and a capacity to cope with the problems of individual students as well as cope with individual differences existing in the students. This is because future strain within the educational system will be greater than human resources alone can overcome. In other that the educational media may accomplish such functions, the principles of instruction must be applied in the design of methodology with the analysis of objectives and the procedures by which objectives are achieved. In addition, if the educational goals are to be achieved when information is presented via the media, estimates of methodological effectiveness must be derived which clearly indicates the ways in which presentation should be modified to cater for the major educational needs. It should be noted that current techniques for the evaluation of media, however, offer little indication of their value. (Bagg aley, 1973).

Apparently, attainment scores and attitude ratings describe presentation effects alone, leaving us to guess at the variables responsible in order to establish current levels of effectiveness and to ensure their subsequent improvement. Cause and effect must be identified with equal certainty by future experimental media research.

- ❖ To conduct future media research to analyze the rationale for teachers, use of educational media in teaching. Since all teachers do not embrace the use of educational media particularly the new media with equal enthusiasm, it is essential that future media research examine teachers rational for use of media misguided conservatism.

C Teacher Education

- ❖ Future research in educational media should identify the types of audiovisual competencies which are needed by practicing teachers at various school levels, class levels and different subject – matter areas.
- ❖ To determine which of the above competencies are being taught in preservice teacher training and in what sequence.
- ❖ To investigate the nature of in-service teacher education programmes designed to teach and/or reinforce audiovisual competencies.

- ❖ To establish a standard to competences needed by specialized teachers, such as television teachers, language laboratory instructors, computer, internate teachers and production technicians and others.

D. Administration

- ❖ To determine the types and extent of service needed from audiovisual centres in various schools and communities.
- ❖ To investigate the administrative structure of various audiovisual programmes and to determine the most productive staff-line relationships between the audiovisual specialist and the other professional staff.
- ❖ To examine the implication of class size, length of class periods and sequence of content on the extensive use of new media in various subject matter.

E Production Design

- ❖ To establish standards of performance for various types of audiovisual media to meet optimal educational needs.
- ❖ To pretest styles of research into media presentation ie. pre-test, and post-test, and student attitude surveys offer no conclusions until specific media have been produced and then provide little information that may be used to revise presentational methods. Besides, no evaluative technique in current usage provides information of guaranteed predictive measure of value in media development. Future media design research should be conducted to produce predictive measure of value in media development.
- ❖ To analyze the relative significance between in – classroom projected with standard equipment, and other systems like closed circuit television and rear screen projection.
- ❖ To investigate the teacher use and acceptance of total courses programmed with new media such as film, television, computer courses, related to smaller units of closely related materials.

F. Testing

Future research should develop tests which would determine an individual‟s relative sense acuity and corresponding psychological composition, thereby identifying the most effective method of individual instruction

- To determine the types of learning situations in which various experiences are as beneficial to the student as real, firsthand experiences.To investigate the relative recall value of vicarious versus real experience.

G. Economics of Media Utilization

- To analyze the relationship between the cost of educational media production and services and their educational outcomes.

- To determine the relationship between cognitive gain and learners attitude towards content and method of instruction essentially as this has not been explored in any great depth.
- Explore personality differences between acceptors and rejectors of educational media.
- Investigate the processes by which media and curriculum become increasingly closely identified with one another in the consciousness and practice of teachers.
- Investigate the practical factors operational in abuse and underutilization of educational media in the educative process.
- Investigate how educational media are perceived by teachers and how they feature in their thinking and organizational plans. (Rodwell, 1978), (Baggaley,1973).

H. Information Communication Technology

Future research is needed in Information Communication Technology electronic media to:

- Establish baseline data to make comparisons in the future
- Determine the conditions necessary for learning communication technologies ranging from television to cable, videodisc, teletex, videotext, computers, internet, satellite, computer based on technologies, fibre optics, etc.
- Establish how electronic learning differ from print learning.
- Explore what the conditions are for successful teaching with the new technologies.
- Examine how our lives will be changed as a result of the new Information Communication Technology.
- Evaluate what is good instruction in electronic learning and
- Ascertain what public policy issues are likely to arise from the answers to these questions; who will be disadvantaged technologically? What will inability to use the new technologies mean to a person or learner in the coming informating age? (White, 2008).

It may interest you to know that dissemination and utilization of research findings are as important as the conduct of research itself. As a result, you will learn steps in ensuring expanding future use of educational media in schools in the next section.

SELF – ASSESSMENT EXERCISE 1

Identify one research topic that will enhance pre-service teachers‟ competencies in use of educational media in teaching.

3.2 Steps in expanding future use of media in schools.

In the last section, we discussed the future needs in educational media. It is hoped that you have learned that media studies were carried out a few years back in the

areas of comparative effectiveness, classroom use, teacher education, school administration, production design, testing, economics of media use and Information communication technologies.

However, all these areas need additional research emphasis. In the last section, a listing of such used research was made. It is important for you to know that the list is only suggestive of areas in which more research must be done to enhance effective use of media in teaching and not exhaustive. In this section, you will learn the steps to ensure expanding future use of media in schools. The steps include: dissemination and use of research findings, establishment of media centres, adequate financing of educational media programmes. We shall discuss them one after the other.

(i) Dissemination and use of Research Findings

In the foregoing units of this course material, you probably noticed that several references were made of previous and present studies conducted in educational media. It was possible for us to make reference to those research findings because the researchers disseminated their findings. Through published textbooks in Audiovisual, Journals of Audiovisual, seminar, workshops and conference papers. The above paragraph has said almost everything about the term "dissemination" if you are now asked to define dissemination, can you do so? I believe you can. You are right if you say that dissemination is to distribute or spread widely research findings or research results or evidence.

It is necessary for you to know that research findings on media, no matter how valid, will be of little value until they are disseminated or distributed widely to the public. Teachers, school administrators, educational technology experts, media specialist, media centres and classroom practice need information. Dissemination of media research findings and utilization of research findings are as important to educational improvement as is the conduct of research itself.

You may be aware that education is a process, not an event, and with each passing generation research evidence adds to the knowledge for its improvement particularly by use of educational media. For example, with disseminated research findings teachers are guided to make the most effective use of educational media in the classroom. A teacher, for instance who had read the results of research studies concerning the most effective methods of utilizing the classroom film realizes that he or she will make use of those research conclusions in his or her own use of the educational films. Such conclusions include Teacher introduction and class preparation, when using classroom film result in significantly more factual information learned that would be the case with such introductions. Again, introductions have a motivating effect upon all parts of the material to follow, but a greater effect upon those parts specifically covered to mention but these. (Allen,

1975). Similarly, school heads need media research findings concerning the effectiveness of various types of educational media and their utilization techniques to enable him or her provide the physical facilities for media use in the school. Besides, he or she with knowledge of research findings and their application in the learning process can create enabling school climate and motivate teachers and students use educational media with confidence. Furthermore, universities and colleges of educational should make use of media research evidence regarding the knowledge and skills that a teacher should possess. The use of media in the teaching of knowledge and skill to pre-service and in-service student teachers are important factors in educational enterprise. It is media research findings that guide media producers with techniques which can be implemented into better production of educational media for use in the instructional process.

(ii) Establishment of Media Centres.

The media centre is the place used for the storage, supply and utilization of educational media which have been organized into an integrated collection of a variety of media such as print, auditory, visual, kits, games, devices and special settings like carrels needed for use of media. It is also called learning resource centre. The media centre contains all the records of the media and equipment obtained by a school or a system, here media and equipment are housed. All aspects of distribution, maintenance, repair, cataloging and inspection are carried out in the media centre. Often facilities for teacher made or locally produced media are located here. Such facilities include drawing boards, paper, transparent materials, tape-duplicating equipment, photographic equipment, and other similar materials and equipment. Most media centres have facilities where preview committee can preview and audition new media and locate sources of the most up-to-date films, filmstrips, slides, records, tapes and other instructional media. Here too, teachers, students, supervisors, and administrators can meet and receive service and professional assistance and as well learn how to operate various types of equipment. They can learn at first hand, their advantages and limitations. (Kieffer, 1965).

To encourage media use, the media centre

(1) Informs teachers and others about available media and services through phone calls, memoranda, and personal contact with individuals and small groups informal methods. Formal methods include demonstrations, conferences, workshops distribution of periodicals literature and media catalogs and similar types of activities.

(2) Trains teachers in media use, giving them insight into the advantages and limitations of each specific type of media.

(3) Supply teachers with media and equipment. This is to make teachers become confident that media and equipment will be available and operate at the time and place of need. Without such confidence, teachers will resort to simpler, less effective teaching techniques they can afford readily.

(4) Production of media and procurement and use of commercial produced media.

(5) Assist teachers and students to analyze their teaching problems and in suggesting methods and techniques for solving these problems. Indeed, the media centre director should through personal contacts with teachers, develop in them the ability to analyze teaching problems and to select methods and techniques for their solution. This will eliminate the necessity of continuous conferences for each teaching – learning problem as it arises.

(6) The media centre reports progress and future needs to the School Administration for evaluation of the status of programmes and the amount of financial support needed. Such report should reflect teachers and students needs and have teacher‟s active support. This is because effective audiovisual media programme belongs to the teacher, not to the director.

(7) A good media central audiovisual programme is one which cuts across all aspects of the school system‟s operation including administration, maintenance, and teaching. The director must work co-operatively with others in planning new facilities, installing and maintaining of electrical and electronic equipment, organizing and conducting in-service educational experiences, and a host of other activities. Without such co-operative the media centre programme may become entirely isolated from the main educational and administrative stream.

(8) Evaluating – constant subjective and objective evaluation is necessary to determine the effectiveness of media centre programme.

(iii) Financing the Media Programme

The operation of a media programme is a relatively expensive venture, but the values received are well worth this expenditure. With the advent of automation and technology in education, it is obvious that the amount spent in the past will appear to be only a drop in the bucket as compared with the large sums of money needed for instructional television, teaching machines, language laboratories, computers, internet services, satellite cast transmission and other electronic tools in the future.

Budgeting therefore is essential. Budgets are used to identity needs and to control expenditures. An audiovisual budget for any school year should reflect not only the type and amount of support needed for that year but also wise planning and consistent progress towards long-range goals. (Seaton, 1984).

You may be aware that the media will contribute few solutions to our main educational problems until dissemination and use of research findings, establishment of media centres and financing of media programmes, and other criteria for their effective use have been developed. (Baggaley, 1973).

This section will bring us to the end of this unit. This unit has provided you a through knowledge of the types and content of various educational media research studies and the understanding of the state of the art. You have also been given direction to better and more comprehensive research in the future. At this stage activity rather than passive learning is expected of you. Your activity in media research starts with a theoretical frame work that will be discussed in the next unit. Get ready for it with a surge of excitement. Before then answer this question.

SELF – ASSESSMENT EXERCISE 2.

Give reasons why one rarely see media in use in our classrooms.

4.0 CONCLUSION

In this unit you have learnt future trend in research in educational media with emphasis on needed research in educational media in future. You have also been introduced to the steps in expanding future use of media in schools. You now know that without research in educational media, dissemination of the findings and the utilization, establishment of media centres and adequate financing of media programmes, media use will not be effective in our educative system. Consequently media will contribute little solutions to our educational problems.

5.0 SUMMARY.

The main points in this unit are:

1. Adequate research in educational media have been conducted and reported in the literature, but some areas need additional research emphasis.
2. Various steps like, dissemination and use of media research findings, establishment of media centres and financing the media programme are essential in expanding future use of media in schools.

ANSWERS TO SELF ASSESSMENT EXERCISE

EXERCISE 1

Example is: The investigation of problems and skills needed by preservice teacher to use educational media effectively and the course contents designed to provide such knowledge and skills in Noun.

EXERCISE 2 –

Noun or little financing of media programmes.
Lack of media centres
Non implementation of media research findings.
Lack of teacher utilization skills etc

6.0 TUTOR MARKED ASSIGNMENT

Identify 2 possible future research needs in 2 information communication technology.

2. Discuss one step you may take to expand future media use in schools.

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MODULE 3 THEORETICAL FRAMWORK AND RESEARCH PROCEDURE IN EDUCATIONAL MEDIA

UNIT 1 LEARNING THEORIES

1.0 INTRODUCTION

In the previous Unit , we discussed future trends in research in educational media. There we were made to understand that more research should be conducted in future. Fundamental to future research in educational media is the psychological basis of learning with a varieties of theories of stimulus – response, cognitive theory of learning and social learning behaviourstic theory, which provide the general principles of learning that serve as frameworks within which media research experiments could have validity and meaningful results. (Coppen, 1972).

The learning theories fall into three major families namely: stimulus – Response, Cognitive and social learning theories. In this unit, you will be exposed to a review of the three major theories. After studying this unit, you are expected to have achieved the set objectives below.

2.0 OBJECTIVES

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

1. Explain what learning theory is using your own words.
2. Identify the behaviourist and cognitivist differences on perspective on learning
3. Identify at least two general principals emphasized by the learning theories that can provide frameworks for media research.

3.0 MAIN CONTENT

3.1 Stimulus – Response Theory of Learning

According to Obi (2001) Edward Thorndike Pioneered the stimulus – Response theorists‟ efforts to understand learning of animals by performing experiments on cat in the puzzle box in 1898. In the experiment, a hungry cat put into a puzzle or problem box was placed near an Odoriferous fish (food stimulus) was able to make the cat pull a string of the box (response) in order to obtain its freedom to have access to the food outside the box. Over a series of successive trials, the cat became increasingly efficient in getting out of the puzzle book. Thorndike concluded that what made the cat learn how to open the box was the strength of the bond connection or association that existed between the food (Stimulus) and the cat‟s pulling of the string (response). He emphasized that the basic unit used for describing behaviour was stimulus – Response (SR) connections. He proposed that all learning involves the formation of new stimulus – response connections. He emphasized two important factors for learning to occur: One is that the cat should be hungry, meaning that there should be some motivation in the cat for learning and the second factor is that food is also ready to satisfy the hungry cat. Thorndike gave the concept of reinforcement, the idea that learning occurs when response produces a

particular kind of event like satisfying state of affair. Thorndike evoked some basic laws of learning like law of effect, law of exercise, law of readiness; and some principles of learning such as the principles of multiple response, mental set, partial activity, assimilation and associative shifting.

Heinich, Molenda, Russell and Smaldina (2002) gave account of Skinner end of connection made up of a variety of educational media carrying the message containing instructional content that is transmitted to the receiver (the learner) during communication process. (Oguranti, 1988). Within this view Rowntree (1974) defined educational media as "vehicle carrying the stimulus mode to be presented to the students (p. 103). These media were identified also as information carriers employed in Instruction, namely: television, radio, teaching machines, textbook, computers, models, pictures. (Agun and Imogie, 1988). The media serving as stimulus mode are identified as: Realia: These are real things, people and events.
Pictorial representations which consists of pictures and diagrams, realistic or symbolic, still or moving images, drawings, graphs, charts, maps used to overcome the shortcomings of the real things. A great many media are capable of presenting the stimulus mode of pictorial representation which include still photographs paintings, maps, charts and graphs can be made large enough be display on a wall or projected on to opaque, slides, filmstrip. They may be used along with other modes in the pages of a book, on the frames of a teaching machine, programme, on a work land, the sleeve of a gramophones record, on an overhead transparency projections.
Verbal and non-verbal human interaction
Written symbols in speech, music and natural noises (Rowntree, 1974).

The responses refers to the behaviour of learners" acquisition of skills to write, read, calculate, development of attitudes, beliefs, values and cultural milieu. Each specific reaction is an exact response to a specific sensation or stimulus – spoken words and written words, etc. much instruction is of this stimulus – response type. This concept is implicit in the programmed instruction approach introduced by Skinner. The emphasis here is on the learner and the correctness of his/her response to questions as the instruction proceeds. In programmed instruction, each sequence of learning is broken into small steps, requiring an appropriate response to each item followed by immediate knowledge of results (known as feedback). If the response is correct, the knowledge is a reinforcement, a rewarding recognition of each correct response. Much of the attention being given to individualized learning follows this Patten (Kemp and Dayton, 1985).

The teacher presents instructional messages utilizing a variety of educational media to bring about these charges in the behaviours of learners either separately or together in a multi-media model learning. Thus, since almost all educational courses involve a several kinds of learning and since many forms of stimuli are needed to

provide the specific instructional events for all objectives, most courses of instruction will require different media of instruction, hence a variety of media or multimedia Approach should be used. (Coppen, 1972)

SELF ASSESSMENT EXERCISE I

Mention one impact of S – R theorists on teaching decisions today in Nigeria.

3.2 Cognitive Theory of Learning

In the last section, you learnt the S – R – theory of learning. It is hoped that you understood that the behaviourists rely solely on observable behaviours. As a result, they are more comfortable explaining relatively simple learning tasks. As a result of their position, the behaviourists have limited application in designing instruction for higher level skills. For example they did not make inferences about how learners process information, where as this is helpful in designing instruction that addresses problem solving skill the cognitivists did. In this section, you will learn the cognitive theory.

The cognitive theorists rejected the idea that learning consists of making responses under the control of stimuli. They maintained instead that learning is a purposive activity influenced by stimuli but not conditioned by them. In which a person acquires insight into relationships. To gain insight into a subject matter, the cognitivists believed one must see it in relation to another person by presenting multi-media consisting of larger frames (Uwin and Macleese, 1978).

In the final analysis congnitivists see learning as a function of an organism having a cognitive holistic view or survey of a problem situation thereby seeing the relationship between one item and the other in the problem situation. It is this perceived relationship by means of a variety of media; which leads to the formation of gestalt which gives meaning to the perceived problem situation and which eventually leads to insightful learning and problem solving. The experiments with apes illustrated the effect of insightful learning that is associated with the kind of learning associated with the Eureka experience.

However, with the S – R and cognitive theories of learning handed down to the later generations of psychologists new trends of theories emerged. The theories include those of Piaget, Dewey, Bandura, Bruner, Gagne and Ausubel, who have tried to interpret and modify these theories to suit the demands of the modern age in the field of education. Of these six theorists we will examine that of Piaget.

Piagetian Theory of Learning

Many scholars in psychology and education base their research on Piaget‟s stage theory of cognitive development. Cognitivists presented a systematic analysis of the genesis of human intellectual development. Piaget‟s major objectives were directed

precisely to find out how children think and reason. The theory of human intelligence was a radical departure from the predominant stimulus – response theory of the 1930s. So far the developmental theory seems to be the most logical explanation of the processes involved in the growth of human thinking, knowledge and intelligence. (Onyehalu, 1988).

To the cognitive psychologists, learning is perceived as an interaction between the learner and the environment or the physical world. While cognition is a gradual and developmental process. Cognitive achievement is influenced by several factors such as organic maturation, past experiences, genetic inheritance and the quality of the environment. (Obi, 2001).

The cognitivist, argues that an organism tries to establish an equilibrium or balance between itself and the environment in which it operates, and in trying to do this, the organism generates some relevant intelligent behaviour. These behaviours not only help the organism to achieve equilibrium but also to get adapted within the environmental milieu in which the organism operates. In doing this the organism learns. (Ezewu, 1987). In the light of this statement, cognitivists created models of how learners process and manipulate information. Cognitivism leads to a different way at looking at learning patterns. For example while the behaviorists simply state that practice strengthens the response to a stimulus, cognitivists create a mental model of short – term and long-term memory. New information is stored in short memory where it is rehearsed until ready to be stored in long-term memory. If the information is not rehearsed, it fades from short-term memory. Learners them combine the information and skills in long term memory to develop cognitive strategies, or skills for dealing with complex tasks. Cognitivists have a broader perception of independent learning than that held by behaviourists. Students are less dependent on the guiding hand of the programmer designer and rely more on their own cognitive strategies in using available learning resources. (Henich) Molenda, Russell and Suraliudo, 2002)

The cognitivists view differently the mental processes that the individuals use in responding to their environment. Piaget (1977) in this light, developed three key concepts of mental development namely:
1. “Schemata 2. Assimilation and 3. accommodation” (p. 7).
He explained that:
Schemata (plural of schema) are mental structures by which individuals organize their perceived environment. Schemata are adapted or changed during mental development and learning. They are used to identify, process, and store incoming information and can be thought of as categories that individuals use to classify specific information and experiences. Very young children learn to distinguish between mother and father. They soon separate dogs from cats and later become aware of different varieties of dogs. These differentiations based on experience lead

to the development of schemata, or the ability to classify objects by their significant characteristics. These cognitive structures change by the processes of assimilation and accommodation, which should be encouraged during instruction.

Assimilation, Piaget said is the cognitive process by which a learner integrates new information and experiences into existing schemata. Piaget borrowed the term "assimilation" from biology, where it refers to the process by which an organism eats food, digests it, and then assimilates or changes it into a usable form. During learning assimilation results from experiences. With new experiences, the schema expands in size but does not change its basic structure. Using the process of assimilation, the individual attempts to place new concepts into existing schemata. The learning experiences can be real life experiences. Rather than waiting for experiences to happen naturally, teachers, instructors or course designers and writers cause experiences to happen through the use of a variety of educational media and methods. Accommodation is the process of modifying existing schemata or creating new ones. Since schemata change with experience, adult learners have a broader and more elaborate range of schemata than do children. When dealing with a new concept or experiences the leaner attempts to assimilate it into existing schemata. When it does not fit, there are two possible responses: the learner can create a new schema into which the new stimulus is placed or the existing schema can be modified so that the new stimulus will fit. Both of these processes are forms of accommodation.

Schemata evolve over time in response to many learning experiences. As teachers, instructors, facilitators or lecturers, we are responsible for providing learning experiences that will result in the creation of new schemata as well as the modification of existing Shemata (p. 7). Upon these conceptions (Piaget, 1977) theorized that "the intelligence or adaptive behaviour of an organism is essentially an interplay between three psychological variables, namely Schemata, Assimilation and Accommodation. A learning organism directs its intelligent behaviour through Schemata, assimilation and Accommodation" (p. 17). This behaviours follow some meaningful pattern and stages of development. Thus intelligence develops from infancy onward through four stages: Sensory motor, preoperational, concrete operational and formal operational. Richmond (1970) summarized Piaget‟s analysis of development of human intelligence and said that:
The sensory motor stage lasts from zero to two years of birth when the infant has no knowledge of the existence of the world or self. His or her innate behaviour patterns are exercised in the environment and modified by the nature of things he acts upon. The child‟s understanding of the world does not go beyond those properties of objects and events which arise directly from his actions relating to them. He has a practical knowledge of the way things behave when he handles them but no conception of why they behave as they do. His thought is locked in his own sensory-motor record, which is unique to him. His knowledge is private and not touched by

the experience of others. The world of public knowledge embodied in the concepts conveyed through language can find no place in the model of the world he has so far elaborated. The emergence and development of language and symbolic thought, called pre-operational state follows after this period, and lasts between two or seven years of birth. Children at this stage cannot conserve, but tend to assign life to inanimate objects and treat them as such. They also talk loudly to themselves.

This period is followed by the concrete operational stage between seven to twelve years of birth when children‟s operations are tied to specific objects and experiences. They need concrete objects or things in front of them in order to perform mental actions. And they need to see, smell, taste, touch and manipulate physical objects in order to obtain solutions to problems. During this period, children master skills connected with addition, subtractions, classification, serialization, relations and above all conservation. They come to know that subtraction is the opposite of addition and that a smaller quantity can normally be subtracted from a bigger one. They can classify objects according to a specific criterion for instance, a mixture of red, blacks, yellow and green toys can be separated according to their colours, while rectangular square and triangle pieces of wood can be sorted out according to their shapes. The children also at this stage can conserve as they have the ability to recognize the constancy or invariance of a quantity despite biasing or misleading physical appearances. They can recognize that the amount, weight or volume of a substance remains the same despite changes in its position, shape, colour or arrangement. In other words at concrete operational stage, children can distinguish appearance from reality. They can distinguished what things look like from what they really are. The child‟s reasoning becomes consistent and no loner distorted and beclouded by attention to irrelevant task orientation. The formal operational stage from twelve years and above is the final achievement in intelligent behaviour made in early adolescence. The stage is characterized by the appearance of formal or logical reasoning typical of adults. It involves flexibility in reasoning typical of adults. It involves flexibility in reasoning, attention to alternatives in problem solving, and ability to discover some simple physical laws by making reasonable generalizations. This is the stage when children can draw sufficient conclusions from insufficient premises through deductive and inductive reasoning. They have acquired the fundamental principles that underlie logical thought. And they can solve problems in the abstract through reasoning. From the Piagetian view point, these stages of intellectual development are hierarchical, sequential and invariant and cross-culturally valid. However, it recognizes that individuals may attain the stages either faster or slower than others depending on experience and environment to suggest individual differences exist in people. (p. 13)

According to Durojaiye (1976), Piaget‟s message may be summarized as follows:

- That intellectual growth is a matter of sequential stages in the maturation of a child‟s capacity to utilize increasingly difficult logical operations.

- That it takes a given number of years for adult thinking abilities to be perfected.
- That experience, being mentally bright or not so bright, and environmental factors do influence children‟s responses, but that these variations are incidential.
- That all children, bright or dull and in whatever environment, do in fact go through the necessary stages in the evolution of thinking ability, which takes a number of years.
- That the time of appearance of each stage of intellectual growth may vary from child to child according to experience and environment.

Some Classroom Implications of the Piagetian Theory

The Piagetian theory emphasizes concrete learning. According to him, knowledge comes through interaction with the physical world. Hence Onyehalu (1988) recommended that "in the classroom therefore, a variety of educational media seems to be very necessary from the point of view of Piaget‟s theory. They appear to be more important when teaching younger children who are able to solve many concrete problems but not hypothetical ones" (pp. 24 – 31). To Unwin and McAleese (1978), "the main claims for educational media are that greater learning results when media are integrated to serve the needs of learners. The assumption, that media can increase achievement gains and retention is based on the hypothesis that the more abstract the content of a message the more difficult it is to comprehend it" (pp 45 – 376). The theoretical rationale for media lies in their ability to add concreteness to any learning situation. Their judicious use will provide the students opportunity to capitalize on their individual perceptual strengths through multiple sensory ways of learning (Obi, 2001).

The Piagetian theory also implied that teachers should individualise instruction to cater for the differing needs of learners. Dunn and Dunn (1972) suggested that a multi-media approach be used by students and teachers to achieve individualized instruction". (p. 35)

SELF – ASSESSMENT EXERCISE 2

Define environmental as used in the cognitive theory of learning.
Discuss the concept cognitivism
What is cognitive psychology?

3.3 Social Learning Behaviouristic Theory.

In the last section, you learnt about the cognitive theory of learning. You will understand that the cognitive theorists made a primary contribution to learning theory and instructional design by creating models of how learners receive, process and manipulate information. And they have a broader perception of independent

learning than that held by the behaviourists. It is often said that action should have bases. This implies that on the bases of the cognitive theory you should rely more on your cognitive strategies in using your course materials as an active participant in independent Learning. As you gladly do this, however, you will be exposed in the next section to another theory called social learning behavioursitic theory.

Bandura and Waters (1961) developed a social learning behaviouristic theory to explain personality development. They theorized that "an individual attempts to imitate the behaviour of the model whose behaviour he has observed" (p. 11). They based their theory on the premised that all behaviour is learned by the organism in the process of constant interaction with the external stimuli in the social learning environment. They rooted their theory in the principles of reinforcement and observational learning which sees modeling as involving both imitation and identification with the stimulus figures being modeled (Obi, 2008).

These theorists emphasized the importance of imitation in learning and vicarious reinforcement in situation where a person observes the action of another person (model) who is reinforced or punished for their actions. The process of learning through imitation is influenced by the nature of the reinforcement given to the model. They asserted too, that if we minutely analyse the behaviour of children, adolescents and even adults, we find that most of the behaviour are limited to imitating the behaviour of the models. They categorized models into two namely:

1. Real life model consisting of parents, siblings, teachers, friends, heroes, films, sport stars and most successful person in the society or in the immediate environment and,
2. Symbolic models which include verbal materials, pictorial and representations (film and TV), written materials, books, magazines and works of art. They observed that it is a common experience that what children view and listen to in TV and in films, is what they try to imitate in their real life. Dress, hairstyle, delinquency and conversational styles have been imitated by our adolescents in recent years from films and TV.

They concluded that from the very beginning of his or her life, the child learns a number of activities through observation of others‟ behaviour. The model which the child observes in his environment plays two important roles in social learning. The first is that the model‟s behaviours serves to elicit some responses in the observer that are already in his repertoire. This occurs when the behaviour is socially acceptable; secondly, it also occurs when the model is performing, proscribed and deviant behaviour.

According to Obi (2008), the social learning behaviouristic theory by (Bandura and Walters, 1961) has "helped to conclude that we can learn acquisition of a variety of new responses" (p. 15). This implies responses like normal behaviour honesty, punctuality, respect for elders and for constituted authority on the one hand and abnormal behaviour on the other hand. It follows from this theory that human

behaviour whether normal or abnormal is learned from the social environment. And once learned, it can also be unlearned or extinguished. (Obi, 2008).

The most common application of learning behaviouristic theory is in the study of effects of the social organization of the classroom on learning in order to address questions such as: what is the group structure of the classroom – independent study, small groups or the class as a whole? What is the authority structure – how much control do students have over their own activities? And what is the reward structure – is cooperation rather than competition fostered? Is cooperative learning more effective and more socially beneficial than competitive and individualistic learning? What set of cooperative learning technique embodies the principle of small group collaboration, learner controlled instruction, and rewards based on group achievement? Instructional designers also ask questions such as what would instruction look like if it were designed for individualized learning or cooperative small groups‟ learning? And what media will be relied upon for their delivery? What other media that will not be relied upon for their delivery? What other media will not rely on mechanical and electronic devices such as programmed instruction, self-instructional modules, simulation and games, multimedia, print, audiovisual, realia will be used for their delivery?

To provide valid and reliable answers to these questions researchers in educational media will come up with specific media study designs that are guided by this social learning behaviouristic theory as a theoretical frame work and subject each claims to extensive testing. (Heinich, Molenda, Russell and Smaldino, 2002)

SELF ASSESSMENT EXERCISE 3

Which specific learning patterns has your university prescribed for you? And which psychological theoretical perspectives (behaviourist, cognitivist social learning psychologist) supported them?

4.0 CONCLUSION

In this unit, you have learnt the learning theories. These are the stimulus – Response, Cognitive and Social learning behaviouristic theories and their psychological theoretical perspectives on learning which media research rely on for theoretical framework to guide their studies and to obtain valid and reliable research results or findings. You may think about other theories and their psychological perspective on learning such as communication theories. This will form part of our discussion in the next unit.

5.0 SUMMARY

The main points in this unit include the following:

1. Fundamental to research in educational media is the psychological basis of learning with a variety of theories of stimulus – response, cognitive and social learning behaviourstic perspectives
2. The S – R or behavioursts stress external control over a learners behaviour. Cognitivists stress internal or learner control over mental processes. The difference in their view point influences how educational media are designed, produced and used as well as guide research in educational media.
3. All theories have some common pedagogical features, namely Active participation and social interaction, motivation, individual differences, feedback, or reinforcement individualized instruction, realistic context, and cooperative groups that lead to effective teaching and learning.

ANSWERS TO SELF – ASSESSMENT EXERCISE

EXERCISE I
Statement of Objectives

EXERCISE 2
1. By environment as used in the theories means not only where teaching and learning take place but also methods, media and technology needed to convey information and guide the learner‟s study.
2. Cognitivism is a theory according to which mental processes mediate learning and learning entails the construction of or reshaping of mental construction of or reshaping of mental schemata.
3. Cognitive psychology is a branch of psychology devoted to the study of how individuals acquire, process, and use information

EXERCISE 3
Individualised self learning, cooperative learning and small group learning. NOUN engages the theories of learning patterns involving stimulus response, cognitive and social learning perspectives.

6.0 TUTOR – MARKED ASSIGNMENT
All the learning theorists (behaviourists, cognitiviests and social learning psychologists emphasized feedback.

(a) Explain the reason that each of the learning theories gave in their emphasis for feedback

(b) List at least 3 sources of feedback on the correctness of your response in NOUN.

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UNIT 2 PERCEPTION, COMMUNICATION THEORIES

1.0 INTRODUCTION

In Unit 1 we discussed learning theories and their psychological perspectives on learning. You learnt that over the years there have been some dominant theories of learning such as stimulus – response, cognitive, and social psychological theories. Each has implications for instruction in general and for the use of educational media specifically. However, other learning theories also exist. In this unit you will learn about them. After studying this unit, you are expected to achieve the underlisted objectives:

2.0 OBJECTIVES

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

Define human perception

Explain how perception relates to media design and to research in educational media.

Explain what brings about effective communication

Explain what noise and redundancy in the communication process mean

Recount the hypodermic theory of communication.

3.0 MAIN CONTENT

3.1 Perception

According to Kemp and Dayton (1985) "perception is the process whereby one becomes aware of the world around oneself" (p. 11). In perception we use our senses to apprehend objects and events. The eyes, ears, and nerve endings in the skin are primary means through which we maintain contact with our environment. These and other senses are the tools of perception; they collect data for the nervous system. Within the nervous system the impressions so received are changed into electrical impulses, which then trigger a chain of further electrical and chemical events in the brain. The result is an internal awareness of the object or event. Thus, perception precedes communication. Communication leads to learning (Kemp and Dayton, 1985).

Two things are of major important about conception. Firstly, any perceptual event consists of many sensory messages that do not occur in isolation, but are related and combined into complex patterns. These become the basis of a person‟s knowledge of the world. Second, an individual reacts to only a small part of all that is taking place at any one instance. The part of an event to be experienced is "selected" by a person on the basis of desire or what attracts his or her attention at any one time. Hence, one needs first to design media that will attract the attention and hold the interest of the learner, and then to make certain that in this sampling procedure the learner gets the right sample, relevant to the learning task. The experience of perception is individual and unique. It is not exactly alike for any two people. A person perceives an event in terms of individual past experience, present motivation, and present circumstances.

While any one perceptual experience is unequally individual, a series of perceptions by different persons can be related to become nearly identical. If you walk around a statue, its shape will constantly change as you change the angles at which you look at it. If someone else then walks around the same statue and looks at it from the same angles, this other person will have different individual experiences, but the series will result much the same as it was for you. Thus a succession of individual experience enable us to agree upon what we have experienced, even through the individual experiences are somewhat different.

The educational media field rests on the assumptions that people learn primary from what they perceive and that careful designed visual experiences can be common experiences and thus influence behaviour, the basis of this assumption our virtual media should be planned, designed and developed to help ensure that media are used to their maximum advantage, not just as interchangeable substitutes for printed or oral message. But to serve as a catalyst for change in the whole instructional environment. The effective use of media demands that teachers, instructors, lecturers, facilitators be better organized in advance, think through their objectives in the light of what perception is, alter the everyday classroom routine, and evaluate

broadly through research in educational media to determine the impact of instruction on mental abilities, feelings, values, interpersonal skills, and motor skills.
It may interest you to know that a useful summary of research validated principles from the bahavoural sciences that can be applied to the design of educational media has been prepared by (Fleming and Lerie, 1978). In it, over 200 principles and corollaries relate to areas of perception memory, concept formation, and attitude change, in the next section, you will be presented a selection of the major conclusion concerning principles of perception.

SEL ASSESSMENT EXERCISE 1

Define perception in your own word

Major Research validated

CONCLUSION CONCERNING PRINCIPLES OF PERCEPTION

In the last section, we discussed perception. It is hoped that you understood perception to mean the process whereby one becomes aware of the world around oneself. You also learnt that in perception we use our senses to apprehend objects and events. Our eyes, ears, and nerve ending in the skin are the primary means through which we maintain contact with our environment. These and other senses are the tools of our perception. In this section, you will learn the basic principles of perception validated by research.

A. The basic principles of perception are:

(i) Perception is relatives, rather than absolute.

(a) It provides reference points to which unknown objects or events can be related, and

(b) Presents a difficult concept through small steps.

2. Perception is selective. It limits the range of aspects being presented to essential factors, presented a step at a time.

3. Perception is organized. It uses numbering and verbal cues like (“next”, “either”, “or”) to give order to a message.

4. Perception is influenced by set. It gives instructions that call for attention to elements, or directions for finding an answer in an illustration.

B. Attention and pre-attention .
Attention is drawn to changes in how relevant ideas in a message are presented (by means of brightness movement, novelty, asking questions and posing problems).

C. Perceptual element and processing such characteristics as brightness, colour, texture, form, and size should be selected and arranged carefully because they have a positive influence on perceptions.

D. Perception pictures and words.

Use the visual channel for presenting spatial (space) concepts and the auditory channel for representing temporal (time) concepts.

E. Perception Capacity.

1. For different material presented aurally, use short sentences, redundancy, and excellent technical quality.
2. The most compatible modes that permit the highest information level are simultaneous auditory and visual presentation of a subject provided by slides and tape, sound film, and video recording.

F. Perceptual distinguishing, grouping and organizing

1. Use lines around, under, and between, to cue groupings; accentuate and relate elements in a visual.
2. Facilitate recognition of similarities and differences by representing several related objects together.
3. Make the organisational outline of a message apparent (subtitles, transitional statements)

G. **Perception and Cognition**

The better an object or event is perceived (by means of applying the above stated and other perception principles) the more feasible and reliable will be memory, concept formation, problem solving, creativity and attitude change. (Fleming and Levie, 1978),

The important thing here is as you design, produce, use or research on educational media. Keep in mind the importance of providing carefully for desirable perceptual experiences in terms of the learner‟s experience background and of the present situation. Such production elements as method of treating the topic (expository, dramatic, inquiry, or others), vocabulary level, kinds and number of examples, pacing of narration and visuals, and graphic techniques can each contribute to successful perception. In this way communication will be more effective and learning should be positive. However, you should bear this in mind that perception leads to communication. And in all communication, whether simple or complex, a sequence similar to what you learned here occurs.

At this stage we shall go over to the next section to discus communication theories. But before then attempt to answer the self assessment question below.

SELF ASSESSMENT EXERCISE 2

How does perception relate to:

the design of educational media.

Research in educational media

3.2 Communication Theories

The hypodermic needle hypothesis: according to Hoban (1974) the hypodermic needle theory states that "messages enter directly into the blood stream of cognition, affection and conduct of a target audience. This implies that just like when a drug is injected into the body, messages when communicated to a target audience have direct effect". (. 32) But this postulate does not hold as individuals engage in considerable selectivity in processing their information. Two bodies of theory have been drawn upon to explain how this selectivity come to exist. The first is reinforcement. Briefly stated, this theory suggests that people will process information that promises to be rewarding and that they will avoid selecting information which does not promise a reward. Reinforcement theories suggest that people seek reinforcement for their attitudes, beliefs and behaviours but avoid a state of inconsistency such as would exist when information would be incompatible with prior or present behaviour. The second theory is consistency theory which also explains selectivity. Hoban explains that consistency theory suggest that when an individual‟s cognition is consistent he seek for new information to resolve the inconsistency. It suggests that people will avoid processing information which will create inconsistent cognition. Thus it is expected that people seek information which is consistent with their own attitudes, beliefs, values and behaviour. The converse of this is that people will avoid conflicting information. Kinbler (1987), explains this tendency in people as "Selective exposure" by this people selectively expose themselves to information on the basis of whether they consciously or unconsciously believe that the information will be reinforcing. Considerable research such as (Gardner, 1972) and (Gardner, 1974) indicated these expectations as correct. When however, exposure to inconsistent or unrewarding stimuli occurs, Gilkinson (1955) said "there is a tendency to pay selective attention" (p. 60). To him selective attention is the tendency for people to pay close attention to information that is consistent with their attitudes, beliefs, values and behaviours and little attention to stimuli which are inconsistent.

Cooper and Johada (1947) observed that "people tend to perceive what they want to perceive or what they expect to perceive, whether or not perception are in accord with what other people might consider reality to suggest selective perception (p.125). Thus attention to stimuli does not guarantee that the stimuli will be perceived in accordance with what we might call "reality" they explained. Dunn and Dunn (1972) discussed selective attention and posited that "even though stimuli may survive the three preceeding selective tendencies: (selected exposure, attention and perception) there is still no assurance that they will be retained by individual for any period of time" (p. 35). There appears to be a tendency for people to forget unrewarding or inconsistent stimuli, and remember those which are rewarding and consistent. It appears, from this account, that humans tend to simply reject information that is inconsistent or unrewarding, and hence may not recall ever having been exposed to that information at any earlier time. They concluded that new information which is consistent with prior information or perceived to be

potentially reinforcing is likely to be processed by the individual and retained; new information which is inconsistent with present information or is perceived to be potentially non-reinforcing is likely not to be processed or retained by the individuals.

On another note, Dunn and Dunn discussed the principle of "Homophility" and "heterophily" as biggest barriers to our acquisition of new information. He explained that homophily is the degree to which pairs of individuals who interact are similar in certain attributes (beliefs, values, education, social status). Simply put, the principle of homophily is that acquisition of information most frequently occurs between a source a receiver who are alike. The reciprocal of this principles also holds the more "heterphilous" (unlike) are source and receiver, the less likely there will be acquisition of information. It merely means, for instance, that a peasant farmer is more likely to acquire new information from another peasant farmer than he is from a University professor. A ruralite is more likely to acquire new information from another ruralite than from an urban resident person, given the existing homophilous state.

In the classroom situation, (Wittich and Schuller, 1967) identified communication barriers that invalidate hypodemic needle theory. These include: verbalism, referent confusion, day-dreaming, limited perception and physical discomfort (p. 174). A failure to understand the communication process itself, the existence of barriers to effective classroom communication, and the means by which these barriers may be eliminated usually results in such failures as are evidenced through pupil disinterest, low levels of comprehension, and in extreme cases actual school drop-out. These can be avoided at a large degree by improving instruction through multi-media utilization of educational media.

From the foregoing, the hypodemic needle hypothesis which states that messages enter directly into the blood stream of cognition, affection and conduct of a target audience does not hold and (Garbner, 1974) has proposed the cultivation hypothesis to suggest that message and message systems cultivate our priorities, our values, our patterns of perception and our very grounds of reality.

Hoban (1974) sees the cultivation hypotheses as more productive and consistent, provides for continuity, cumulation and tender care, all of which are essential in education and classroom communications. He believes that the future hope of developments in classroom communication process lies in the further development of the cultivation hypothesis into a full blown theory. Which over time, can be tested empirically, and explicated more fully so as to lend itself to practical applicability. Hoban believes that implicit in the cultivation hypothesis is that the multi-media generally have the solution to all the barriers to effective communication and have a major impact on the diffusion of new information.

According to this author, there are so many media and in real life various media are used in combination, that is we live in a multi-media world. He went further and identified three basic propositions or constructs about media:

Each medium carries its own inherent message with long range psychic effects;

Sensory limitations of input information from any one medium is completed by internal arousal of complementary sensory responses.

The audience participation subjectively in message formulation and becomes co-source or co-author in its transformational and complementary participation.

These media constructs perhaps may have helped to conceptualizing multimedia uses

SELF – ASSESSMENT EXERCISE 3

Identify the barriers that invalidation hypodemic communication theory in the classroom situations.

3.2.1 Communication Sequence

In the last section, you learnt communication theories. In this section you will learn communication sequence „particularly in the classroom and the implicit problems.

In all communication, simply or complex, a sequence naturally occurs various writers graphically illustrated with a model. In our discussion, the emphasis will be on the elements, the actors of noise and redundancy, and how they function to affect the success of your efforts to communicate effectively.

The sequence in all communication whether simple or complex, starts with a message originating at the mental level, generally in the form of information, in the brain of the source or sender. This encoded or converted into transmit table form like a thought verbalized, as for conversation by being turned into sound waves or words written for a script. The message then passes through a transmitter like print, slide, videotape, via a suitable channel or media (air, wire, paper, chart, light, etc to the receiver‟s eyes, ears, and other sensory nerve endings and then to the brain of the receiver where the message is decoded or converted into mental symbols. (Kemp and Dayton, 1985).

Effective Communication depends upon participation of the receiver. The receiver reacts by answering, questioning or performing mentally or physically. There is then a return, or response loop of this cycle, from receiver to sender. It is termed feedback. It happens through words, expressions, gestures, or other actions. This reverse communication advises the originator how satisfactory the message was received. Feedback enables the originator to correct omissions and errors in the transmitted message or to improve the encoding and transmission process or even to assist the recipient in decoding the message.

In this communication sequence, what ever interferes with the transmission of the message is called NOISE. The factor of noise can have a serious impact on the success or failure of communication. Noise can be created internally within the receiver, to upset satisfactory communication for example, a lack of attention. At times noise cannot be avoided and in planning educational media, the factor of redundancy is often used to overcome the effect of evidence or anticipated noise. Redundancy refers to the repeated transmission of a message.

Possibly in different channels, to overcome or bypass distracting noise. Some examples of redundancy are showing and also explaining an activity, projecting a visual and distributing paper copies of the same material to study, and providing multiple applications of a principle in different contexts.

Bear this in mind that in working with instructional media you should understand where the media as channels of means of communication fit within the framework and process of message movement between sender and receivers. Then you should know how the various elements, along with factors of noise and redundancy, function to affect the success of your efforts to communicate effectively.

SELF – ASSESSMENT EXERCISE 4

Explain the meaning of noise, and redundancy in the instructional process with examples.

4.0 CONCLUSION

In this unit you have learnt perception and communication theories. You have also learnt communication sequence and the implicit noise and redundancy factors their functions, problems and the remedies. You will also note that other theories exist and serves as theoretical framework to research in educational media. These will now form part of our discussion in the next unit.

5.0 SUMMARY

The main points in our discussion in this unit include the following:

1. The communication theories reviewed revealed various novice factors in the instructional process.
2. The communication sequence also identified various noise and redundancy factors that can make classroom communication ineffective.
3. In situations were media are used and are validated by media research they offer solution of problems of communication barriers.

ANSWERS TO SELF ASSESSMENT EXERCISE 1

Perception is the internal awareness that a person develops for recognizing an event or object in the environment. (Discuss)

ANSWERS TO SELF ASSESSMENT EXERCISE 2

(a) Gaining a person‟s attention, holding his or her interest, and making sure the correct message is received are important considerations in designing educational media relating to perception.

(b) The design of a research study should be guided by perception principles and theory. Valid and reliable results are some of the considerations in relating educational media to perception.

ANSWERS TO SELF ASSESSMENT EXERCISE 3

Day dreaming, ill-health, hunger, bereavement in the family. Etc.

ANSWERS TO SEF ASSESSMENT EXERCISE 4

Noise is any disturbance that interferes with or distorts transmission of the message of instruction in the educative process. Example flashing touch light when a lesson is going on.

Redundancy refers to the repeated transmission of a message often used to overcome the effect of evidence of or anticipated noice in the instructional process.

Example, projecting a visual and distributing copies of paper on the same topic of study.

6.0 TUTOR – MARKED ASSIGNMENT

Define the concepts of homophily and heterophily. Explain how they constitute a barrier to our acquisition of new information suggest a remedy.

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UNIT 3 INFORMATION PROCESSING THEORIES

1.0 INTROUCTION

In unit 2, you learnt about perception and communication theories. You also learned the principles of perception validated by research and the communication sequence and the implicit barriers. In this unit, you will learn information processing theory. You will also examine the theorists approaches to instruction and learning principles as emphasized by the psychology of learning theories. After studying this unit you are expected to have achieved the objectives stated in 2.0.

2.0 OBJECTIVES

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

1. Recount information processing theory correctly
2. Explain the educational implication of Information processing theory.
3. Distinguish the approaches to instruction of all the learning theories
4. Identify and explain learning principles as emphasized by all the learning theories which are considered in media design, use and research.

3.0 MAIN CONTENT

3.1 Information Processing Theory

Another theory relevant to educational media design use and research is the information processing model. The model of learning and memory which forms a basis of information-processing theories like that of Atkinson and Shiffrin (1968); Anderson and Norman (1973); Robert Gagne (1976) postulates a number of internal structures in the human brain and some corresponding processes that they carry out. A version of this model has been articulated by Gagne (1976) as "the flow of information" (p. 44). In his account, from the environment, the learner receives stimulation which activates his receptors and is transformed to neural information. Initially, this information enters a structure or structures called the sensory register, where it persists for a brief interval. The information next enters the short term memory, where it can persist for a limited period, generally thought to be up to twenty seconds. The most critical transformation of the information occurs when it leaves the short term memory and enters the long term memory. This process Gagne called encoding. The information which is available as perceptual features in short-term memory is now transformed into a conceptual or meaningful mode. Apparently it is stored not as sounds or shapes, but as concepts whose meaning is known and can be correctly referenced in the learners environment.

The information that is stored is organized in various ways, rather than being merely collected. It is generally recognized that visual and other kinds of imagery may form a basis for the encoding that characterize the input to the long memory (Piaget, 1977). Apparently, then, many forms are taken by the process of encoding. What is learned may be encoded in meaningful verbal units like sentences or perhaps even more comprehensive units. Encoding processes may take the form of tables, specially arranged matrices, diagrams, or detailed images or pictures, graphs, and so on of the information being learned. The main characteristics of encoded materials, for entry into long term memory, is that it is meaningfully organized. This presupposes external events in attending.

In explaining this aspect of the model Gagne (1976) first articulated the apprehending phases of learning and said "In the very brief period before something is stored and therefore learned, the learner‟s processes are concerned with taking in or apprehending the stimuli relevant to learning. These preparatory phases consists, first, of an alertness to stimuli which goes under the general name of attention. Second, there is the very important screening and organizing of the raw stimulation, or what has been described as selective perception, this leads to a storage of relevant stimulus features in the short-term memory. From this point, stored information is ready to be transformed again or encoded to enter the long term memory.

It is easy to understand that if learners are to respond to stimulation in order to learn they must first be presented with stimulus. This means that their senses must be oriented toward the source of the stimulation. Attending may be thought of as the initial event of learning made possible by an internal state that can often be detected by observing what learners are looking at or listening to. This internal state is believed to be in part a function of a central neural system called the reticular activating system and the state itself is one of arousal or alertness. The kinds of external stimulation that produce alertness are fairly well known. Increase in the intensity of stimulation, such as those made by educational media of sound and light and so on are usually dependable stimuli for the command of attention. More generally, any sudden change in stimulation, up and down, is likely to constitute an effective stimulus to alert the leaner. The sudden dimming of lights in a theatre alerts the audience; a sudden turning off of the sound of a radio similarly command the attention of a listener.

External Events in Selective Perception

Gagne (1976) posits that the processing of information that has been registered in the sensory register proceeds with perception, which is selective in its operation. (p. 123). One who is looking at another person may selectively perceive her face or hand or clothing or, under other circumstances, her totality as a person. Similarly, one may perceive a window as part of a wall. Selective perception is guided by a

control process that includes a temporary mental set which may be activated by verbal instructions or other forms of stimulation. Thus, a common external event affecting perception is the verbal communication that activates such a mental set. Other kinds of stimuli are frequently used to influence selective perception. For example, the learner who is reading a text may encounter pictures which illustrate key concepts, and italic type or underlining which indicates important terms. If a pictorial material is being presented, it may emphasize important features. The purpose of additional stimuli is to facilitate selective perception by increasing the difference between relevant and irrelevant features of the objects or events being observed.

External Events in Acquisition

In order to enter and be stored in the long term memory, the material of learning must be encoded. That is, it has to be transformed into a form that is meaningful. The process of encoding, and the subsequent entry of the encoded information into long-term memory may be considered the central and critical event in an act of learning. This pivotal process of encoding may obviously be affected by events in the learners‟ environment or events planned as a part of instruction. A particular scheme for encoding may be directly communicated to the learner. For example, a teacher may organize a set of facts about farm products of various states in a table which divides the states into regions, and the products into several convenient categories. The table then becomes an encoding scheme, and quite an effective one. As a second possibility, learners may be encouraged to provide their own individual encoding schemes. Some may use visual images, others rhymes, others a network of super-ordinate concepts. In this case the external stimulus is functioning to activate a set of the learners, which thereafter brings to bear one of the learners‟ cognitive strategies for encoding.

External Events in Storage, Search and Retrieval

Having been acquired, the new capability must be stored in order to qualify as something that has truly been learned. The change that has been brought about by the process of encoding is retained over a period that might be a few minutes or a lifetime. The storage of learned items in long term memory can presumably be influenced by external events, particularly by the learning of other items. Previously learned propositions might conceivably influence the storage of propositions to be newly learned (proactive interference) or the learning of new proposition might interfere with the store of some that are already learned (retroactive interference).

The processes of search and retrieval seem to be definitely subject to the influence of events external to the learner. The provision of cues to search and retrieval is obviously an external event of great importance to remembering. Such cues can be incorporated into the situation designed for initial learning and encoding. Presumably, they can also be effective at the time of recall, if they are able to

suggest to the learner a search strategy which is relevant to the encoding already accomplished. Cues for retrieval can take a variety of forms. Besides the categorization function already referred to cueing can be accomplished by matrix or tabular organizations, graphs, pictures and so on. (Gagne, 1976)

3.1.1. Educational Implications

The information-processing model of learning and memory is seen by (Gagne, 1976) to be of great significance for planning and design of instruction in educational programmes. The model tells us that an act of learning, however brief or extended it may be in time, composed of several phases. Learning begins with intake of stimulation from the receptors, and ends with feedback that follows the learner‟s performance. Between these events are several stages of internal processing sensory stores, short-term and long-term stores. Instruction, is therefore not simply a matter of presenting an initial stimulus, it is composed of several different kinds of external stimulation with variety of educational media which influence several different processes or learning. For example, the unique attributes of media to reproduce image slides, slides duplicates photographic prints store information, retrieve information (audio-tape, video-tape, films, filmstrips), promote active responses by the learner. Slide duplicates of visual or verbal information could be shown and repeatedly to reinforce and emphasize a point. Audio tape instruction can be played several times by a learner who seems to be slow in grasping the content being taught. Thus educational media in their variety do not only help remediate but also help to reinforce, summarize, motivate and enrich the teaching – learning experiences. (Obi, 1992)

SELF – ASSESSMENT EXERCISE I

State one implication of information processing theory to teaching and learning in Nigeria.

3.2 The Theorists Approaches to Instruction

Instruction refers to the arrangement of information and environment to facilitate learning. By environment we mean not only where instruction takes place but also the methods, media and technology needed to convey information and guide the learner is study. (Heinich, Molenda, Russell and Smaldino, 2002).

While going through this material a question you are likely to ask is “What are the approaches of psychological learning theorists‟ to instruction? You will find the answers as you read along. Each of the psychological learning theorists has its own approach to instruction. For example, while the behaviourists stress external control over a learner‟s behaviour, cognitivists stress control over mental processes. You should note that this difference in view-point influences how media are designed and used. Furthermore, behaviourists specify behavioural (performance) objectives then limit instruction to whatever is necessary to master those objectives. When

programmed instruction was introduced, materials not directly related to the objectives was carefully screened out. Instructional design and media were highly structured. This approach has been very successful in teaching basic skills and knowledge.

Instructional designs based on cognitive psychology are less structured compared to those based on behavioural psychology. They allow learners to employ their own cognitive strategies, and they encourage interaction among students. Learning tasks that require problem solving, creative behaviour, or cooperative activity lend themselves well to a cognitive instructional approach.

Unlike the behavioural theorist, the cognitivists do not limit their definition of learning to observable behaviour. They believe that learners learn more than what is expressed in immediate behaviours. They may at a later time use knowledge previously learned, but not previously expressed in building their schemata.

The social learning theorists or constructivists considers the engagement of students in meaningful experiences as the essence of learning. They embrace a shift from passive transfer of information to active problem solving. They also emphasize that learners create their own interpretations of the world of information. They contrast their perspective with those of the behaviourists or cognitivists, who believe that the mind can be "mapped" by the instructor. They argue that students situate learning experience within their own experience and that the goal of instruction is not to teach information but to create situations so that students can interpret information for their own understanding.

The role of the teacher is not to dispense facts but to provide students with ways to assemble knowledge. The constructionists believe that learning occurs most effectively when students are engaged in authentic tasks that relate to meaningful contexts. The ultimate measure of learning is therefore based on the ability of the students to use knowledge to facilitate thinking in real life. The constructionists provide a rich learning environment and allow learners to create their own meaning, using a variety of media and technology. This is the least structured approach to learning. (Heinich et al, 2002).

SELF ASSESSMENT EXERCISE 2

As a designer and user of media which particular learning theory will you adopt for teaching and learning activities?

3.3 Principles of learning as a Middle Ground of Agreement Among the Psychology of Learning Theorists.

Inspired by each of the psychological perspectives of the learning theories, designers of instruction and media have developed a powerful frame-work of principles for instruction. In this section, our discussion will centre on those learning

principles agreed upon by all the psychological learning theorists (behaviourists, cognitivists, constructivists or social learning). This is because these principles are important factors to designing, and use of educational media as well as research in educational media.

The principles of learning are as follows:

1. Active participation.

Effective learning happens when students are actively engaged in meaningful learning task as they interact with the content. Participation activity here means ein mental or physical activity interspersed during an instructional presentation.

2. Practice and Repetition.

New learning requires more than one exposure to take root. Practice especially in varying contexts, improves retention rate and ability to apply the new knowledge, skill or attitude.

3. Individual differences.

Learners vary in terms of personality, general aptitude, knowledge of a subject, learning styles, readiness, level of motivation, and comprehension rate. Effective methods allow the individual to progress at different rates given different materials, and even participate in different activities.

4. Feedback.

Learners need to know if their thinking or performance is on track; feedback provided by teacher/facilitator, through correction of papers, used of electronic messages from a computer, scoring system or use of a game or by other means will encourage the learner. Learning is increased when students are periodically informed of progress made in task given them. Knowledge of successful results a good performance or need for certain improvement will contribute to continued motivation for learning.

5. Reinforcement.

When the student is successful in learning, he or she is encouraged to continue learning. Learning motivated by success is rewarding, it builds confidence and it may affect subsequent behaviour in positive ways.

6. Realistic Contexts.

You are most likely to remember and to apply knowledge that is presented in real world context; rote learning leads to “inert knowledge” you know something but never apply it to real life.

7. Application.

Application of what is learned increase the individual‟s ability to transfer the learning to new problems or situations. Unless a student can do this, complete understanding has not taken place. First the learner must have been helped to recognize or discover generalizations (concepts, principles, rules) relating to the topic or task. The opportunities must be provided for the learner to reason and make decisions by applying the generalization or procedures to a variety of new realistic problems or tasks.

8. Social Interaction.

Fellow humans serving as tutors or facilitators or peer group members can provide a number of pedagogical help as well as social supports.

9. Motivation.

There must be a need, an interest, or desire to learn on the part of the student before attention can be given to the task to be accomplished. Moreover, the experiences in which the learner will engage must be relevant and meaningful to him or her. Therefore it may be necessary to create interest by means of motivational treatment of the information presented using educational media.

10. Pre-learning preparation.

Students should have the necessary satisfactory experiences that may be prerequisites to their successful use of the educational media to be studied. This means that when planning media to use, careful attention should be given to the nature and probable level of preparation of the group for which the media are to be designed.

11. Emotions.

Learning directed at emotions, personal feelings, and intellect is influential and lasting. Instructional media are powerful means of generating emotional responses such as fear, anxiety, empathy, love and excitement. Therefore careful attention should be given to media design if emotional results are desired.

12. Organization of Content.

Learning is easier when content and procedures or physical skills to be learned are organized into meaningful sequences. Students will understand and remember materials longer when they are logically structured and carefully sequenced.

13. Learning Objectives.

When students are informed of what they can expect to learn through the use of instructional media their chances for success are greater than when not so informed.

It is realized that a statement of objectives to be accomplished with the media when presented is helpful to those who will plan the media. The objectives indicate what content will receive attention in the media plan. (Kemp and Dayton, 1985; Heinich, Molenda, Russell and Smaldino, 2002).

SELF – ASSESSMENT EXERCISE 3

1. List four steps you may take to utilize these principles from perception, communication and learning theories for designing media to present factual information.
2. Which media research design would you use to evaluate your designed media product. What guided your use of the principles?

4.0 CONCLUSION

This unit has given clear evidence that psychology of learning theories, perception, communication and information processing theories provided the guiding principles and practice for educational media design, production, use and media research theoretical framework.

5.0 SUMMARY

The main points in this unit are as follows:

1. The information processing theory has contributed to the psychological perspectives that have significant implications on approaches to instruction.
2. The theorists contributed the principles of learning acceptable among the psychology of learning theorists and are important factors to consider in the design and use of educational media. They also serve as theoretical framework for research in educational media.

ANSWERS TO SELF ASSESSMENT EXERCISE 1

It is a great significance for the planning and design of instruction and media in Nigerian educational programmes

EXERCISE 2

Media designers and instructional designers need to develop an eclectic attitude and approach towards competing schools of learning psychology perspectives. We are not obliged to stick to a particular learning theory. We use what works. If we find that a particular learning situation is suited to a behaivourist perspective, then we use behaviourists technique and principles. Conversely, if the situation seems to demand cognivists on constructionist or social learning methods, that we should use. Thus, an eclectic approach is essential when we allow ourselves to be guided by the

learning theories. We use the theory that works when we are designing, planning, producing and using media, as well as in selecting a theoretical framework for research in educational media.

EXERCISE 3

The steps are as follows:

1. Design the production for your specific learner audience.
2. Tell your viewers what is coming, and what they should learn from the media presentation.
3. Associate new facts and ideas with ones the viewers already know.
4. Rely on visuals and mental imagery i.e. associating words with pictures, to help viewers remember what was learned.
5. Do not overload your production with information.
6. Give the viewer time to let the information sink in.
7. Use repetition to hammer in critical facts.
8. Present a review of the major points in an organized pyramidal structure.

6.0 TUTOR – MARKED ASSIGMENT

1. Which learning theories support the shift in instruction from teacher – centered to self – paced learning emphasized in Noun?
2. Identify and explain at least two principles of learning emphasized by all the learning theorists.

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Unit 4 Overview of Educational Media Research Procedure

1.0 INTRODUCTON.

In the last unit, an important part of what you learnt is that effective learning happens when students are actively engaged in meaningful tasks as in the case of interacting with the content. In this unit, you will be actively engaged in educational

media research procedure. Your active participation is preferable to lengthy periods of passive reading and listening. Provision should be made by you for frequent practice in writing media research. Often in different media research writing contexts. This will help you to understand and internalize the sequence of activities in conducting media research as well as lead you to long–term retention of the procedure. The objectives stated below specify what you are expected to learn after going through this unit.

2.0 OBJECTIVES

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

1. Briefly describe media research problems identification and selection of a research topic and procedure involved.
2. Discuss selection of theoretical framework for media research.
3. Correctly pose media research questions and formulate hypotheses.

3.0 MAIN CONTENT

3.1 Media Research Procedure

According to Nwana (1990). "Research procedure is nothing other than a sequence of activities which when followed will enable the investigator to achieve his aim." (P.14). Educational Media Research Procedure simply means a sequence of steps you must follow when you embark upon a programme of research in educational media. These steps are namely:

- Identification of a research problem.
- Choosing a research topic
- Selection of a theoretical framework.
- Posing research questions.
- Formulating hypotheses.
- Review of the literature.
- Designing the study.
- Instrumentation for data collection.
- Collection of data.
- Organization of data
- Analysis of data.
- Interpretation of data.
- Conclusions
- Writing the research report.
- Publication.

In order to expose you to research procedure, a brief description of these steps will now be made in the next section.

SELF – ASSESSMENT EXERCISE 1

Explain using your own words research procedure

3.1.1 Problem Identification

Educational media research begins with the researcher focusing his or her attention at identifying a problem whose solution is considered to be useful to effective learning. Design, producing and utilization of educational media may enhance effective teaching and learning. In educational media research, identification of a problem is the most difficult step in research process. This is because the researcher begins with a question that deals with issues of sufficient consequence to warrant investigation. The problem must be the type that can be solved through scientific or empirical investigation. It must be one for which the solution is not already available but for which the means for finding answers through collecting and analyzing data are available. (Olaitan and Nwoke, 1988).

You should be able to distinguish between the problem area which is of research interest and the research problem itself. A problem area of research interest is the broad area or topic or event which could be studied in education. For examples what are the relative effectiveness of various educational media, conventional teaching techniques like multi-media approach, cooperative learning, Team–Assisted Individualized learning, computer based cooperative learning, simulation and problem based learning, simulation and games, cooperative simulation games, programmed instruction, personalized system of instruction (Ps1), programme tutoring, instructional modules to mention but these. It could also be the relative effectiveness of two or more types of educational media. Other areas of media research interest include classroom media use, teacher educational media use, school administration media decisions research, media design and production, instruments for use in media research, economics of media utilization/cost effectiveness, and the newest information and communication technologies for learning.

Bear in mind that interest in a particular area should not be the only reason to begin work in your particular area of interest. There must be an existing viable researchable problem in your area of interest. You can identity such specific researcherable problem from your classroom experience and experiences of others (this is practical source of problem). You can identify specific problem from earlier media research studies (empirical source) and from views expressed in textbooks, journals, and books of readings in educational technology and other subject areas. (theoretical source). Bear it in your mind that sources of researchable problems as indicated here are not the same. Acceptable research problem can be difficult, frustrating and sometimes time consuming for a beginning researcher. However, there are guide to select acceptable researcherable problems. For example, a researchable problem must be significant to be accepted as a research problem. A problem is considered significant if it is new and interesting as to uncover new

grounds or offers something refreshingly different. In some cases a research problem is considered significant if the problem is commissioned by an interested agency and one is required to investigate what the research finding considers important. (Ali, 1996).

Another characteristic of acceptable research problem is that it is empirically researchable. A problem is empirically researchable if it is possible for you to collect and analyze data derived from investigating it. Acceptable research problem too must be one researchers identified and accepted which can be replicated by other researchers at the same time or place. Once your chosen research problem is identified, then you develop a topic from the problem area of investigation and discus the acceptability and approval of such a topic with your research project supervisor. It is at this stage that our discussion will shift to choosing a research topic in the next section. But before then answer the question posed below.

SELF – ASSESSMENT EXERCISE 2

List 2 characteristics of a researchable problem.

3.1.2 Choosing A Research Topic

In the last section, you learnt problem identification from theoretical, empirical, and practical sources. It is hoped that you gathered that acceptable research problems must be significant. Empirically research must be replicable. In this section, you will learn choosing a research topic.

In some tertiary institutions, students are required to choose own topics for approval by research project supervisors. Students at whatever level who are required to choose their own topics should be guided by the following principles:

- The topic must in nature be educational generally and it should be on media particularly.
- The topic should contribute to effective educational media design, production and use, to achieve effective teaching and learning.
- Look through a list of research projects that were previously carried out by students of your university or similar university to see whether a new project can be designed to replicate the study in a different geographical area, sample or time span.
- Adopt different research design for the study, or different techniques for collecting the needed data.
- Read through the abstract to obtain the main ideas of the research project report to help you to get a topic.

You can read a few research reports in your study centre under the heading “Further Research” and from it synthesized a topic. However, if these are not sufficient to help you get a topic, then consult your supervisor for help. If your centre or faculty selects topics for students, then select a topic from the list as your last alternative.

After you have chosen your topic now closely look at views, opinions, thoughts on realities as seen by others, articulated and documented in books, journal articles, and previous researches. By doing this, you set a clear theoretical framework for your study. Such a theoretical framework should be concise and self–explanatory information on the problem, questions and hypothesis to be studied.

We shall now go to the next section where we will discuss selection of theoretical framework for a study.

SELF – ASSESSMENT EXERCISE 2

What compulsory activity does problem identification impose on you as a researcher?

3.1.3 Selecting a theoretical framework

Theoretical information for media research can be obtained from several sources. These include perception, communications theories, learning theories, social learning behaviouristic theories, information processing theory and reported media research studies. You should bear in mind that once you select and document your theoretical framework you should allow it to give insight and guidance to your study for a valid result.

SELF – ASSESSMENT EXERCISE 3

Identify clearly the sources of theoretical frame work for media research

3.2 Writing the background posing research questions and formulating research hypothesis.

Having successfully selected a problem, and a research topic approved by the assigned project supervisor, the researcher will now write the background to his or her study. You should note that the background to the study is an introduction of the study. It provides at first glance, concise information of the major theoretical, empirical and experimental considerations on which the study is anchored. The background serves as the guidepost of the study with information on the major thrust of the study including the independent, dependent and intervening variables being considered.

Let us consider one example of background information to illustrate the points being made in our discussion in this unit. We shall base our example on the current National Open University of Nigeria (NOUN) format for writing students research project report in the school of education.

The topic Chosen is:

Effects of Multimedia Approach on Retention of High, Middle and Low Ability Students in Secondary School Economics. (Obi, 2008)

The Background of the Study/Introduction

In Nigeria, one of the aims of teaching secondary school Economics is to equip students with the basic principles of Economics necessary for useful living and for higher education. The teacher‟s responsibility is to encourage the students to acquire and retain the knowledge imparted in our school for future solution of economics problems of society in Nigeria, developing countries and the world at large (Federal Government of Nigeria National Economics Curriculum for Senior Secondary Schools, 1985). But to the teachers‟ greatest surprise, students‟ retention of what is learnt is at a very low level. Awoniyi (1988) noted that "In most cases much teaching goes on in many classrooms though little retention takes place" (p. 138). Dale (1969) Observed that "helping students to remember is one of the greatest problems of teaching and learning" (p. 101). In Enugu State in particular, the low level of retention in secondary school economics which cuts across the higher, middle and low ability students is persistent and has generated much concern among teachers.

On the basis of empirical studies, Albeck (1992) linked the unsatisfactory low level of students‟ retention in Economics to poor talk and chalk lecture approach of teaching adopted by teachers. The fact is that in secondary schools, particularly in Enugu State, teachers of Economics have resorted to verbalizing their lessons, relying heavily on the use of only one medium the chalkboard otherwise called the talk and chalk approach of teaching economics. This approach obviates the use of a variety of educational media to individualize instruction and leads to rote learning. "(P.10). Indeed, teaching with talk and chalk approach does not make abstract economics concepts very clear, and does not organize subject matter meaningfully with cues to create a will to learn in the students. The resulting continued low level of students‟ retention in economics in secondary schools particularly in Enugu state attests to the fact that the use of talk and chalk lecture approach is not appropriate for teaching secondary school economics. Mevey (1975) Suggest "the use of multi-media approach for effective teaching of economics to enhance students‟ retention in Economics (p. 35). The glossary of Educational Technology Terms (1987) defines multimedia approach as:

> a methodology based on the principle that a variety of audio-visual media and experience correlated with other instructional materials overlap and reinforce the value of each other. Some of the materials may be used to motivate interest, others to communicate basic facts, still others to clear up misconceptions and deepen understanding. (p. 80)

Nelson (1976) asserted that "the multimedia approach is an effective method of generating greater students‟ active involvement and better organization of

meaningful subject matter with cues in the process of acquisition and retention" (p. 38). These claims of multimedia approach must not be made on inadequate research evidence. A scanty number of experiments directly investigating the effectiveness of multimedia approach have been carried out by Mevey and McCoy (1973), Kenedy and Wikes, Oyediran, Agoro and Fabiyi (2004). A related study has also been done by Ezeanya (1988). However, to the best knowledge of the researcher, no study have specifically evaluated the effects of multimedia approach on the improvement of high, middle and low ability students‟ retention in Economics in Enugu State, Nigeria, hence this study was undertaken.

You probably noticed in the foregoing background that earlier studies dealing with the topic at hand were cited then followed by more recent studies, in that progression order within the subject matter of investigation. You also noticed the researcher‟s line of presentation of his information. Researchers on the bases of empirical findings linked the unsatisfactory low level of students‟ retention in economics to poor talk and chalk approach. They noted that this teaching method leads to rote learning from research evidence multimedia approach promises to enhance student‟s retention in economics elsewhere. A hunch or suspicion is raised. Therefore it needs to be empirically confirmed whether with multimedia approach in teaching secondary school economics, retention of students would significantly improved.

You should note that for you to develop and have a well written background; it has to be presented in a logical, analytical, simple clear, precise and self-explanatory manner. You have to notice too, that whenever a variable or technical term is used, it has to be defined in the context it was used. However, NOUN format provided a section in chapter one where operational definition of terms should be made. It is important for you to understand that in general, a background information on a media research topic should not be too long. For a dissertation or thesis the background should range from two to three pages. It will interest you to know that a long background information with little or no substance and very little or no inductive reasoning behind it is a poor way to introduce your research report to your supervisor or your external examiner. It will ultimately cast negative feelings towards your research report.

Without doubt, the background of your study gives your examiner and reader a foretaste to what the study is all about. In addition, it gives the reader an insight into the substance, direction and plan of the research carried out. Notice that if it is well presented, brief to the point and self – explanatory, then half the battle is won by you. In the NOUN format what follows introduction or background is Rationale/Theoretical framework. The theoretical framework for the study in our example is information processing theory. The content of this theory has been

sufficiently articulated in the previous units and sections. You are referred to such units.

However, the rationale is that information processing theory advocated the use of a variety of media to provide cues for retention of what is learned and transfer of what is learned to new situation. With the organization of a variety of media in a multimedia approach fashion, economics instructions in the form of tables, graphs, diagrams pie and bar charts, cartoons, comics and posters used in combination with realia of concrete media as learning stimuli will provide rich sources of cues that serve to enhance improvement of students‟ retention in economics.

Another theory that provides a framework for this topic is Reinforment theory, which states that people will process information that promised to be rewarding and they will avoid information which does not promise a reward. (Kimbler, 1987).

The rationale is that based on this theory, the multimedia approach economics lessons presentation if adopted in this study, will organize subject matter meaningfully with a variety of media integrated to complement each other so that the whole is greater than the sum of its pass in immersing the students in multi – sensory economics learning experience. Besides, presentation of lesson in economics in multimedia approach will make abstract concept clearer and meaningful to students to better learn and retain subject matter that will be taught. Multimedia approach lesson presentation will be more rewarding and consistent in ensuring retention of economics concepts to the students if exposed to it.

Notice that the theories and the rationale for their use as the theoretical framework for study in our example is now the guide of the study, and the researcher should always bear it in mind as he or she progresses in the research work. It helps the researcher to ask the question. Is it true that multimedia will enhance student‟s retention of economics content learned? We will now turn to statement of problem. But before then, answer this question.

SELF – ASSESSMENT EXERCISE 3

Now identify any media research problem, choose a topic from it and write the background or introduction to it.

Statement of the problem

This is the continuation of the last section, in which you will be exposed to statement of the problem with example.

A statement of the problem is a clear concise persuasive information indicating what the subject matter of a research under investigation is. Such information is stated to show the relationship between the subject matter variables planned for

investigation as indicated in the background. Let us consider the example given below.

In secondary schools in Enugu State teachers of economics have resorted to verbalizing their economics lessons, relying heavily on the use of only the chalk board otherwise called the talk and chalk method of teaching when properly tested alternative could have improved their teaching effectiveness and assisted their students retention of subject matter studied. Such talk and chalk approach obviates the use of a variety of media to provides rich sources of cues that serves to enhance students retention in economics.

In recent years, however, several new teaching approaches have developed that offer promise of individualizing instruction and providing cues for students retention of what is taught. An example is multimedia approach. A number of experiments directly investigating the effectiveness of multimedia approach have been carried out by Mevey and McCoy, (1973), Kennedy and Wikes (1975), and Oyediran, Agaro and Fabiyi (2004). Some related studies have also been done by Ezeanya (1988). However, none of these studies have specifically evaluated effects of multimedia approach on students retention in secondary school economics in Enugu state Nigeria. There is therefore, the need to evaluate the effects of multimedia approach on students retention in economics in secondary school.

You probably may have notice that a proof of an existing problem was established. And there was a justification for carrying out the study perceived as a problem based on empirical evidence. It is interesting you note that the statement of problem is a statement which pin points what is wrong with or about the subject matter of a study (Ali, 1996). Next is for you to learn the purpose of the study in the next section.

Purpose of the Study.

The purpose of a study is the intention of the study. This is normally presented clearly and stated in a sensible and practical language.
The purpose of the study was to

(1) Investigate the effectiveness of multimedia approach on a sample of SSII students of economics using a set of multiple choice objective questions based on retention gains on the three units of economics taught.
(2) Explore the effects of interaction between the multi-media and intellectual ability of students on the retention of economics concepts taught based on some criterion measures.

Research Question

Research should flow naturally from the statement of the problem. It is expected of you to note that simplicity and clarity of language in posing your research questions are important. Let us consider an example below.

1. What is the retention of high, middle and low ability students exposed to multimedia economics instruction and the high, middle and low ability students not so exposed as measured by their scores in an economics retention test?
2. Is there any interaction between media of instruction and intellectual ability of students to retain economics concepts as measured by their scores in an economics retention test?

It is interesting to note that research questions provide useful basis for getting descriptive data. And the descriptive data could be used to get a sharp and clear rich picture to the problem of the study under investigation. What is meant here is that answers to be provided by these research questions are merely for describing events and not for determining the nature and scope of a cause – effect relationship between the independent and dependent variables.

You are to note that a research question should seek answer to only one question or one thought. It should not be posed to seek answers for two or more questions. If it does, it becomes double barrelled questions that may confuse your respondents.

Hypothesis

A hypothesis is a tentative guess or a preconceived views of the researcher expressed as statement of what is expected to be the outcome of a study with regard to the variables contained in the statement of problem. The aim of hypothesis in a study is preconceived views presented as a statement to be accepted or rejected. We can now state that hypothesis is a statement of what a researcher expects to be the outcome of his or her research in the light of the variables contained in the statement of problem for investigation. Let us consider an example below.

Hypothesis

Ho_1: There is no significant difference at 0.05 level of significance of the mean retention scores of high, middle and low ability students exposed to multimedia economics instruction and high middle and low ability students not so exposed as measured by an economics retention tests.

Ho_2: There is no significant interaction effect at 0.05 level of significance between media of instruction and ability of students as measured by their scores in economics retention tests.

It is interesting for you to note that hypothesis and research question serve two different but complimentary purposes as shown in the foregoing examples. While

the research questions will provide answers merely for describing events of the study; hypotheses testing will determine the nature and scope of a cause – effect relationship between two or more variables in an experimental study. For these reasons research questions and hypotheses are necessary and so should be included in a study.

You are expected to note that there are two classes of hypotheses namely; inductive and deductive hypotheses. Inductive hypothesis is one which is stated on the basis of certain observation and in which events are predicted and not backed by evidence or data for doing so. Inductive hypotheses is not sought through empirical or scientific approaches. Here people simply try to explain or predict the future even when there is no data or evidence to back it up. The second class of hypotheses is called deductive hypotheses. Deductive hypotheses are testable hypotheses in terms of collecting and analyzing relevant data to support or reject them. Empirical or Scientific approaches are used in doing the testing. Most of the media research are based on deductive hypotheses.

Deductive hypotheses as used in media research are of two types. These are the alternative and null hypotheses. The alternative hypotheses could be directional or Non-directional. In our example, we have used null hypotheses. If you want to know more about this, you read the tests recommended for further readings in this unit. Before then answer the question on self assessment exercise no 4.

SELF ASSESSMENT EXERCISE 4

(1) State the problem of the topic you have chosen in exercise 3
(2) Write the purpose of the Study
(3) Pose the research question
(4) Formulate the hypotheses.

4.0 CONCLUSION.

In this unit, we discussed educational media research procedure. The sequence of research activities involving problem identification, choosing a research topic selecting theoretical framework with the rationale as well writing the background posing questions and formulating hypotheses were discussed in detail with examples.

5.0 SUMMARY

The main points that will cover in this unit are:

1. Research procedure means a sequence of steps you must follow whenever you embark on a programme of research in educational media
2. The following steps were discussed:
   - ♦ Identification of a research problem
   - ♦ Choosing a research topic

- ♦ Selection of a theoretical framework with rationale
- ♦ Writing the background
- ♦ Stating the statement of the problem
- ♦ Posing the research questions
- ♦ Formulating the hypotheses

3. Students were given examples and are expected to undertake a research project in the steps discussed above.

ANSWERS TO SELF ASSESSMENT EXERCISES

EXERCISE 1

1. It is empirical and researchable

2. It must be significant

EXERCISE 2

Thoughtfulness, foresight, hindsight extensive consultation with supervisor, centre manager, facilitators, other students, with previous research project reports, journals, books, and library and internet materials.

EXERCISE 3 AND 4

Students should identify a problem related to education media. Choose a topic and write with theoretical framework, write the statement of problem, the purpose of the study, pose the research question and formulate the hypotheses.

6.0 TUTOR – MARKED ASSIGNMENT

Identify all the researchable aspects of educational media research. From any aspects, choose a topic, and conduct the research and submit the report to your facilitator.

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UNIT 5 DESIGNING THE STUDY

1.0 INTRODUCTION

In the last unit you learnt research procedure. It is hoped that you gathered that research procedure is a sequence activities a researcher follows when embarking upon a research project in order to achieve the objective of the study. You learnt some of the steps which include identification of the research problem, choosing a research topic, selection of theoretical framework, writing the background, posing research questions and formulating hypotheses. It is hoped that you did not only learn these steps, you practiced writing the steps.

In this Unit, you will learn how to design the study. After studying this unit, you are expected to have achieved the objectives stated in 2.0.

2.0 OBJECTIVES

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

1. Explain what designing the study means
2. Describe what each of the components of designing the study is
3. Identify a research and design the study.

3.0 Main Content

3.1 Definition of Research Design

According to Nwana (1990) "Design is a term used to describe a number of decisions which need to be taken regarding the collection of data before the data is

ever collected" (p. 54). In educational media research, the framework for conducting research rests upon the design for the research. The activities which are carried out within the design specifications constitute the research methodology. Research design is the plan or blue print which determines the nature and scope of the study proposed to be carried or carried out. Research design in educational research in general and media research particularly is important in terms of the fact that it provides the researcher the information he or she needs leading to his or her knowing what kind of method to be used or is planned for use. Indeed, the early part of chapter three of and research work in education includes a section on design. In the NOUN Format for writing research report, The Chapter three entitled Research methodology has its item 3.2 for "Research Design". The reason for its inclusion is for you to show what design you used as well as why the particular design was used and to justify its appropriateness. This is important because any design selected for a study should be appropriate and adequate for use in exploring the problem of the study. When this does not happen the researcher runs the risk of being stuck with misleading procedures, data, and results to the detriment of the study. It is interesting for you to known that research design has components, we are going to discuss them in the next section. But before then answer this question.

SELF – ASSESSMENT EXERCISE I

Define research design in your own words.

3.2 Components of Research Design

In the last section, you learnt the meaning of research design. It is hoped you understood that research design is a plan or blue print which is made by a researcher. It determines the nature and scope of the study proposed to be carried out. In this section, you will learn the five components of research design namely: population or target of the study, sampling and the sampling procedure, Research conditions, Data Analysis and Conclusion. We shall briefly discuss them and then examine some examples. Get ready to design your own study after studying the illustrative examples.

SELF – ASSESSMENT EXERCISE 2

Identify all the components of research design.

3.2.1 Area of Study

Here the researcher needs to find out answers to questions such as where will the research be conducted? Will the study be carried out in urban area or rural area? Will it involve a whole state or the whole country or local government area. Will the study be done in primary, secondary or tertiary institutions?

3.2.1 Population

In addition the investigator needs to find satisfactory answers to another questions as the following: What constitute the population to be studied. Will the research population be educational media, students, teachers, school administrators, and so on? You would probably have known that a research population is any group or object which a researcher wishes to study but which of necessity possesses one or more common characteristics that are of interest to the researcher. It is interesting for you to know that when it is not possible to study all the attributes of a population, investigator restricts an investigation to a universe or small fraction of the population. This small fraction of the population is called the sample. All the participants in a research study comprise the sample or subjects. The method of composing the same is called sampling. Various methods or techniques used in sampling are random sampling, balloting, systematic selection, use of table of Random numbers, stratified random sampling and purposive or judgemental sampling.

3.2.3 Research Conditions

Research conditions are the events that comprise the conditions under which the research is expected to be conducted to yield the required data. The activities relate to answering such questions as the following:

- Who will do what in the research process?
- When will it be done?
- With what will it be done and how will it be done?

It may interest you to know that in experimental studies, to find answers to these questions is not easy at all. This is because, in an experiment, the research conditions are more detailed and demanding. Besides, the experiment imposes rigorous research conditions aimed at helping the researcher to establish the presence of or absence of a cause – effect relationship in the phenomenon investigated.

It may also interest you to know that there are two distinct forms of research conditions in an experiment. These are: (1) the treatment condition(s) and (2) the control condition(s). Both conditions are opposite to each other in an experiment. The treatment condition concerns the independent variable which is manipulated to see whether it has any significant effect on the dependent variable. The independent variable is any event which causes or may not likely cause something to happen while the dependent variable is the outcome of an event. In an experiment designed to determine the effect of multimedia approach on students retention of high, middle, and low ability students in secondary school economics, the multimedia. approach and chalkboard only with teacher talk comprised the independent variable while the retention scores are the dependable variable (outcome).
One of the serious considerations in this study is to ensure methodical compliance to the pre-determined nature and scope of events which constitute the research

conditions. For, example, where the experimental group as part of their research condition will receive multimedia instruction, no one in the control group should be allowed to receive multimedia instruction. If this happens, it will contaminate the experimental group. The researcher must ensure that events which constitute the treatment conditions are unique by being different from the events which comprise the control group.

Similarly, there must be consideration of time as a research condition. For decisions must be taken as for how long the events constituting the control and the treatment conditions will last. The investigator should decide who will be involved in the different activities of the research conditions. For example, what will experimental and control groups differently be doing? What will research assistants and the researcher be doing? All these are some of the considerations the researcher must be aware and take adequate care of.

3.2.4 Data Analysis

Data Analysis means the treatment of data so that they become summarized or reduced to a point they can become meaningfully interpreted. To analyze research data the researcher must know what the data of his or her study are and the statistical tools to use; the conditions under which each tool can be used; as well as how the statistical tool are used for calculations. (Ali, 1996).

It may interest you to know that research data have no meaning on their own unless when they are analyzed and described. To be able to analyze data well, you should be able to know first the scale or the kind of data you want to analyze. Data can be nominal (descriptive classification); ordinal (ordered arrangement); interval (relatively constant distance between judgements); and so on.

The type of data to be analyzed determines the type of statistics to be used for such analysis. It is important for you to note that when statistics used in data analysis is not appropriate, no accurate verifiable meaning can be derived from the analysis made. For this reason the investigator should first of all find out what kind of data would be collected in his or her study and then decide appropriate test statistics to be used in analyzing the particular data. It is either descriptive or inferential statistics are normally used in data analysis. While the descriptive statistics are the measures of central tendency (the mean, the mode, and the median) and measures of dispersion or variability such as (standard deviation, range, percentile etc.) The inferential or parametric statistics used to make inferences are T-test, Chi-square test, Anova and Ancova.

It is important that at the research design or plan level you know what conclusions or interpretations that can be drawn from the results of the statistical analysis. This demands that in addition to possessing the knowledge of the statistical techniques of

analysis, you must also be able to interpret your data accurately. It is after planning your research systematically that you undertake a review of related literature to your study. This will be our topic for discussion in the next unit.

SELF ASSESSMENT EXERCISE 3

When and why does a research considers area of study, Population, Sampling research condition and data analysis.

5.0 SUMMARY

The main points in this unit include the following;

1. Research design is the plan or blueprint of the nature and scope of the study proposed to be carried out
2. The components of research design include decisions on area of study, population, sample and sampling techniques, research conditions, data analysis and literature review taken systematically before embarking on the research project.

ANSWERS TO SELF ASSESSMENT EXERCISES

EXERCISE 1

Research design is the description of a number of decisions which need to be taken regarding the collection of data before the data is collected.

EXERCISE 2

Population, Sampling, research conditions, data analysis, literature review, conclusion.

EXERCISE 3

Before he embarks on the study. To be properly guided to conduct successful study.

6.0 TUTOR – MARKED ASSIGNMENT

Identify a research topic and design the study.

7.0 REFERENCES/FURTHER READINGS

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UNIT 6 LITERATURE REIEW

1.0 INTRODUCTION

In the last unit, you learnt research design and the components. In this unit, you will learn literature review. After studying this unit you would have achieved the objective stated in 2.0.

2.0 OBJECTIVES

At the end of this unit you should be able to:
Define literature review
List and discuss three purposes of literature review
Carry out literature review satisfactorily

3.0 Main Content

3.1 What is Literature Review

According to Ali (1996) "literature review is the careful and systematic identification and or location, documentation, analysis and reporting of information which are relevant, related and useful to the study" (p. 34) The key word in this definition is identification. Identification here implies consultation with fellow researchers, facilitators, supervisors of research project, educational technology specialists, audio-visualists, librarians, to obtain information relevant to his or her study.

It is interesting for you to know that it is generally true that at the beginning of any research project, you only have vague idea of what you intend to study. It is only by consulting the primary sources like experts in the field, facilitators, supervisors of research topics, etc. and secondary source materials like textbooks, journals, encyclopedias, magazines, newspapers, periodicals, professional association newsletters, audiovisuals – microfilms, film cards and microfiches and so on that you receive information on knowledge and information on methodology of the study you are interested in. And such information will enable you to pin yourself more precisely down to the problem. It will enable you to identify the problem more clearly such that you can now describe it to your supervisor, centre managers, facilitators and fellow students without sounding hazy or empty. Indeed, such information is very useful to you in formulating a clearer mental picture of the research problems under focus. As a consequence of clear focus and clear definition of your research problem and issues related to it, you .would adequately be on your way to building up a picture of what the likely solution to your research problem would be, namely: formulation of a hypothesis and posing correct research question

Your other purposes for reviewing literature related to your study will be discussed in the next section. But before then answer this question.

SELF – ASSESSMENT EXERCISE I

Define and explain the meaning of literature review in your own words.

3.2 Purpose of Literature Review

The major purpose of any literature review is for you to determine the nature and scope of views, opinions of experts in the field and earlier research done in your proposed area of study. This helps you to acquaint, familiarize and determine certain areas not well covered by earlier research studies so as to plan to emphasize such areas in your proposed research. It will also guide you to avoid completely or minimize doing your study in over researched unimportant areas that have been overtaken by events. It may interest you to know also the amount, quality and variety of work that has been done in the particular area that is of interest to you, it will also give insight on the amount of research work remaining to be done, so as to make a decision on whether to continue with your study or not.

It is also important for you to understand that another benefit to be derived from literature review is that you will be able to obtain information on the methods and designs adopted by previous researchers in attacking your identified problem or problems of your research. Then from the different strategies and techniques you will be able to select one that is most appropriate to your own conditions and you apply it. However, after you have assessed them, where the techniques cannot fit your problem, then you develop new strategies of your own. (Nwana, 1990).

You may have observed that through media research, new information is obtained, new relationships between variables are established, new concepts are created and the existing concepts tested and verified in the design, production, and utilization of educational media. Thus research and media are interrelated. How do we obtain these informations? Your answer is correct if you say it is from the review of literature. This is true. For example, the original ideas that are linked into hypothesis are derived from investigating documented sources from review of literature. Besides, reference to documented sources of information helps you to:

- Uncover, discover and evaluate information;
- Establish new relationships by analyzing and synthesizing established evidence or discovering new ones;
- Replace an existing concept or completely create a new concept in a attempt to translate them into practical use;
- Verify existing concepts by re-examining the premises on which the concepts were created. (Olaitan and Nwoke, 1988)

In addition literature review helps the researcher to uncover the following:

- Ideas about variables that have proven important and unimportant in a given field of studies;
- Information about work that has already been done and which can be meaningfully extended or applied;
- The status of work in a field in terms of conclusions and applications;
- Meanings and relationships between variables that a researcher has chosen to study and wish to hypothesize about (Tuckman, 1978).

It is interesting for you to know that review of literature involving investigating documents is mostly done in the library, we shall now extend our discussion to the use of the library in the next section.

SELF – ASSESSMENT EXERCISE 2.

State 2 purposes of literature review

3.3 The use of the library

In the last section, you learnt the purposes of literature review. In this unit, you will learn the use of the library for literature review.

Scientific media research starts in the library. You should therefore get familiar with the use of the library, essentially to be able to locate needed materials fast. Using the services of the materials and reference materials will assist you to form a list of preliminary bibliography. Soon after this, ask for help of the librarians. You can also use the computer for a library search. Where computer is used, you should first of all make a list of the key words pertaining to the research. These key words aid the computer to locate sources of information related to the topic of you study. The key words are fed into the computer which selects the references by printouts of abstracts and bibliographical data. Computer search is time saving.

Once you connect the computer in ways that enable you to communicate and share information, you have a network. Networks connect schools, homes, libraries, educational institutions, organisations and business. So that you can access and share research information downloaded from other computers. It may interest you to know that computer networks comes in many sizes and are used for many types of applications the most widely known and used network is the internet. Actually the internet is an international collection of computer networks, a colossal network of networks. It implies that the internet connects thousands of computer networks worldwide. It provides users with several basic types of connection services, one of which is the information search capabilities for accessing libraries and databases of information throughout the world. Thus, by use of the internet you review literature related to your research. (Heinich, Molenda, Russell & Smaldin 2002). What source by which you reviewed literature related to your study. It is expected that such literature review should be reported in your work. We shall now turn to the next section where you will learn how to report the reviewed literature. Before that happens, answer this question

SELF ASSESSMENT EXERCISE 3

Give 2 reasons why the use of library is highlighted in media research.

3.4 How to Report the Reviewed Literature

In the last Section, you learnt the use of the library. In the section that follow you will learn how to report the reviewed literature.

The first approach to reporting literature reviewed is careful collation of the materials namely index card, notebook, photocopy etc. All referred materials should be put in a pile. The initial grouping will reveal the scope of coverage of issues covered in the review of literature done.

The review report should be broken down into related sub-headings with the topic of your research. Each section is presented with regard to discussing the views, opinions, facts, evidence etc you considered important in explaining details within the area in question in your study. You may choose the number of sub-heading s in your review depending on your topic and what your research project supervisor suggested.

For illustration purposes, a research work on effects of multimedia approach on retention of high, middle and low ability students in secondary school economics, for example, can be broken down into the following five subheadings. Each sub-heading will reflect the basis on which the hypotheses and the research questions were derived.

- Theoretical framework for multi-media approach (stimulus response, cognitive, perception, communication and information processing theories)
- Multimedia approach and media: characteristics, advantages and limitations
- Some factors that affect students‟ achievement and retention
- Related studies
- Summary of literature reviewed.

SELF – ASSESSMENT EXERCISE 4

Based on the topic you have chosen break it down into sub-headings in the light of your research questions and hypotheses.

4.0 CONCLUSION

In this unit, you have learnt what literature review means, the purposes and the use of the library including computer and internet. You have also been introduced to how to report the reviewed literature.

5.0 SUMMARY

The main points in this unit include the following:

1. The review of literature is the systematic search for and documentation of information useful and relevant for investigating a proposed research problem.
2. Approaches to literature review presupposes the adoption of certain guidelines including location and using a variety of reference sources in the library, via computer and Internet.
3. Reviewed literature should reported on the basis of the research topic chosen and broken down into sub-headings in the light of the research questions posed and hypotheses formulated.

ANSWERS TO SELF ASSESSMENT EXERCISES

EXERCISE 1

Review of literature is the systematic search for and documentation of information useful and relevant for conducting a proposed research project.

EXERCISE 2

1. It helps the investigator to obtain information on the methods and designs adopted by previous researchers, from these, he or she will be able to select one that will be most appropriate for his chosen study.
2. It provides the research with a theoretical base as well as expose the researcher to the expressed opinions and research findings of others in the areas of the topic chosen.

EXERCISE 3

1. To uncover, discover and evaluate information.
2. To access research work that has already been done and which can be extended or applied

6.0 TUTOR MARKED ASSIGNMENT

Why is literature review useful and relevant for a research study.

7.0 REFERENCES/FURTHER READINGS

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MODULE 3 RESEARCH DESIGN AND STATISTICAL TOOLS IN EDUCATIONAL MEDIA.

UNIT 1 RESEARCH DESIGN

The main design employed in the study is the quasi-experimental design for the purposes of evaluating the effects of teaching with the multimedia approach on students‟ achievement and retention in secondary school economics. It involved the use of intact classes. The use of intact classes was decided upon to avoid disrupting normal class activities in the schools selected in the study.

The specific study design used in the study is the pre-test-post-test control group design. It involved experimental and control groups illustrated thus: (MMATG) E : xo: x_1 :x_2 Group Two –Talk and Chalk control group (TACCG)

C: x_0 : _____ : x_2.

Where:
E stood for experimental group
C stood for control group
X_0 stood for pre-test. The sign: _____: stood for no treatment
X_1 stood for treatment
X_2 stood for post-test.

Area of study

The area of this study is Nsukka education zone in Enugu state. Specifically the study was conducted in Akposhi and Amachalla towns in Enugu-Ezike, Igbo-Eze North Local Government Area, and in Obollo-Afor and Obollo-Eke in Isi-Uzo Local Government Area.

Population

The population of this study comprised all the senior secondary year two (SS II) economics students in the Nsukka Education Zone, Enugu State.

Sample and sampling procedure

The sample for this study comprised 207 SS II students in seven intact classes from four schools randomly drawn from 78 secondary schools in Nsukka education Zone, Enugu state. The size of the sample was due to the fact that economics is an elective subject and not compulsory. McVey (1973) said that "samples of 200 or more subjects are adequate to test cognitive achievement and retention".

Assignment of subjects to Experimental and control Groups

By a simple random sampling the four schools involved in the study were assigned to the experimental and control groups. One hundred and ten SS II students in the experimental schools then became the treatment group. Ninety seven SS II students who were in the control schools became control group to the treatment group. The sampling plan is presented in table 1 below.

Table 1: Grouping of Experimental and control samples by set

Set	Schools	Groups
1	S_1 and S_3	Experimental
2	S_2 and s_4	Control

Where

S_1 stood for experimental school one – Community Secondary School, Obollo Afor with 61 SS II Economics Students in 2 intact classes.

Stood for control school two-

Saint Patrick‟s Model Comprehensive secondary school, Obollo-Eke with 65 SS II Economics Students in 2 intact classes.

S_3 stood for experimental school three-

Model comprehensive secondary School, Akposhi Enugu-Ezike with 49 SS II Economics students in 2 intact classes.

S_4 stood for control school four-

Community secondary school, Amachalla, Enugu-Ezike, with 32 SS II Economics students in 1 Intact class.

UNIT 2 INSTRUMENT FOR DATA COLLECTION

Three (3) research instruments were used for data collection in this study. They included an Achievement and Retention Test in Economics (ARTE), Entry behaviour Text in Economics (EBTE) and instructional package in Economics- the instruments were developed by the researcher.

The achievement and Retention Test in Economics(ARTE) was a 50-item 5-option multiple choice objective test designed to measure students‟ understanding and retention of the Economics contents of chosen topics for the study after treatment. In the test, students were expected to show competence in analysis, application, synthesis and evaluation of economic issues. The achievement and retention tests were the same except that in the retention test the items were-arranged to check the use of already acquired response set by the students in answering the questions used to as pretest. A pretest is criterion referenced to the objectives which the designer intended to guide learners to achieve". If you consider a hierarchical instructional

analysis an entry behaviour test measures all the skills that appear below the “line” while a pretest measures all the skills that appear above the „line‟ he concluded.

The Entry Behaviour Test in Economics (EBTE) was a 50-item 5-option multiple choice objective test designed to measure skills which have been identified as being critical to the beginning of the instructional package. The (EBTE) test items provided the basis on which it was determined if both the experimental group and control group have equivalent entry knowledge prior to commencement of treatment. It afforded also the premise to justify the comparison of the treatment groups on an equal level.

The instructional package was made up of three units of learning experiences chosen from the SS II scheme of work for economics in the 1991 secondary school year. The three units were

Supply of and demand for labour;
Public finance; and
Supply of and demand for money.

It was established that these units of the economics scheme have not been done by the SS II students in the schools involved in this study. It was reported that these units were part of areas in economics that secondary school students find very difficult to understand. It was therefore, hypothesized that the use of multi-media approach would add more concreteness to the concepts, and so clearer to understand more easily than when presented with the more conventional method of chalkboard and teacher talk. The lesson topics per day per week, the performance objectives and the multimedia package were determined from the three units used. Two models of instruction were employed: the multimedia approach and the “talk and chalk” verbal approach. The lessons were prepared on a handout so that for multimedia approach, the lesson content would be presented through a variety of media integrated in the teaching as appropriate and for the control the lesson content would be presented verbally with the help of chalkboard. The learning materials were prepared from the ordinary level economics text books in use in secondary schools-

Instrument construction

A test blue print based on the topics to be taught was prepared as presented in Table 2.

Table 2: Table of specification for economics test items

	INTELLECTUAL BEHAVIOUR LEVELS

	Knowledge 13%	Comprehen sion 15%	Applicatio n 18%	Analysis 1 8%	Synthesis18%	Evaluation 18%	
CONTENT AREAS (SS 11 ECONOMICS) (SYLLABUS(1991)	LOW ORDER QUESTIONS		HIGH ORDER QUESTIONS				**TOTAL**
UNIT 1: LABOUR MARKET 25%	2	2	3	3	3	3	15
UNIT 2: PUBLIC FINANCE 45%	3	4	5	5	5	5	27
UNIT 3: DEMAND FOR AND SUPPLY OF MONEY 30%	2	3	4	3	3	3	18
TOTAL	7	9	11	11	11	11	60

Summary: High order questions – 72% or 44
Low order questions – 28% or 19
Total questions = 60

Based on this blue print, a 60-item multiple choice objective test was developed to measure students understanding and retention of the contents of chosen topics for the study after treatment. The content of the test items was based on the performance objectives of the three units of SS II Economics scheme used in the study. The items covered the six levels of the cognitive domain of (Blooms, 1971) taxonomy of educational objectives The 25, 45 and 30 percentage of items assigned to the units were based on the amount of emphasis with respect to content area coverage and teaching time.

Knowledge and comprehension levels of the cognitive domain were condensed into the low order questions while application, analysis, synthesis and evaluation levels were condensed into the high order questions. This study aimed at increasing students‟ competence in answering higher order questions hence little attention was paid to low order questions. Consequently, 72 percent of the test items were assigned to high order questions and 28 percent to low order questions as presented in table 2.

In addition, another set of 60-item multiple-choice test was designed to measure students‟ previous knowledge (entry behaviour test) to provide the basis on which to

determine if both experimental and control commenced on equivalent entry knowledge prior to treatment.

Validation of Instruments

The instruments were subjected to two forms of validation as follows:

i) Face validation: (a) The test items were faced validated by 12 Economics teachers currently teaching SS 11 students in secondary schools in the Nsukka educational zone; three economists who are lectures in the Department of Economics; and two lecturers who are experts in education, University of Nigeria, Nsukka. They checked the structure of each item including the language used. They also examined the mental processes that each item elicited with respect to accepting or rejecting low order and high order question classifications. They examine too, the extent to which the test item reflected the objectives of the lesson topics relating to the media of instruction. Their objective criticisms and comments guided the corrections, acceptance and rejection of some test items.

b) Multimedia Instructional Package

Visual component of the multi-media representation: charts, graphs, cartoons, comics, diagrams, pictures, posters and the hand-out were assessed by:12 Economics teachers in the Nsukka Education zone: 2 graphics technologists, curriculum centre, Enugu, a senior Lecturer in Educational technology, department, of Education, University of Nigeria, Nsukka, on the bases of quality, relevance and authenticity to the lesson topics, performance objectives, students, developmental levels and class activities, as well as integration with audio tape recordings, real objects and real life situations and other media used in teaching the lessons. Their criticisms and suggestions guide the corrections, inclusion and exclusion of details in the final version of the media used. The corrected version of the media including the hand-outs were administered on 20 SS II economics students of Ohado community secondary school, Ohodo in Igbo-Etiti Local Government Area. They read through and underlined sentences and captions not understood. The 20 students guided restructuring misunderstood sentences in the handout and captions in the media. Thirty SS II economics students of Premier secondary school, Ukehe in Igbo-Etiti Local Government Area were further administered the multi-media package for criticisms of the media. Their comments guided the final preparation of the diagrams, pictures, cartoons, charts, posters, graphs, and hand-out. Forty SS II economics students of community secondary school, Opi, were used to test the instructional effectiveness of the instrument. The performance of the students in the pilot study test results showed evidence that the instrument was instructionally effective.

ii) Content Validation

The content validation of the instrument went beyond relying on the expert opinions. It was strictly based on the relevant contents of the units of SS II

economics scheme of work used for the study and the computation of psychometric qualities of the test items.

Initially a 60-item multiple-choice objective test was designed to measure students‟ achievement and retention of economics contents (ARTE). Another 60-item multiple choice objective test was also designed for entry behaviour test (EBTE). These initial test items were then trial tested on a sample of 20 SS II Economics students of community secondary school, Ohodo, and 20 SS II economics student of community secondary school, Achalla, all in Igbo-Etiti Local Government Area, Nsukka education Zone, who are not part of the study sample. The students answered the questions.

iii) Scoring

Each correct answer to the items in the test was scored one mark, while an incorrect answer was scored zero. The maximum score obtainable was 60 marks and the minimum was zero.

iv) Item analysis

The analysis of students‟ scores fell within the upper and lower thirds to determine the facility and discrimination indices so as to exclude items considered very easy or very difficult. The item analysis was made in the light of the following psychometric characteristics: Item facility (IDI);and Distracter index (DI). The items which satisfied the requirements in the table of specification, which also have a facility level between 0.30 and 0.70; a discrimination capacity of between + 0.22 and +1.00 as well as have positive distracter indices were included in the test instrument. After the item analysis was done, non-viable items such as those which did not fall within the range specified above were removed or restructured, the items that discriminated negatively were dropped. In the end a 50-item multiple-choice objective economics test was prepared for achievement and retention. A 50-item multiple-choice objective economics test for entry behaviour test were obtained. The use of the table of specification, and selection of test items which only satisfied the psychometric qualities assured the content validity of the instrument.

Reliability of the instrument

The Achievement and Retention test items was administered on 20 SS II Economics students of Ohodo Community Secondary school, while the entry Behaviour Test items was administered on 20 SS II economics students of Achalla Community Secondary school in order to establish their reliability. The reliability (internal consistency) measure of the test items was calculated using the test-retest reliability technique. The students were asked to answer the 50-item multiple choice objective questions for Achievement and Retention Test (ARTE) and entry Behaviour Test (EBTE) respectively. The scores of the students were recorded. A retest of the students after 4 weeks made the second test scores available.

The scores of the 20 students from the two different administrations for each set of the tests-ARTE and EBTE were correlated using the spearman‟s Rank Order correlation coefficient technique. The computation of the data obtained yielded a coefficient of stability over time of r = -0.98 for Entry Behaviour Test (EBTE) and r = -0.99 for Achievement and Retention Test in Economics (ARTE). The ARTE was subjected to further internal consistency computation using the Cronbach‟s alpha. The result yielded a reliability coefficient of 0.99 which further used in the study (see Appendices G and H) respectively.

Pilot study

The pilot study which served as the test run for the main study was conducted prior to the major research efforts. The pilot study was to achieve the following objectives:

1. To validate and compute reliability of the economics tests used in the study.
2. To validate the multi-media package so that revision could be effected before the main study started
3. To identify the extraneous variables which could constitute bias threat to the main study so as to effectively control them.
4. To identify the problems of statistical analysis to enable the researcher to effectively address such problems.

The following decisions were taken in the light of experience gained from the pilot study:

1. Schools distant from one another were used as proximity of pilot classes caused leakage of information, comparing notes and exchange of hand-outs, took place during pilot test.
2. Appropriate statistical analysis was chosen in the light of extraneous variables identified.

Variables of the study

The variables of the study were grouped as independent, dependent and intervening variables.

Independent variable: The two treatment conditions: Multi-media approach and chalk and talk verbal approach constituted the independent variables of the study.

Dependent variable: The achievement and retention test scores of the students were the dependent variables.

Intervening variable: The intellectual ability of the students and media interactions were the intervening variables of the study.

UNIT 3 EXPERIMENTAL PROCEDURE

The researcher collected a letter from the head of Education Department, University of Nigeria, Nsukka. The letter was presented to principals of sampled schools to introduce the researcher and solicit for their assistance such as authorizing the researcher‟s use of SS II economics students and teachers for the study. In each school, the principal referred the researcher to the subject head of economics who subsequently referred the researcher to the economics classroom teacher. The researcher and the classroom economics teachers agreed upon the time-table and date for work shop training to be executed by the researcher for the 4 teachers involved in the study for a period of 2 weeks. The entry behaviour test and pretest were administered differently as one of the regular class activities two weeks before the treatment. A total of 36 lessons were delivered to subjects. Three periods were used for teaching economics lessons per week and the teaching of the lessons lasted for a period of 3 months. There was the need to ensure that the observed differences on the dependent variables (Achievement and Retention scores of students) were attributed to the influence of the independent variables only (multi-media approach and talk and chalk verbal approach). As a result, the researcher took the following steps to control some extraneous variable which if left may have biased the study:

A) Bias due to different treatment conditions

i) instructional situation

Efforts were made to ensure the homogeneity of the instructional situation across the groups as follows:

1. All the teachers involved in the study used the same unit contents, and note of lesson except the methods of instruction.
2. The experimental and control groups were exposed to the unit contents at the same teaching time allocated to economics in their school time-table.
3. The experimental and control groups were found identical in entry behaviour and pretest scores, age range, some economics environment and same historical event.

ii) Teacher Variable

The four teachers involved in the study had their initial differences, for instance in qualification, intelligence, personality, and relationship with students. To minimize the effect, a workshop was organized for the four teachers involved in the study by the researcher. The workshop was held seven times. In the first meeting, the four teachers who participate in the study received an explanation as to what the research was all about and the objectives of the study. All the teachers were acquainted with the roles they were expected to play and how to do it. There was a serious stress on all the teachers keeping to a fixed teaching time and the need for teachers to make themselves approachable to students and to strictly use the teaching methods as appropriate. The four teachers were given the lesson notes prepared on the topics of the three units covered by the study. The lesson objectives and the procedures for achieving them were discussed with the four teachers.

In the second induction meetings the 2 teachers in the control group received specific instruction on lesson presentation using the chalkboard. Each teacher taught an equivalent of 40 SS II students of Community Secondary School Achalla, in a trial practical session supervised by the researcher. Training continued at the third meeting with necessary corrections made, until the 2 teachers in the control group possessed require necessary skill and demonstrated competence in treatment implementation.

In the fourth induction meeting the 2 teachers in the experimental group received specific training on using the multimedia approach. The researcher and the 2 teachers reached agreement on the observational data to collected on the teacher at the time of induction. Each teacher taught an equivalent of 31 SS II economics student of Community Secondary School, OPI, in a trial practical lessons supervised by the researcher. Training continued up to the Seventh induction meeting with the necessary corrections made, until the 2 teachers possessed required necessary skill and demonstrated competence in treatment implementation. At the end of these sessions the judgment of the researcher showed that the 2 experimental teachers had a high degree of competent performance in delivering the verbal part of the multi-media instructions, allowing a larger part of the instructional messages to be expressed through a variety of media. McVey (1973) provided the basic guidelines for multimedia lesson presentation as follows:

1. Avoid information overload. Don‟t bombard students with sights and sound which are either irrelevant to achieving the lesson objectives of or which proceed at such a pace that makes comprehension difficult.
2. Adjust presentation pace for note-taking. On the other hand, when a lesson has a heavy information load and note-taking in not required, announce this to the class prior to the presentation.
3. Don‟t attempt to show all information; use hand-outs when possible. Distribute printed outlines or notes prior to the presentation.
4. Keep visuals simple but substantive. In the case of complex maps, tables and so on, display simplified versions, and hand-out more detailed versions to the class.
5. Always edit, preview presentation prior to use.

This measure was to ensure the teachers understood their roles and were faithful to the treatment expectations, and to achieve teacher and treatment condition equivalent across group. Additionally, efforts were made to take care of the differences across the group through a statistical solution by using the pretest scores as a covariate to the post-test scores in the 2-way analysis of covariance‟s.

B) **Bias Due to Novelty**

To eliminate the effect of novelty biasing the study, the 2 economics teacher and 110 students in the experimental group participated in the organization, planning and production of the multimedia package. In the organization, students provided much of the effect needed to prepare an effective multimedia package. For instance students helped to assemble throw always from homes, industries, carpentry shades, such as nails, wood and so on.

In the planning, three weeks before the presentation time, the researcher and the two economics teachers participating in the experimental group held initial production meeting. The possibility for translating verbal concepts into visuals and audio modalities were discussed, and arrangements were made for co-ordinating the production effort. The instruction messages were translated into series of specific drawings, charts, graphs, audio recordings photographs and other materials. At this stage, rough sketches of the pertinent concrete media to be included in the unit such as money-Naira and kobo, resources persons, real goods in the learner‟s environment were made. The planning covered taking decisions on pictures to be copied, newspaper cuttings to be made, and official documents to edit. The audio tapes and the film previewed prior to use. The intermix of the media were planned and the sequenced steps determined for large class size, group and individualized presentation. A trial run revealed the necessary changes made.

C) Bias Due to Hawthorne Effect

This contamination occurs when experimental conditions are artificial, and the objects become aware that they are being used for an experiment. This was controlled by allowing teaching and testing take place within the normal school time-table. The actual instruction on the units were given by the regular Economics teachers in the four schools involved in the study. The researcher was not directly involved in the administration of the treatment.

D) Rosenthal Effect

This is a type of bias caused by the subjective evaluation of students‟ achievement and retention of content learned. This was controlled by the use of a set of 50-item 5-option economics multiple choice objective text format.

E) Undesirable Sensitization of Subjects

This is a form of contamination which occurs when the pretest influence sensitizes the subject and through attention focusing influence improves the instructional effectiveness of the treatment. To control undesirable sensitization of subjects from interaction effect of tests and treatment, the administration of entry behaviour test, pretest, achievement and retention tests followed the usual continuous assessment evaluation.

Grouping Students into Ability Levels

The various classes of students used for the study were grouped into high, middle and low ability levels. The teachers used the students‟ raw scores from the entry behaviour test and pretest and the first term economics test scores to group them. The following criteria guided the groupings:

70-100-High ability
50-69-Middle ability
0-49-Low ability.

All students who scored 70 marks and above were grouped under high ability, while students who scored between 50 and 69 marks were grouped under middle ability. Students who scored,0 to 49 marks were grouped under low ability.

Pre-testing

After grouping students into high, middle and low ability groups, they were pretested using the 50-item economics cognitive achievement test on the subjects. The instrument was administered on the subjects and their result recorded prior to commencement of treatment. The exercise provided confidence that the schools were experimentally equivalent at the entry stage, thus meeting the requirement to make comparisons at the performance of the control and experimental groups at the post instructional stage.

Treatment

The main treatment for the study was teaching the experimental and control groups with some variations. The 110 students in the experimental groups received multi-media instructions, while the 97 students in the control group were presented instruction without the multi-media approach. The classes of the control group were conducted in the regular manner which consisted of expository teaching and learning with sole reliance on the chalkboard and teacher talk. All the 110 students in the experimental and 97 students in the control groups were exposed to the same lesson content with the major difference being in the methods of teaching.

Post Testing

The achievement test was administered, immediately after the treatment phase of the experiment. This was followed by the retention test two weeks after the achievement test. The scores of the students were noted and recorded.

Method of data Analyses

Descriptive and inferential statistics were used to analyze the data obtained from the study. The descriptive statistics involved the computation of the means and standard deviations from the achievement and retention test scores of students classified into

experimental and control groups, and ability levels. The computed means scores were used in answering the six research questions. The six hypotheses were tested using the inferential statistics which involved the use of a 2-way analysis of covariance (ANCOVA) with the pretest scores used as covariate to the post-treatment scores. The achievement and retention test scores were used as dependent variables in all the ANCOVA analysis. All the hypotheses were tested at 0.05 level of significance. The reason for using analysis of covariance in testing these hypotheses was the inability of the researcher to achieve accurate equivalence of teacher personality, qualifications and experience. There was also the inability to match the intact groups completely on their measures of general intelligence (I.O.), and to attain complete equivalence of practical operations of conditions across the groups. The Analysis of covariance (ANCOVA) was primarily used in this study as a procedure for the statistical control of the extraneous variables and as the statistical solutions which removed from consideration the effect of uncontrolled pre-existing differences among the intact groups. Additionally, ANCOVA served to reduce the error variance and thus increased the precision of testing the null hypothesis of the research by partitioning out the variation attributed to the covariate Hinkle, Wiersma and Jurs (1988) asserted that:

The analysis of covariance is used primarily as a procedure for the statistical control of an extraneous variable. The two potential benefits of using ANCOVA are: for an adjustment for pre-existing differences that may exist among the intact groups prior to the research, and for reducing the error variance.

Additionally, where the value of F-ratio indicated a difference, a multiple classification analysis (MCA) technique was used to find out the direction of the difference. In all these analyses the pre-test scores were used as a covariate.

TUTOR MARKED ASSIGNMENT

Use this opportunity, after studying this example, to design the study you chose the topic in the previous units. Submit your work to your facilitator in this course (EDT 823) for assessment.

Unit 4 DEFINITIONS OF STATISTICS AND THE COMMON TERMS USED IN STATISTICS

1.0 INTRODUCTION

In the previous module – module 5. We described a number of decisions which were taken regarding the collection of data before ever the data were collected. There we were made to understand from the practical example given that the purpose of the

study is to determine the effects of multimedia approach on retention of high, middle and low ability students in secondary school economics.

The target instrument for data collection, the multimedia instructional package, the pilot study, the experimental procedure and method of data analysis were systematically planned to ensure that in the study, a pretest– post – test control group quasi – experimental research design successfully generates data to determine if significant difference existed between experimental group taught economics with multimedia approach and control group taught with talk – chalk approach using retention test in Economics (RTE). It may interest you to know that when the Data are obtained after the research is conducted, they will be meaningless until they are statistically analyzed.

That is to say that in the original form, in which the data were collected were usually a confusing meaningless retention test scores until descriptive statistics using analytical tools and procedures presented the data in a more usable and meaningful form. In addition, the inferential statistical analysis will explore the hypotheses and determine the effects of multimedia versus talk and chalk approaches upon the performance of experimental and control groups in terms of the retention test to determine if significant differences existed between them.

You may not be aware that descriptive and inferential statistics perform different functions in statistical analyses. While descriptive statistics as a method or tool is concerned with the organization and presentation of data in a convenient, usable and communicable form. The inferential statistics is concerned with addressing the problem of making broader generalizations or inferences from sample data to populations.

Thus in units 2 and 3 we shall be discussing the nature and basic tools for descriptive and inferential statistics. But before discussing the two, one after another you will be exposed to the definitions of statistics and the common terms used in statistical analyses in this unit – unit 1

After studying the unit, you are expected to have achieved the objectives listed below.

OBJECTVIES.

After studying this unit, you should be able to

1. Define statistics
2. Define some terms used in statistics.
3. Exhibit the proper frame of mind to accept the concepts of statistics including media research.
4. Exhibit a healthy attitude of skepticism and the habit of thinking statistically.

MAIN CONTENT

Definition of Statistics.

Statistics as a term has been variously defined in literature as numerical information, a summary of numerical information and as a discipline in literature. Adamu and Johnson (1975) defined statistics as "a collection of numerical data." (p. 2). It appears, it is from this definition that we have phrases like trade statistics, food statistics, price statistics etc. As a plural of statistic, Adamu and John (1975) also defined statistics as "a summary of a collection numerical data expressed as the total, the minimum, the maximum, range, the average etc of such data" (p. 2). As a method of dealing with data, Akuezuilo (1993) defined statistics as a tool concerned with the "collection, organization, presentation, analysis and interpretation of numerical data" (p. 74).

These definitions stressed statistics as a tool of treating data so that they are summarized and reduced to a point they are interpretable. Thus, statistics enable us to draw general conclusions to make predictions about what will happen under certain conditions. In addition statistics help us to make or take decisions on the basis of available numerical information. One of the areas statistics has tremendously helped us to take decisions is in educational media research. In media research circles statistics have become a handy tool for solving the day to day problems.

In describing the functions of statistics in educational media research, certain terms would be used which you may or may not be familiar with. It is important therefore, for you to learn the meaning of the common terms which will be employed repeatedly throughout our discussion of the functions of statistics in media research in the next section.

SELF – ASSESSMENT EXERCISE 1

Define statistics using your own words.

3.1.1 Definitions of the Common Terms Used in Statistics.

In the last section, you learnt the meaning of statistics. It is hoped that you gathered that statistics is a tool concerned with the collection, organization, analysis, presentation and interpretation of numerical data or facts or observation. It may interest you to know that in describing the functions of statistics, certain common terms which you may or may not be familiar with will be used. In this unit therefore, you will be exposed to the definition of the common terms used in statistics. The common terms used in statistics are namely: variable, discrete variable, continuous variable, observation, population or universe, data, frequency or enumerative or categorical data, sample, random sample, purposive sample, parameter, statistics. You will now be exposed to their meanings one after the other as follows:

Variable is a feature possessed by the members of a population. The value of such feature may be only in integers or in any kind of real numbers. Examples of variables are age, weight, height etc. (Adamu & Johnson, 1975). Variable also means a characteristic or phenomenon which may take on different values such as weight, I.Q and age etc, are variables since they can take on different values when different individuals are observed. A variable is contrasted with constant value of which never changes for example multimedia Approach and students‟ retention scores.

Discrete variable – A discrete variable takes only integers as values. Example, number of pupils in a class, size of family etc.

Continuous variables takes any kind of real numbers measured not counted. But it can be observed in discrete form. Example, weight, age, time etc.
Observation - observation is a value of a variable for a member of a population. For example, the following are marks in mathematics for 5 members of the class. 60, 90, 49, 20, 61. These values are called observation.

Population or universe – is a complete set of individuals, objects or measurements having some common observable characteristics. Thus all Nigerian citizens of voting age constitute a population or universe.

According to Adamu and Johnson (1975) "population is a collection of the individual items, whether of people, or things, that are to be observed in a given problem situations. A population can be finite, countable or uncountable" (pp. 2-3). From this definition, we can perceive collection of individual item as a collection of human beings, animals like birds, goats, cattles and rats, inanimate objects like chart, graph, film, radio, chairs, and even a part of a given population like NOUN students participating in research and media tutorials.

Sample – is a subset of a population or universe. Sample is a part of a population observed for the purpose of making scientific statement about the population. A sample can be random or purposive.

A random Sample – is obtained by using a table of random numbers, tossing of a coin, throwing a dice, drawing slips of paper from a container, in selection of the members of the sample from the population.

A sample is purposive if the members are selected judgmentally. i.e. not selected by using any of the methods given above.

Data are numbers or measurement which are collected as a result of observations. They may be head counts (frequency data – example number of individuals or they

may be scores as on a retention economics test. Frequency data are also referred to as enumerative or categorical data

Parameter – any characteristics of a population which is measurable. For example the proportion of registered democrats among Nigerians of voting age. A times Greek Letter (e.g μ, a) are used to represent population parameters.

Adamu and Johnson (1975) defines parameters as "a characteristics of a population which helps to summarize information about the population with regard to the variable under study-" (P.3).some of common parameters are measures of location and measures of dispersion

A frequency is the number of times each value or group of values of a variable occurs.

Statistics, a number resulting from the manipulation of raw data according to certain specified procedures. It is common to use a statistics which is calculated from a sample in order to estimate the population parameter. For example, a sample of Nigerians of voting age is employed to estimate the population of men in the entire population of voters. We shall employ statistic letters (e.g. x, s) to represent sample statistic. You are now aware of the common terms used in statistics. Why not test your understanding of then by answering this question.

SELF ASSESSMENT EXERCISE 2

Identify 4 common terms used in statistics and define one.

3.2 A Word of Advice to you not to be scared of Statistics.

In the last section, you learnt the meaning of the common terms used in statistics. It is hoped you gathered that statistics is the scientific method of decision making that expresses itself through these terms. In this section, your teacher this course material, has a word of advice to you. Since every good student listens to his or her teacher, it is hoped that you will listen to your teacher – the course material. The facilitator is not your teacher but your helper in addressing your course material comprehension difficulties and experienced problems during tutorials. After listening to your teacher, the course material, it is hoped that you will approach statistics with healthy frame of mind and attitude of appreciation of statistics. It is the most exciting fields of study and application in virtually all areas of human endeavour including educational media research.

This course material on (EDT 823 – Research and Media); It is your teacher. It asked you to think for a moment and ask yourself this question: Who am I? To answer this question, you should understand that you are absolutely unique. No one else possesses your physical features, your wonderful intellectual make up, your personality characteristics, and your value system. Do you know that one of your

uniqueness is that you are naturally a statistician? You are an enormously sophisticated statistical instrument for decision making ever created by the Almighty Jehovah God our maker.

Indeed, every moment of your life provides testimony of your being a statistician with ability to receive, integrate and process a wealth of sensory information and then to act upon this information in an instant to decide a spectrum of possible causes of action. This aspect of decision making that has to do with numerical information is statistics.

It is interesting for you to know that the decision you make from sensory data is correct. To illustrate, every moment there is some kind of decision for you to make. What to eat, what to wear to attend tutorials, whether to play or read your course materials or not and so on. Decisions are part and parcel of your everyday life. Thus, you make decisions uncounted millions of times each and every day of your life. It is for this reason that you should regard yourself as a sublime mechanism for generating statistical decisions in this sense, you are already a statistician.

Without doubt, in daily living, your statistical functioning is usually informal and loosely structured. It is therefore true to state that you behave statistically. Although you may be totally unaware of it. Since you are a decision maker or taker and statistics is the scientific method of decision making. STATISTICS IS IN YOU. You are a statistician. This is the reason you have been calculating arithmetic means almost all your life; calculating your test average in your courses. YES STATISTICS IS IN YOU! Now say to yourself – statistics is in me.

Now that this course material – your teacher – attempts to provide you with some of the formal procedures for collection and analyzing data, and for making decisions or inferences, based upon theses analyses, you should constantly draw upon your previous natural statistical knowledge and experiences and relate them to the statistical content aspect of this course material.

You are expected to use the statistics in you to study the statistics in this course material. So that your study of statistics becomes most interesting and exciting and should not become a series of dreaded exercises.

You may not be aware of it that if it is approached with the proper correct frame of mind, statistics can be one of the most exciting fields of study. It will interest you to know that statistics has applications in virtually all areas of human endeavour and cuts across countless course of study including educational media research. Do you know that one 19th Century prophet remarked that statistical thinking will one day be necessary for efficient citizenship as the ability to read and write? (Rulon, 1944), you are today the fulfillment of this prophecy with your apparent habit of thinking

statistically. You are urged to keep this thought constantly in mind. Statistics in this course material will be much more exciting, interesting and profitable to you if you develop the habit of thinking statistically. Because practice makes perfect, constantly attempt to apply statistical concepts to all your daily activities, no matter how routine.

If you are in an urban setting where traffic is controlled by electric light; when you are stopped at an intersection which you cross frequently, carefully, note the time the traffic light remains red. Make some estimate of the length of the green cycle. If it is red three minutes and green two, you should expect that the chances are three in five that it will be red when you reach the intersection start collecting data. Do you find that it is red 60% of the time as expected? If not why not? Perhaps you have unconsciously made some driving adjustments in order to change the statistical probabilities. From now, when you see statistical information being exhibited, remember you are naturally a statistician and statistics is in you, then develop a healthy attitude of skepticism. Ask pertinent questions on the issue under consideration, Ask how the sample was obtained. Was it at random, or is the sample selected on the basis of prior information indicating a rather careless selection. Do not jump to conclusion.

Watch advertisements on television and in newspapers. When it is claimed that "Choco milk is more better" ask "more better than what? What is the evidence? If, you, indeed, make statistical thinking an everyday habit, you will not only find the study of statistics in this course material and its application to research very interesting, but the life you live will appear different and perhaps, more interesting and fulfilled.

SELF ASSESSMENT EXERCISE 3

State one benefit you will have from developing a healthy attitude of statistical skepticism.

4.0 CONCLUSION

This unit is a very interesting unit, particularly as it has exposed you to the definitions of statistics and the common terms used in statistics. You have also had a word of advice and encouragement from your teacher, the course material not to be scared of statistics. The urge for you to develop a healthy attitude of statistical skepticism ended the unit.

5.0 SUMMARY

The main point in this unit are as follows:

1. Statistics is defined in literature by many authors in various ways. First it is defined as a summary of a collection of numerical data express as the total, the minimum, the maximum, the range, the average of such data

etc. Second, as a collection of numerical data or facts and the third as a method or tool concerned with the collection, organisation and analysis of numerical data or facts.

2. A number of terms commonly employed in statistical analysis were defined.
3. Finally, it was pointed out that statistics is one of most exciting fields of study and not a series of progressive exercises in calculated masked tingling tedium, if approached with the right frame of mind, you are urged to develop the habit of thinking statistically and to constantly attempt to apply statistical concepts to all your daily activities no matter how routine, including your research activities in educational media research.

ANSWERS TO THE SELF ASSESSMENT EXERCISES

EXERCISE 1

1. Statistics is a collection of numerical data or facts which are expressed in terms of summarizing statements and which have been collected either from several observation or from other numerical data.
2. Statistics may also be defined as a method of dealing with data. This definition stresses the view that statistics is a tool concerned with the collection, organization and analysis of numerical data or facts or observations.

EXERCISE 2

1. Variable (2) Data (3) Population or Universe (4) Sample

A Sample is a subset of a population or universe.

EXERCISE 3

It will help develop effective thinking which is both creative and critical. Creative thinking will help me in the formation of possible solutions to a research problem in educational media using statistical tools. Or it may possibly help me make adequate explanations of a phenomenon in media design, development, use and research. Critical thinking will help me, on the other hand, in the testing and evaluation of the proposed solutions in all aspects of research in educational media.

In addition it will sharpen my use of the steps of the scientific method of decision making or taking i.e. statistics. Such as in: (1) observation (2) problem identification which involves asking questions about the observations made (3)Hypothesis formulation which involves guessing or proposing answers to the questions posed

(4) Experimentation to provide the necessary evidence for accepting or rejecting the proposed answers or hypothesis. (5)Conclusions which can be redefined, modified, and clarified when the situation arises (6) Theory formulation. Finally it will help me to become objective and concentrate on the pursuit of truth in all the problems I take up, no matter how unpleasant or threatening it may be. This will assure me that my final decision is sound. It will also enable me develop a sense of discipline, be open to my feelings and exclude them when they are not relevant and include them, when they are, and be able to discern the different. The above teaches me that thinking statistically is very important but it requires practice both for understanding the statistical tools fully and for developing skill in applying them particularly in educational media research. In fact, what stops me from practicing now? Practicing statistics I must.

6.0 TUTOR MARKED ASSIGNMENT

1. Define statistics as a tool or method of dealing with data.
2. Indicate which of the following is a variable or a constant:
   (a) Number of days in the month of August
   (b) Age of fresh students entering NOUN
   (c) Time it takes to complete (TMA) assignment

7.0 REFERENCES/FURTHER READING

Adamu, S. O. and Johnson, T.L. (1975) Statistics for Beginners. Ibadan: Onibonoje publishers and Book Industries (Nig.) Ltd.

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UNIT 5 DESCRIPTIVE STATISTICS

1.0 INTRODUCTION

In the last unit, you learnt the meaning of statistics, the common terms used in statistical analysis and you received a word of advise. It is hoped that you understood that statistics when regarded as a method of dealing with data, is defined as a tool concerned with the collection, organization and analysis of numerical facts or observation or data. When statistics is regarded as a collection of numerical data or facts which are expressed in terms of summarizing statements and which have been collected either from several observations or from other numerical data, it is defined as a collection of statements such as the average 1.Q of SS 111 students, is high or seven out of fourteen NOUN students prefer electronic examination to the traditional examination. You also learnt that a distinction may be made between the two functions of the statistical method namely: descriptive statistical techniques and inferential statistical techniques. In this unit, you will be exposed to the meaning of the descriptive statistical techniques and the tools of statistical analysis. After studying this unit you would have achieved the objectives listed below:

2.0 OBJECTIVES

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

1. Define descriptive statistics
2. Identify the different descriptive statistical tools
3. Explain when and how to use descriptive statistical tools for data analysis in educational media research.

3.0 MAIN CONTENT

3.1 Definition of Descriptive Statistics

Would you be able to recall the definition given to statistics in unit I? If so, well done! As was stated in that unit, statistics is a tool concerned with the collection, organization and analysis of numerical data or facts or observation. In other words, statistics is the processes for gathering, organizing, analyzing and interpreting numerical data. Since such quantitative data are yielded by research, statistics is a basic tool for measurement and analysis in research (Best, 1981).

The question now is when does statistics as defined above become descriptive? When statistics is concerned with the organisation and presentation of data in a convenient, usable and communicable form; then it is descriptive statistics. (Olaitan and Nwoke, 1988). A researcher uses descriptive statistical method in analyzing data when he or she is interested in merely describing the characteristics of the group studied. Thus descriptive statistical analysis then limits generalisation to that particular group observed. And conclusions drawn from the study apply to that group alone.

According to Ali (1996) "Descriptive statistics are used in analyzing data that are merely descriptive such as for answering research questions only. Descriptive statistics are therefore used for describing data" (p. 57). Bear in mind that analyzing data or data analysis means the treatment of data so that they become summarized or reduced to a point they can be meaningfully interpreted. We can illustrate the above statements with example.

Let us imagine that a researcher administers a pretest to 42 students before treatment in economics. And at the end of the test grading, the test score for the 42 Economics students were recorded as follows:

39	54	55	60	42	48	55	60	55	48	51	85	65
53												
35	56	62	52	56	52	58	34	48	60	48	68	55
52												
52	58	42	47	60	46	65	46	51	34	65	39	59
47												

In this their original form as collected, these scores are usually confusing and meaningless. The scores or data need to be organised in some systematic way to make some sense and convey some meaning out of them.

The research will employ descriptive statistics to perform its descriptive functions of organizing the scores. The research may do the following:

1. Rearrange the scores and group them in various ways, in order to be able to see at a glance an overall picture of these scores by using frequency distributions.

2. The research may construct tables, graphs, and figures to permit visualization of the results by using graphing techniques.
3. He or she may convert the raw scores to other types of scores like percentile ranks, standard scores, standard Normal distribution which are more useful for specific purposes
4. He or she can calculate average, to learn something about the typical performance of studies in this subject using measures of central Tendency – the mean, the media and the mode.
5. He or she may employ the average as a reference point and describe the dispersion of scores about this central point, by use of measures of variability or measures of dispersion – (The Range, Mean deviation the variance, standard deviation).
6. The research may even wish to determine the relationship between intelligence and these classroom scores by use of correlation coefficient, regression and prediction. The statistic for describing the extent of this relationship is called correlation coefficient.

From these illustrations, we can say that descriptive statistics is for describing data are the measures of central tendency (mean, mode and the median).
The measure of dispersion or variability (the standard deviation, range, percentile.
In conclusion, descriptive statistics are useful in so far as they enable us to reduce a mass of raw data to a point where we are able to determine how close (centrality) or how far apart (dispersion or variability) each score is from a fixed point. (Ali, 1996).

SELF – ASSESSMENT EXERCISE 1

Define descriptive statistics.

3.2 Descriptive Statistical tools

In the last section, you learnt the meaning of descriptive statistics. In this unit, you will learn the tools for descriptive statistical analysis.

1. Descriptive statistics performs the function of organizing a set of data with the following tools:
   frequency distribution, relative frequency distribution, cumulative frequency distribution and cumulative relative frequency distribution, Tables.
   - Graphs, frequency distribution namely: frequency and polygon, relative frequency histogram and polygon, cumulative frequency histogram and polygon and cumulative relative frequency histogram and polygon.
2. Table. a table is a two dimension representation of statistical information or data. It organizes information on the attributes under study in such a way that the relationship between all the data on the attributes can be seen and understood at a glance. When data consists of the frequencies (i.e. number of times events or things occur) a simple table can be built up which shows against each attribute studied the number of times it has been noted. A table

is also usually drawn to assemble data required to test hypotheses. Depending on the data obtained, a table can be simple or complex.

3. Graphs. atimes, it is easier to visualize the nature of data distribution when the data is shown in a graphic form. Table of data involving only one variable can be represented pictorially using bar – graph or pie diagram.

The tools that descriptive statistics uses in data analysis describing characteristics of a typical score in a group of scores or the spread of a group of scores or the extent of difference among the scores in a group etc are:

1. Percentages-presenting data by frequency counts has a number of limitations. If the groups to be compared are unequal in size, the frequency count may have little meaning. It is then better to translate the frequency counts into percentages. This enables the researcher to compare subgroups of unequal size meaningfully.

   Translating frequency counts into percentages indicates the number per hundred compared. The use of common base of 100 make the comparison clearer.

Percentage is one of the simplest statistical tool often used in analysis of data in educational media research. For example, suppose in a study out of154 teachers in a school, 30 used media in teaching Economics while 124 did not. You can determine the percentage by simply dividing the number of teachers by the number that used media in teaching Economics, and then multiply the quotient by 100.

i.e.

$$\frac{30}{154} \times \frac{100}{1} = 19.5\%$$

Thus, 19.5% of the teachers used media while 80.5% did not. You are to notice that the percentages for all the teachers in the school add up to 100. This is because percentages is expressed on the hundred point scale in which 0% means that there were no cases of the sample being studied. 50% means that half of the sample is present, to 100% which means that all the sample being studied are present in the school under reference.

2. Measures of Central Tendency or Average – provide some basis for describing the characteristics of a group or groups. Three common measures of central tendency are the mean, the media and the mode.

The mean is the arithmetic average obtained by adding the scores of sample together and divide the total by the number of subjects. The symbol for the mean is $\underline{x}$ and the formula for calculating the mean is:

$$\underline{x} = \frac{\Sigma x}{N}$$ where

X = the score of each subject in the sample

N = Number of subjects or items in the sample

Σ = sum of

The mean is very useful in media research data analysis. This is because beyond the information it provides, it serves as a base from which many other measures are computed, one example is t – testing for significance difference of the two independent means.

- The median – is a point in the distribution that has exactly the same number off scores above it as below it when all the scores are arranged in order the specific point at which the media exists in a given distribution is a bit different depending on whether the number of individuals in the group is odd or even. If N is odd, then the media is the middle score in the distribution. However, if N is even then the media is a hypothetical score value midway between the two scores that occupy the mid-point in the distribution.
- The mode – is the score that occurs most frequently in a distribution. It is located by inspection rather than computation. For data grouped in intervals the mid point of the most frequently occurring interval is the mode (Azuezuilo, 1993)

It may interest you to know that:

- The median reflects only the score value that divides a distribution into two equal parts; and
- The mode reflects only the most frequently occurring score in a distribution.

From these, the alteration of a single score or some scores in a distribution may not change the media or mode of the distribution. Such an alteration will definitely change the mean of the distribution.

The measures of central tendency is very important tool for analysis of data in educational media research. When a researcher administers a test to students and scores it. He or she is left with a set of scores. And a single score on its own has no meaning except when compared to a standard depicting the performance of the whole class particularly in a norm – reference test. The researcher naturally would be interested in the performance of each student. However, to effectively interpret the student‟s score, the researcher needs to compute some of other indices that would provide a standard for comparison. An index of central tendency of the students‟ score distribution provides the required standard. The researcher is expected to compare the performance of any student against the average score of the whole class. This would enable him or her answer such questions as: does the student earn more or less than the average score of the whole class? This a very important question for the researcher because a single score on its own has no meaning except when compared to a standard showing the performance of the whole class.

The procedure a researcher would adopt in determining the average performance of his or her subjects in a test is computing the score of the distribution, except when the distribution is highly skewed. In such a case, the median score depicts the typical performance of the whole class. The researcher would only use the modal score to supplement any information from the mean or median especially when the distribution has more than one mode. Thus, a measure of central tendency would provide the required standard against which scores of individual students are compared. (Okpala, Onocha and Oyedeji, 1993).

3. Measure of dispersion or spread of scores describe how much the scores spread out from high to low scores. The tools of measures of dispersion include the range, the semi-intequartile variance and standard deviation. To know more of these tools you are referred to the referenced text. This will enhance your active participation in the learning process. Learn their meaning and how to compute them in all cases.

4. Measures of Relative Position

Another descriptive statistics for describing data is measures of relative position. It is used to interpret test scores of students. It gives you an indication of where a score is in comparison with the other scores in the distribution. Based on such indication, it is then possible for you to known how well an individual student performed on a test compared to all those students who took the same tests. It is also used to compare a student‟s test results in two or more different test to find out in which one he or she did much better, the test scores notwithstanding. The measuring tools of relative position are percentile ranks, standard scores –Z– score, T– score and stanire.

Percentile rank of a person, on a test, is an indication of the percentage of scores which fell below his or her score. A person‟s percent is very useful means of reporting public examination test results in which a nation wide comparison is implicit so that one can know at first glance how he or she compared with other students on the same examination.

Standard scores are used for measures of relative position. Standard score is a derived score which expresses the distance of a raw score from a reference point, typically the mean, in regard to standard deviation units. Two types of standard scores are the z scores, stanine and the T – scores.

It may interest you to known that standard scores provide us a means of comparing one‟s scores in several different subjects. Such a comparison is not possible with the mean; it is not possible to have a mean for a students‟ performance on geography, economics, history, biology, mathematics at the same time. The use of standard scores allows ones results in different subjects to be compared on a common scale.

By converting ones test scores to standard scores we can average these scores and get one valid final measure of his or her grade. Z – score expresses how far a score is from the mean in terms of standard deviation units.
The Z score formula is:

$$2 = \frac{x - \underline{x}}{_{S}.D}$$

Where x = score on a test
$\underline{x}$ = mean score on a test
S.D = Standard deviation value of a test.

5. Measures of Relationship – attempts to determine the nature and scope of relationships, if any exists between two or more variables. The degree of relationship existing between variables is referred to as correlation (γ) while the statistic index of measuring it is correlation coefficient . correlation coefficient presents a picture of how a change in one variable results in a change in the corresponding correlated variable. When two variables are positively highly correlated it means that both variable have a correlation coefficient close to a perfect correlation, + 1. In extreme case, there may not be any relationship at between variables. Both variables in such circumstance have neutral correlation. With a negative correlation, high score on one variable is matched with low score on the second variable and vice versa. (Ali, 1996).

You should note that correlation (represented with r) is an important measure of relationships in educational media research in terms of predictions we make on some variables based on how these correlate with other related variables. It makes it possible for one to make predictions on the basis of correlation coefficient. It is interesting that you note that when two variables are strongly positively correlated, it does not mean that one causes the other. Causation can only be established through controlled experiments not correlation studies. The two tools for calculating correlation coefficient are by the product moment correlation and the Spearman (rrho) (row) if you want to know more about these, read the recommended test in the further readings.

SELF – ASSESSMENT EXERCISE 2

What tools do the following descriptive statistics use for data analysis:

- Measures of central tendency
- Measures of relative position
- Measures of relationship

4.0 CONCLUSION

In this unit, you have learnt the definition of descriptive statistics and the tools, you also learnt their importance. It is hoped that you understood that descriptive statistics summarizes and describes data with regard to centrality, spread, relative position and relationship. The specific statistical tools for doing these were discussed.

5.0 SUMMARY

The main points in this unit are:

1. Data by themselves convey little or no meaning until descriptive statistics describes them and
2. Descriptively summarizes them with regard to their centrality, relative position and relationship.

The specific statistical tools for describing data are percentages, means, median, mode, range, semi-inter-quartile, variance, standard deviation, standard score, Z – score, T – score and stanine.

ANSWERS TO SELF-ASSESSMENT EXERCISES

EXERCISE 1

Descriptive statistics is concerned with the organisation and presentation of data in a convenient, usable and communicable form.

EXERCISE 2

- ♦ Mean, median, mode.
- ♦ Percentile ranks, standard scores Z – score, T – score, Stanine.
- ♦ Spearman rrho (row), product moment correlation or Pearson.

6.0 TUTOR MARKED ASSIGNMENT

Give reasons why you would use specific descriptive statistics for sumarising your research data.

7.0 REFERENCES/FURTER READINGS

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UNIT 6 INFERENTIAL STATISTICS CONTENTS

1.0 INTRODUCTION

In the last unit, you learnt the meaning of descriptive statistics the tools and their Importance. It is hoped that you gathered that Descriptive statistics organizes, summarizes describes and interprets data with regard to centrality, spread, relative position and relationship. The specific statistical tools descriptive statistics used in doing these are percentages, mean, median, mode, percentile ranks, standard scores, Z-score, T-score, stanine, spearman rrho (row), product moment correlation or pearson. You learnt too that descriptive statistics only lend themselves to descriptive and predictive purposes, they can not be used for establishing a cause and effect relationship between two variables in experimental research situations the purpose is to explore hypothesis of a general nature. This is for inferential statistics to do.

In this unit, you will learn the meaning of inferential statistics, the tools and when and how to use the inferential statistical tools to make valid inferences from the sample to the population. After studying this unit you will achieve the objectives stated below.

2.0 OBJECTIVE

At the end of this unit you will be able to

1. Define inferential statistics
2. Describe the inferential statistical tools and the situation under which to use them
3. Discuss the major considerations affecting the use of inferential statistics for treating research data.

3.0 MAIN CONTENT

3.1 Definition of Inferential Statistics

You may be aware that in research in educational media we may have the need to use our data to establish a cause-effect relationship between two variables. We can do this when the researcher manipulates the independent variable. Usually, randomly sampled subjects are used for experimentation. Data obtained from observation on the sample are generalized to the population from which sample was drawn. We use inference or induction to generalize experimental research result to the population. The statistics which helped us to make valid inferences from sample

to population are called inferential statistics. From this perspective Olailan and Nwoke (1988)state that inferential statistics involves "the process of sampling and the selection of a sample that is assumed to be representative of the population from which it is drawn based upon the characteristics of the sample, results can be generalized to the population"(P.145)

It may interest you to recall that the major concern of descriptive statistics is to present information in a convenient usable and understandable form. Inferential statistics, on the other hand, is concerned with generalizing this information or more specifically with making inferences about populations which are based upon samples taken from the population. Thus, inferential statistics make valid inferences from the sample to the population. Ali (1996) said "inferential statistics are the most powerful and sensitive tests for use in data analysis" (P.139). So statistical inference is a means of vigorously estimating parameters; population characteristic, from the statistics of sample characteristics, based on the laws of probability. Errors can be introduced in inferential statistics which can mitigate the strengths of inferencing. This errors are called internal and external threats. However, to minimize the mitigation threat inferential statistics are used in line with complying with certain underlying basic assumptions. The underlying assumptions are:

(1) The samples are randomly composed not selected. And the randomly sampled groups are independent of the population and of each other. That is, no contamination between sampled groups, and between sample and population and the composition as well as the observation of the sample are interpedently done.
(2) The variable studied is normally distributed in the population such that the samples have equal or nearly equal variances
(3) The scales of measurement of variables are in interval or ratio data not nominal or ordinal. (Ali,1996).

You may wish to note that inferential statistics are means of establishing cause-effect relationships between two variables as probability statements. The researcher is, most likely concerned with determining how likely it is that results from the his or her sample can be generalized to the population, that is determining whether there is a statistical difference between x and y as they affect z, some conditions of error not withstanding. Also, there are those tools inferential statistics use for data analysis which needs considerations. We shall discuss this in the next section meanwhile, it is hoped this material is not too difficult for you to understand. However, you may test your understanding of the material by doing the following self-assessment exercises.

SELF-ASSESSMENT EXERCISE 1

Define inferential statistics in your own words, and identify just two assumptions,

3.2 Inferential statistical Tools and when to use them.

In the last section, you learnt the meaning of inferential statistics and the assumptions. In this section, you will learn the tools of inferential statistics for data analysis and how you may use them. What are the tools of inferential statistics, you may ask? Read on and you will get the answer. There are a number of different tools of inferential statistics available for analyzing data. The statistics to be used would depend on the type of the study design and sometimes on the number subjects per group. For example, in a two group comparison of randomly composed and unpretested subjects having independent means, if the number of the subjects per group is less than 30, a t test of two independent means is appropriate. However, if there was a pretest-posttest and subjects selected per group is more than 30 for a posttest only a critical ratio test of independent mean is appropriate. In three or more group comparison of independent mean in which there was no pretest and one independent variable is involved an analysis of variance is the appropriate statistics to use; if however, two or more independent variables are involved, a multiple or multifactor analysis of variance or path analysis or meta-analysis is appropriate. In a pretest-posttest design, analysis of covariance statistics is appropriate. But if more than two groups are involved in a pretest-posttest design study and two or more variables are involved in the design, a multiple or multifactor analysis of covariance is appropriate. If you want to determine the significance of the difference between what you expect and what you observe, the chi-square test of significance is appropriate.

Before we proceed any further let us list the tools of inferential statistics for data analysis. If you will recall from this discussion the tools are:

- T-test of independent means,
- Analysis of variance (ANOVA)
- Multifactor Analysis of variance (MANOVA)
- Analysis of covariance (ANCOVA) The above listed tools are parametric tests.

Non parametric tests include the Chi-Square test, Manun-Whilne Y U test, sign test and the Wilcox matched-pars signed ranks test. These tests are used when the nature of distribution of the population parameters from which the research samples are drawn are not known to be normal as well as when the variables are in nominal or ordinal form. For this reason, they are less precise and have less rigorous power than parametric statistics to the extent that using non-parametric statistics poses the real danger of one very likely accepting a null hypothesis that should be rejected. This fear, in part, explains why many researchers in educational media do not use non-parametric tests. However, non-parametric design has merit not making any assumption about the population distribution parameters from which the sample was drawn. If the sample differs from the population, an escape value left open by using this technique explains any difference between what was predicted to happen but did not happen and what then happened that was not predicted. (Ali, 1996).

To show you how each inference tool is calculated with worked examples using any given formula in this course material is not in your own best interest. To urge you to often refer to the recommended test for further readings of the worked examples is a desirable step to encourage you to take responsibility for your own learning at your own pace.

It will also provide for your participation in the statistical computation practice in a varied form, for your response, and for immediate feedback to your response. The worked examples in the books recommended for your further readings were evaluated and found fit to provide you realistic computation context for your practice with feedback through self-learning individualized activities. But before then answer this self assessment question posed below.

SELF ASSESSMENT EXERCISE 2

Carefully distinguish between descriptive and inferential statistics.

3.3 Major Considerations on how to use inferential statistics

In the last section, you learned inferential statistical tools and when to use them, in this section you will learn the major considerations on how to use inferential statistics. You may wish to know that there are certain important considerations which affect the use of inferential statistics. These considerations are important because they play some roles on how you use inferential statistics for decision making in research in educational media. The considerations include decisions on the hypothesis formulated to be tested, the level of significance of the testing to be done; the concept of degree of freedom that should exist between and within comparative groups; the two types of errors affecting the level of significance and the method of composition of sample so that it is not a biased one.

You can understand that an experimental study involves the testing of hypothesis upon which conclusion inferable to the population are based. The hypothesis is a basic tool of inferential statistics just as surgical knife is currently a basic tool of surgeons. A hypothesis is a declarative statement based on a sample data. It establishes the link or no link between the independent and dependent variable. Such a statement indicates the outcome of an event (dependent variable) is caused by another variable (independent variable). It may indicate that an outcome is not caused by another variable. Thus, we have two types of hypothesis, namely null hypothesis and alter native hypothesis.

The null hypothesis of a no difference test of significance assumes that the independent variable did not cause the observed dependent variable and that whatever dependent variable is, was due to chance not due to the effects of the independent variable on the dependent variable.

As a consequence, the null hypothesis is one in which there is no direction of difference. Null hypothesis is, in this sense, two-tailed test of significance since it does not indicate a direction of difference. On the other hand, the alternative hypothesis assumes that the outcome of an experimental event, (the dependent variable) is caused by the independent variable. Now when two aspects of an independent variable are compared as in our example, say teaching students economics, using multimedia approach versus chalkboard only with teacher (chalk and talk) approach to determine their affects on students retention on economics test, we may state that the use of multimedia will produce better retention of what is learnt than the use of chalk and talk. In this regard we have indicated a direction of difference that raises the question: What method will be more effective in terms of enabling students retain what has been learnt?

Thus, when a hypothesis provides a direction of difference; it is called a one-tailed test of significance. But you should note also that an alternative hypothesis can be two-tailed. If we state that there is a significant difference in students retention on economics test on the basis of how they were taught by use of multimedia versus talked and chalk, without indicating which group will do better, this is a two-tailed alternative hypothesis. This is so because even though statistical significant differences in retention exist between multimedia taught and talk and chalk taught respective groups, the direction of better retention is not indicated.

The essence of knowing whether a hypothesis is a one-tailed test is determined at its own level of significance. Thus, the critical value of any inferential statistics is determined by two separable levels namely (1) the two-tailed level of significance for null and non-directional alternative hypothesis and (2) non-directional alternative hypothesis and one-tailed level of significance for directional alternative hypothesis. This implied that one major consideration you must make on how to use inferential statistics is to:
(1) Determine the type of hypothesis to test, (2) the level of significance to test it, (3) then computing the test of significance using a particular inferential statistics. (4) You will also need to determine the degree of freedom from the appropriate critical values of the particular statistics before you decide on the acceptance or rejection aspects of the hypothesis.
Finally, another major consideration in using inferential statistics is the need for ensuring that biases are not introduced through the subjects used for data collection, through the instruments used in measuring the dependent variable or through the manipulation of the independent variable. Biases will arise from selection of samples if you show bias in the way you select and assign your samples into experimental and control groups. If you select purposively or judgementally instead of randomly, biases would set in to contaminate the study. A researcher bias is a serious problem that must be avoided. (Ali, 1996).

Similarly, instrumentation error arising from instrument not being valid and reliable and without the psychometric qualities computed and assured to reliably measure the constructs they were meant for, will introduce instrument-biased error biases that can spoil the study. Again, if you wittingly or unwittingly favoured or hated one particular aspect of the research condition by preferential condition to the other, it will introduce biases into the study. And this should be avoided. You may wish to appreciate that eliminating these different kinds of biases that are potential sources of distortions to the validity and veracity of conclusion usually drawn based on inferential statistics will strengthen our assertions based on inferential test of hypothesis in an experimental research in educational media. Would you recall the practical examples of experimental study based on inferential test of hypothesis in module 5? If so well done! As was shown in that module 5, examples were critically provided for you to learn from. Consolidate what you have learnt by seeing unit 4 of module 7 also.

SELF ASSESSMENT EXERCISE 3

Identify one tool of inferential statistics used in data analysis

4.0 CONCLUSION

This unit is very interesting unit, particularly as it has exposed you to the meaning to the inferential statistics, the tools and the major considerations on how to use inferential statistics test of hypothesis in an experimental research in educational media.

5.0 SUMMARY

The main points in this unit are as follows:

1. Inferential statistics is concerned with making inferences specifically about populations which are based upon samples taken from the population. Thus, inferential statistics makes valid inferences from the sample to the population in an experimental study.
2. When inferential statistics summarizes and reduces data obtained from large samples that have been randomly composed, the generalizations of data to the population is more accurate compared to if the data were obtained from small sample and selected samples.
3. For designs of experiments certain considerations have to be made before data can be inferentially treated and interpreted.
4. These considerations and actual inferential statistical tools used in data analysis were identified with their non-parametric techniques and you are referred to further reading materials recommended with varieties of worked examples for practice and feedback.

ANSWER TO SELF-ASSESSMENT EXERCISES

EXERCISE 1

Inferential statistics is the statistics that enable us to make valid inferences from the sample to the population in an experimental study.

- One of its assumptions is that the samples are randomly composed not selected purposively or judgementally.
- The scale of measurement of variables are in interval or ratio scale not nominal or ordinal scale.

EXERCISE 2

While descriptive statistics present information in a convenient, usable and understandable form. Inferential statistics, on the other hand generalize this information or more specifically with making inferences about populations which are based upon samples taken from the populations.
Analysis of covariance (ANCOVA).

6.0 TUTOR MARKED ASSIGNED

Set up an experimental study on the media topic you have chosen for a two group quasi – experimental pretest-posttest control group design. Take time to design the study as illustrated in module 5. Conduct the study and publish your findings for your facilitator‟s assessment.

7.0 REFERENCES/FURTHER READINGS

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MODULE 4 TYPES OF RESEARCH DESIGN

Unit 1 EXPERIMENTAL RESEARCH DESIGN.

1.0 INTRODUCTION

In module 4, unit 2, we discussed research design. From that discussion, we gathered that in educational media, the framework for conducting research rests upon the design of the research. Research design is the blue print which determines the nature and scope of study carried out or proposed to be carried out. Usually the activities that are carried out within the research design specifications comprised the research methodology. Implicit in the research methodology is a section on what design was used as well as why the particular design was used. This is important because any design selected for a study should be appropriate and adequate for use in investigating the problem of the study. When this does not happen the researcher runs the risk of being stuck with a dead – end or misleading procedures, data and conclusions to the detriment of his or her study. This fact gave rise to the need to study types of research design to guide and direct researchers to select and comply with the best research design suitable for his or her study.

In this unit, we will discuss types of research design. There are two types of research design namely experimental research design and descriptive research design. We will discuss them one after the other. The objectives below specify what you are expected to have learnt after studying this unit.

2.0 OBJECTIVES

At the end of this unit you should be able to do the following.

1. Identify the different types of research design.
2. Explain each type of research design
3. Choose a particular type of research design best suited to your research work.

MAIN CONTENT

Definition of Experimental Research Design

According to Nwana (1990). experimental study is described as "any study in which the investigator deliberately interferes with the situation by controlling what groups of persons are exposed to certain conditions". (P. 72). This statements implied that the experimenter changes the values of independent variable, and observes the effect which this change will have on the dependent variable. This is what happens in the simplest form of an experiment. (Nkemakolam, 1995). Thus experimental research designs are those studies which are mainly concerned with identifying the presence of cause – effect relationship between the independent and dependent variable. This type of research design enables you to test hypothesis upon which valid, reliable, verifiable conclusions are premised. It offers a rigorous scientific approach to investigating a problem in educational media research.

You may have observed that experimental research design calls for establishing conditions under which an experiment can take place before such a design is said to be experimental. For example, experimental research design demands that subjects for the study are randomly drawn and grouped. And or the research conditions of

treatment and control be randomly assigned to subjects. Then whatever variables are to be manipulated are clearly defined and rigorously complied with to avoid contamination. Also whatever extraneous variables that can mitigate between the independent and dependent variables are identified early enough say in a pilot study before the main experiment so that how these extraneous variables can be removed or severely minimized administratively and statistically are indicated. Similarly, how observation including testing, data collection, etc are to be made by who, when and why are indicated. Again, the types of statistical analysis to be used in testing the hypothesis and reaching conclusions are assured to be appropriate and relevant. (Ali, 1996). The core demand for experiment in research in educational media is ensuring that proper controls have been established before commencing experimentations. Three levels of control are involved. The first level is ensuring that all subjects are homogeneous or equal or the same or equivalent in their entry skills, and achievement or performance before experiment starts. It may interest you to note that if all the subjects are not homogeneous before the experiment starts, the post treatment test scores across the groups of subjects after the experiment may be credited to chance and not to experimental treatment and research control conditions.

It may interest you to know the one of the ways of ensuring a homogenous sample is through pretesting of subjects to obtain a base-line entry skill data prior to the commencement of the experiment. And based on the base-line data. subjects are equally distributed to treatment and control group condition. Another way of ensuring homogeneous samples is to ensure subjects or samples are randomly drawn from the same population rather than being selected. When subjects are selected purposively. they lead to the undesirable composition of arbitrary and non-probability samples subject to researcher biases.

It may also interest you to know that the second level of control in an experimental design study is the identification of, and strict compliance with, manipulation and systematic observation of the treatment condition. While the control condition is not manipulated but merely observed. It is from doing these, that the data obtained are appropriately parametrically treated. (Ali, 1996).

The third level of control involves the sharp and clear assurance that internal and external validity threats to the study are minimized.

It may specifically interest you to know that experimental research designs may be classified based on the power of researcher to effect these control of variables. Based on this criterion, about sixteen forms of experimental research design have been identified and discussed by Campbell and Stanley (1963). For details you may wish to consult this book and others recommended for your further readings. Meanwhile we will discuss only four of the most common ones in the next section. But before then answer the question that follows.

SELF ASSESSMENT ERERCISE

Evaluate the weakness and strengths of the experiment designed in module 5 as well as the experiment you are requested to design in the light of the facts discussed in this section

3.1.1 Forms of Experiment Research Design.

In the last section, you learnt the meaning of experimental research design. It is hoped that you gathered that experimental research design are those studies which are mainly concerned with identifying the presence of cause-effect relationship between the independent and dependent variables. You also learned that various forms of experimental research design have been classified based on the researcher‟s ability to control variables of the study. In this section, you will be exposed to some forms of the experimental research design.

It may interest you to know that Campbell and Stanley (1963) described sixteen forms of experimental research design. We will however discuss the few common ones most often used in research in educational media. In discussing those forms of experimental design the following symbols explained below will be used.

R represent the random sampling of subjects, random assignment of subjects to the groups and random assignment of treatment to the groups.

X is the experimental variable (independent variable) manipulated.

C refers to the control group – the group that does not receive the experimental treatment.

E refers to the experimental group – the group that received X – the independent variable treatments.

O represents observation or test administered to subjects and which is a measured of subjects on their performance on the dependent variable. O, represents the measure the dependent variable before manipulation of the dependent variable X, it is usually a pretest of some type administered before the experimental treatment. O_2represents the dependent variable after the manipulation of the independent variable X_1 it is usually a post – test administered to subjects after the experimental treatment.

S represents the subjects used in an experimental study, the plural is s.

A dash (.....) for the control group indicates that it does not receive the treatment X. We have just gone through the symbols. We will now discuss two forms of experiment – post – test only, Equivalent – groups Design and Quasi – experimental Design.

The first form of a true experiment is the post – test only, Equivalent – groups Design. This design is represented as follows:

Sampling	Grouping	Pretesting	Research Condition	Post Testing
R	Gr 1	-------	X	O

R	Gr 2	--------	C	O

The post-test only equivalent groups is a very powerful and effective design in the sense that it minimizes, if not completely removes, internal and external validity threats to an experiment. Experimental and control groups are equated on a pre-determined variable, through random sampling and grouping. There is no pretest and the randomization process is part of the control to endure that the effects and contamination by all possible extraneous variables are removed which then assures that any initial difference between both groups, before the commencement of the research conditions is very small and indeed due to chance and of no serious consequence to the observed outcome at the end to the experiment. In this design, after subjects are assigned to groups. (there can be as many groups as the researcher wants but they must be made equivalent through randomization) the researcher has to decide which group will receive treatment and which group will receive control. Only the subjects in the treatment group will be exposed to the experimental treatment. The control group receives no treatment but in all other respects it is treated like the experimental treatment group. For instance, if the planned experimental treatment is teaching with laboratory method while the control is teaching like lecture, these conditions will prevail respectively to the two unique groups. But other conditions will be the same for both groups. The amount of time allotted for actual teaching, the qualifications and teaching personality factors. The topics taught, etc will have to be the same for the experimental treatment group as well as the control group.

At the end of the experiment, both groups are given the same post-test which is a measure of their reaction or response to the dependent variable (achievement on a test, etc). The mean post-test score of the experimental treatment group subjects is statistically compared with the mean posttest score of the control group subjects is statistically compared with the mean post-test score of the control group subjects with a test. The underlying assumption is that if the means of the experimental treatment group is the same with that of the control, then treatment is of no significance. Put differently, if the means of the experimental treatment group and the control group are statistically significantly different (and this difference is too large to be due to chance or to be explained to have risen by chance factors) one can then assert that the experimental treatment conditions were responsible for the observed result; treatment caused the outcome of difference in observation among the experimental treatment group subjects. This design is strongly recommended for use in experimental research in educational media because of its many in built advantages one of which is establishment of how homogenous or equivalent research groups – had already been highlighted. Also, this designs ensures adequate controls for the main effects of pretesting, history, and maturation.

This design is useful because of its rigorousness and flexibility in using it for studies where pretesting is undesirable and will introduce internal validity threats or in studies where pretesting is necessary. Such as in studies involving early or entry level nursery pupils may have no level of knowledge or any knowledge at all to be pretested for. You may note that this design can be extended to include more than two groups if necessary or needed. The only disadvantage of this design is that while it establishes the difference in performances, achievements etc. at the end of the experiment, it does not allow the researcher the opportunity to observe any change when the study started and when it ended; the reason for this being that there was no pretest which would have allowed some observation on the kinds of changes, if any, within the same group of subjects or across different group of subjects. (Ali, 1996).

The second form of a true experiment which we will discus is the Solomon Four-Group Design. This design was established in response to the need for finding an all-embracing and rigorous design which satisfied many of the demands by their studies. The design is presented below:

S	Grouping	Pretesting	Research Condition	Post Testing
R	Gr 1 = Exp	0	Treatment or X	0
R	Gr 2 = C	0	- or Control	0
R	Gr 3 = Exp	None	“Treatment or X	0
R	Gr 4 = C	None	- or Control	0

Source: Ali. A. (1996) “Fundamental of Research in Education”. Akwa: Meks Publishers (Nig.) (62 - 68) ISBN 978 – 2702 – 66 – 8.

The major essential feature of Solomon Four-Group Design is that it employs an alternate or control to each line of activities in the design plan. For instance, Group 1 arrangement is an alternate to Group 2; Group 3 arrangement is an alternate to Group 4, as far as the research conditions of treatment and control concerned. Other features of this design is that it overcomes the interactive effect of pretesting and the experimental treatment group three is not pretested but received treatment. The mean score data of control group two subjects, between the pretest and post-test design studies. Notice that experimental group three is not pretested but received treatment.

The mean score data of control group two subjects, between the pretest and post-test (the dependent variable) are used to determine the interaction effect between pretest and post-test. Also, notice that because pretest was administered in this design (to Groups 1 and 2) data from pretest can be compared with data from post-test, as Gain Scores thus enabling the researcher to observe and determine the direction of change in the subjects. You may recall, as we pointed out in the two previous paragraphs, post-test-only, equivalent design lacks this advantage since it does not include pretesting.

In Solomon Four-Group Design, the post-test means are used for analysis of variance calculation to determine how significantly different subjects were on the dependent variable measure (the post-test) You are right if you argue that even when the experimental treatment group 1 subjects demonstrate a statistically significantly higher mean post-test than control group 2 subject there is in no basis for asserting that the difference was due to treatment in favour of experimental treatment group 1; so you can argue that it was due to chance. The basis of your argument may be that interactive effect of pretesting have distorted the post-test data thus nullifying the effects of the experimental treatment. By adding the post-test data from control group 3 that did not receive any pretesting this argument then does not have a locus standi especially if the mean posttest value of control group 3 is significantly higher than that of the control group 2. We can correctly assert that the experimental treatment caused the observed outcome (post-test) rather than the interaction between pretest-posttest or interaction between pretest and treatment being the cause.

Thus, control group three is acting as a balance or alternate to experimental treatment group in this design. By adding the control group 4, the design gains control over any possible contemporaneous effects that may occur between pretest and post-pretest. Seen at full glance, this design really involves conducting one experiment twice; once with pretesting to two groups and once without pretesting to two groups. The pretested groups are contrasted between themselves and the post-tested groups are contrasted between themselves, as far as treatment is concerned. Then on their own, experimental group I fully contrasts with control group 3 while control group 4 fully contrasts with control group 2. The advantages of this design, in addition to that noted above is that this design minimizes to the barest minimum internal and external validity threats to experimental research.

There are two main disadvantages arising from using Solomon Four-Group Design. It imposes more cost in terms of time, money, efforts, and the second problem is with regard to the enormity of statistical analysis required by this design.

There are four groups of subjects and six sets of test data and there is no single statistical tool that can treat these six sets of data simultaneously given that for the

four groups, there is no four sets of complete data; if all the groups had had pretest, then there would have been four sets of data for the four groups, but as you well know, this is not the case. Consequently, the post-test is analyzed for its interaction effect of pretesting with the treatment and post-test. (Ali, 1996)

Quasi-experimental Design

In a large number of situations, researchers find it difficult, if not impossible to use true experimental design in carrying out their studies. This may be because the scheduling and implementation of experimental treatment conditions or the randomization and grouping of subjects are not possible; in some cases, schools would not allow their pupils to be used as research subjects. Under this circumstance, the researcher can only use experimental designs which offer less control compared to the true experiment designs. Designs of experiments which offer such less controls and rigour are quasi-experimental. To use these designs effectively, the researcher should know the main strengths and take full advantage of them while avoiding the weakness and pitfalls as much as he can. In other words knowing which variables have been inadequately controlled for, the sources of internal and external validity threats and so on helps the researcher to avoid their pitfalls.

One type of quasi-experimental design is the Non-randomized Control-Group, Pretest-Post-test design. The design uses non-randomized groups this option occurs when the researcher cannot randomly sample and assign his subjects. Consequently, the researcher has to use his subjects as groups already in existence such as groups already organized as classes, women of equal socio-economic status, members of the same social club etc.

Since the research subjects are not randomly sampled, selection of subjects increases the researchers selection biases as well as sampling error in terms of whether the selected subjects truly represent the population from which they were drawn and whether the subjects when grouped, are homogeneous or equivalent. To minimize these problems, there is need for selecting subjects on such criteria which would ensure that homogeneity or equivalence of subjects in the different groups established is achieved or seen to have been achieved, at the beginning of the proposed study. Furthermore, a pretest should be administered at the beginning of the proposed study and the pretest data used for finding out whether the subjects in the different groups are homogenous (equivalent) or not. If subjects in one group score disparagingly higher than subjects in another group, in the pretest, through sorting and or rearrangement, it is possible to establish homogeneity (equivalence) of groups. For instance, this can be more easily done by the researcher proceeding with the study and at the end of the study using an analysis of covariance technique to compensate for the initial lack of equivalence (Analysis of covariances is a statistical technique which establishes equality of baseline data, pretest, before the commencement of the study, and men analyses the posttest data vis-à-vis that of the

pretest and determines whether there is any significant difference between groups based on the gain scores, pretest, and post-test). Lets look at a representation of the non-randomised control pretest-posttest design.

S	Grouping	Pretesting	Research Condition	Post Testing
-	Expt. Gr 1	0	Treatment or X	0
-	Control Gr 2	0	- or Control	0

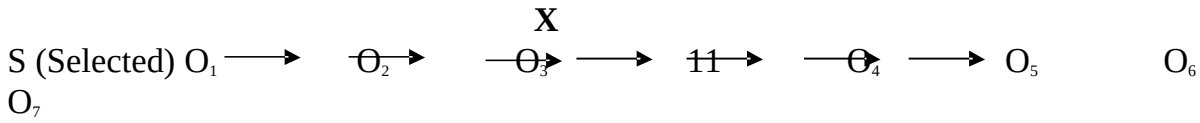
Given that it was not possible to randomly compose and group subjects, you may wish to consider, the alternative, assigning experimental and control conditions randomly on the subjects. This can be done by flipping a coin to decide which group is to be the experimental treatment and which group is to be the control group. As much as possible, subjects should not be informed ahead of time about what the research conditions are.

Again, they should not be requested to volunteer for any particular group especially if they are aware of what each group will be involved in during the research. When this happens, and subjects are aware of the research condition they will be exposed to, there is a tendency for them to react to this awareness and consequently knowingly or unknowingly distort the full effects of the treatment/control conditions (i.e. the research conditions) on the dependent variable (the outcomes of the experiment). Even when we achieve this anonymity in disclosing research conditions to the subjects, there is yet another problem of regression posed to this kind of design; an experimental design in which subjects are selected, rather than sampled, and there is pretesting and posttesting.

Regression of scores occurs when it is not clear how the subjects posttest scores were affected by the mere fact that they were pretested. In the educational settings where students prepare for examinations or test by basing their readings on previous tests, regression of scores becomes a very serious issue. Let us suppose that more members of a particular group, e.g. the experimental treatment group scored low on the pretest and very high on the posttest which may on the face value suggest a robust treatment effect on the dependent variable. The high chang+e in pretest to posttest scores, called gain scores, may be as a result of regression of scores itself arising from experimental subjects reaction (previous exposure to and recall knowledge) to pretesting. This observation, if it occurred among the control group equally results in regression. It is possible to minimize and account for the effects of regression of scores in an experimental design study.

This can be done by analyzing data obtained from quasi experimental designs with analysis of covariance statistics. Analysis of covariance is a procedure for testing the statistical significance of the difference in means of two selected groups based on their pretest and posttest result, and nullifying the distortions arising from regression

of scores of subjects between their pretest and posttest scores. Another quasi-experimental design is the Time Series Design. In this design, prior to the commencement of the research condition, the selected subject (or subjects, as the case may be) is measured on the dependent variable at fixed periodic intervals, using the same test. Thereafter, the experimental treatment condition is introduced as the subject(s) is exposed to it. After treatment (x), the subject(s) is again measured at fixed intervals using the same earlier tests. This design is represented below:-



X is treatment, given after the 3rd test

The effects of treatment is determined based on the change or gain in the test results, immediately after treatment. In other words, any difference in performance beyond the point of the introduction of the treatment, i.e. beyond the third test or from the fourth test onwards is an indication of the effects of experimental treatment. One major weakness of this design is that it is not sensitive to controlling extraneous validity threats of history, maturation, reactive effects of the series of test and so on. (Ali, 1996).

It may interest you to know that the other quasi-experimental design have some merits. You are advised to consult some of the texts recommended for your further readings.

SELF ASSESSMENT EXERCISE 2

When is a particular research design preferred to another?

3.1.2 Characteristics and use of types of Experimental Research design.

In the last section, you learnt forms of experimental design. In this section you will learn characteristics and use of the experimental research design.

Characteristics of Experimental Design Studies

Experimental research is designed to explore the nature and scope of cause-effect relationships between independent variable (What is manipulated to observe its effects, if any) and dependent variable (outcome observed, following the manipulation of the independent variable, as the treatment). Experiment research in education media are intended to answer educational media questions such as: what effects does A have on B? if we systematically change E under carefully controlled conditions, what effects would it have on D? Thus, experiments manipulate the independent variable to determine their effects on the dependent variable. Hypothesis are stated within the framework of a defined and acceptable research problem.

An appropriate experimental design is used for collecting data scientifically toward testing the stated hypotheses. Data obtained through an experiment are treated and results used to accept or reject the hypotheses. Conclusions drawn on such acceptances or rejections are then generalized to the entire population so that the ultimate goals of an experiment are to predict events, control and expect certain events, build up the body of knowledge and facts within a given area experimented upon and discover new grounds to exploit towards improving mediated learning. Because the goals of experiments influence our lives profoundly, a great deal of careful and important considerations guide how they are carried out. These careful and important considerations constitute the framework or characteristics upon which the conduct, substance or bedrock of experiments are anchored. There are three essential characteristics of any experiment. These are control, manipulation, and observation.

Control characteristics aspects of an experiment is concerned with arranging the research condition and complying with it in such a way that their effects can be investigated. Without control, it becomes impossible to determine the effects of an independent variable on the dependent variable; the essence to control is therefore clear. The two assumptions underlying control in an experiment are 1) given that two situations are equal in every respect except for a factor that is manipulated or added to or deleted from one of the two situations, any difference appearing (as measured through testing) between the two situations is attributable to the factor that was manipulated, or added to or deleted from. This assumption is called the law of the Single Variable developed by Mill (1873). And he states:

If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon. (p. 69).

2) The second assumption is that if two situations are not equal but it can be demonstrated that none of the variables is significant in producing the phenomenon under investigation, or if significant variables are made equal, any difference occurring between the two situations after the introduction of a new variable to one of the systems can be attributed to the new variable. This assumption is referred to as the Law of the Only Significant Variable.

Of the two assumptions above, the second one is important in education because it is very unlikely that the outcome of a study (the dependent variable) or what we observe after manipulating the independent variable can be as a result of one variable (acting alone without any other variables affecting or influencing the outcome we observed). This is because education deals with human beings who are

constantly affected by many variables and what we observe about them, are consequences of many variables, not one variable. Experiments in laboratories involving chemicals, temperature changes, pressure changes can be attributed to the Law of the Single Variable. Fortunately in education, we can substantially minimize the effects of other variables so as to manipulate one variable, under rigorous controlled conditions so as to determine its effects on the dependent variable, within the assumption of the law of the only significant variable (other variables are operating along with the manipulated one but these variables are controlled out or to a minimum thus leaving the significant variable to dominate and exert its effects on the dependent variable). If a variable is known or suspected to be irrelevant and unlikely to operate in conjunction with a likely significant variable, it is ignored. Insignificant variables in academic achievement related studies include height; hair colour; weight; religion; tribe; shoe size, sex; size of head, toe, hands etc; dress preferences; musical preferences and so on. These should be uncontrolled for or simply ignored in experiments in which teacher personality, effectiveness, teaching methods, comparisons of two or more curricula effectiveness are intended to be investigated for determining their respective effects on students achievements. On the other hand, significant variables which can influence experiments and need to be controlled for when one is carrying out experiments on students achievements, include their interests, study habit, motivation, reading ability, general intelligence, socio-economic status of parents, and others like these variables. To reduce the effects of these undesired but significant variables which may not be the main thrust of a study but can affect it the researcher must establish controls which minimizes the effects of these undesired but significant variables. He can do this by ensuring that subjects in the research groups are equivalent and or matched on each of these undesired but significant variables before commencing experiments on the groups. Otherwise, if for instance, subjects, in group 1 are better readers than group 2 subjects; group 1 subjects have more interest than group 2 subjects; group 1 subjects have better motivation than group 2 subjects, any difference in subjects achievements, between the two comparative groups, can be attributable not just only to the one independent variable of the experiment manipulated (such as teaching method; teacher personality/effectiveness etc) but also the other undesirable but significant variables of reading ability, levels of interests and levels of motivation, respectively, as far as the three distinct examples are concerned. Control therefore, indicates the researchers actions designed to eliminate the influence of undesired but significant variables as well as eliminate or by so doing eliminate the differential effects of undesired but significant variables upon the different groups of subjects participating in an experimental study in education and studies in other disciplines. When such controls have been achieved, the confounding, mitigating or mixing effects of the undesired but significant variables are reduced or removed that only one variable, the significant variable is then deemed to have caused the observed outcome (dependent variable) of the experiment. There are five ways of controlling for the undesired but significant pre-existing variables which can confound, mitigate

or mix an observed outcome of an experimental study; they are considered pre-existing because, in a sense, they existed in the subjects or the subjects had them before the commencement of the experiment. The five ways are through radomisation of subjects; random assignment of subjects to respective groups using a sample-and-assign to group method rather than sample and after, then assign subjects to their respective groups; random assignment of treatment or control conditions to research groups, respectively; use of covariance statistics if the research design involved pretesting or if subjects were selected and then grouped for the experimental purposes; matching students and ensuring that they are all equally matched on each of the undesired but significant variables and then assigning them to their respective research groups.

Manipulation characteristic aspect of an experiment is concerned with the researchers actual and deliberate compliance with all facts of the predetermined set of varied events, conditions, and actions which are imposed on the treatment group subjects as the experimental treatment; only treatment is manipulated while the control research condition or placebo is not manipulated. However, in an experiment, the researcher must comply with all aspects of the research conditions of experimental treatment (which is manipulated) and control (which is not manipulated). Technically, the experimental treatment condition is the hallmark or substance of the independent variable and it is the condition that is manipulated for investigation of its effects on the dependent variables.

Finally proper and accurate observation characteristic aspect of an experimental design study concerns the researchers carefulness in determining exactly those attributes or outcomes in a study which he wants to measure and record. Ideally, such attributes or outcomes to be measured should be quantitative and dependent variables. Observation in its most direct operation in the school setting involves testing and recording students achievements and this requires that the researcher develops and uses tests that are fair to the testee and valid and reliable for measuring the subject-matter or construct the tests were supposed to measure. It also requires that we grade and score achievements in a fair and accurate manner. It is only when we do these that achievement are an index of observation of learning in schools can lend itself to a high level of predictability of learning as well as explanation of how learning occurs. Obviously, we cannot as you probably know measure learning per se but we can attach a fixed quantity at a time, place and on a given school subject (achievement) and refer to this quantity as learning. Therefore, the more careful, the methods of our measuring achievements in an experiment is the more correctly we would be in measuring learning, predicting learning and understanding how students learn within school setting (Ali, 1996).

SELF ASSESSMENT EXERCISE 3

List the three essential characteristic of any experiment.

4.0 CONCLUSION

In this unit, you have been exposed to the meaning of experimental research design, the forms and the characteristics and use of the types of experimental research design.

5.0 SUMMARY

In this unit, a summary of the points is that:

1. Research design is a blue print or plan of action of events which if implemented would enable you investigate the problem of your study.
2. There are many forms of research design; and
3. Any type of research has its compelling characteristics which are preconditions to decide on their use.

ANSWERS TO SELF ASSESSMENT EXERCISES

EXERCISE 2

When can the researcher effect controls effectively.

EXERCISE 3

Control, manipulation and observation

6.0 TUTOR – MARKED ASSIGNMENT

Choose a suitable research design for your study.

7.0 REFERENCES/FURTHER READING

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UNIT 2 THREATS TO EXPERIMENTAL DESIGN STUDIES

1.0 INTRODUCTION

In the last unit, you learnt different types of experimental design, the forms and the characteristics. In this unit, you will learn the threats to experimental design studies. These are internal and external validity threats. We shall discuss them one after the other. At the end of the unit, you will have achieved the objectives listed below.

2.0 OBJECTIVES

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

1. Explain what constitutes validity threats to experimental design studies.
2. Identify and explain internal validity threats to experimental design studies
3. Discuss the external validity threats to experimental design studies.

3.0 MAIN CONTENT

3.1 Threats to Experimental Design Studies

Would you be able to recall the definition given to experimental design studies in the previous unit? If you do, excellent and well done. As was stated in that unit experimental design studies explore the nature and scope of cause – effect

relationships between independent variable and dependent variable. In order for an experimental study to achieve this goal and help the researcher make accurate and verifiable predictions and explanations of events, their causality and so on, the activities which comprise the research itself must possess a high degree of validity and reliability. It may interest you to know that it may not have this validity if the experiment is threatened. There are two classes of such validity threats namely internal validity threats and external validity threats. We will discuss them now one in this section and another in the next section.

SELF ASSESSMENT EXERCISE 1

Identify the two validity threats to any experimental design study.

3.2 Internal Validity Threats to Experimental Studies

In the last section, you learnt that internal and external validity threats may not allow experimental research studies to possess a high degree of validity and reliability to achieve its goal of enabling researchers make accurate and verifiable predictions and explanation of research events. This is a very disturbing problem. In this section, you will learn what these internal validity threats are and how to minimize them. It is when the internal validity threats are removed or minimized that it would be possible for the researcher to assert that it was the experimental treatment that brought about the change of the observed effects on the dependent variable. Generally, eight extraneous variables have been identified to have serious internal validity threats to experimental research in educational media (Ali, 1996), (Campbell and Standley, 1966); and (Cook and Campbell, 1979).

These extraneous variables are identified as follows:

Pre-testing, History, maturation, instability of instrument, experimental mortality, statistical regression, selection biases arising from differential selection of subjects; influence of earlier treatment experiences.

We will now discuss them one after the other in this section.

1. Pretesting: Pretesting which is administering research test to subjects before the commencement of a study sensitizes them to become aware or suspicious of the purposes of the post-testing aspect of the experiment. In the educational setting where students prepare for their examinations from previous examination papers, protest questions may be carefully, repetitively and methodically studied by students prior to the posttest almost to the extent that any observed improved performance on the posttest by the subjects may not be because of effects of the experimental treatment. Designs of experiments which have pretest suffer from this internal validity threat.
2. History: Certain historical and unique environmental events beyond the control of the experimental researcher but which may have had profound effects on the student subjects can confound the independent variable of a research study on the dependent variable of the .study Historical events such

as famine, calamities, economic hardships, change in the school year or curricula, anxiety produced by the forthcoming cxamination can either singly or in combination, as the case may be, enhance, disturb or stimulate student subjects performance on the dependent variable A longer experimental research study stands a higher chance of historical events affecting it.

3. Maturation: Subjects, and indeed all human beings, do change with time regardless of what treatment conditions they are exposed to. Between the initial test and subsequent tests, the subjects may have undergone many kinds of changes since they are influenced by several factors of life not just that of the experimental treatment factor. Changes include becoming less or more bored, becoming more or less wise, becoming more or less motivated, as the case may be. And each or all of these changes may produce an observed dependent variable which is then falsely attributed to the experimental treatment rather than these maturational changes.

4. Instability of Instrument: If an experimental design instrument for data collection is not valid, reliable and appropriate or if the techniques of using the instrument, as well as observing and recording the data are not consistent and systematic, data obtained from such instrument or techniques are unstable. An instrument which is faulty or precise and valid instrument wrongly used will yield unstable data, when used. Similarly, haphazard techniques in data collection yield unstable data. Researchers should guide against any source of error such as instrument decay (faulty, imprecision from overuse etc) which poses an internal validity threat to their work. For instance, if research assistants are used for recording observed data, care must be taken to ensure that they know what to observed, when to observed, what to record, how to record, when to stop recording either because of fatigue, boredom and lack of focus on what to record. Otherwise, serious errors are introduced into the experimental data and become a serious internal validity threat. Under no circumstance should the same assistant be used for recording observation data for experimental and control groups.

5. Experimental Mortality: Subjects in an experimental research study may reduce in number between the time the experiment commenced and when it ended. Losses in data can arise from illness, parental request, deaths, movement of some subjects to another school, unwillingness of subjects to continue, and incomplete data set. Imagine that almost all the losses were subjects in the experimental treatment group who had scored low in the pretest. Because those remaining did well in the pretest they would most naturally do well in the posttest not so much because of the effects of treatment as much as the fact that those students who scored low in the pretest did not do the posttest. Mortality is a problem in experiments which span long period.

6. Statistical Regression: If subjects are grouped on the basis of their pretest scores, in addition to the interactive effect between pretest and posttest, there will be problem of statistical regression. Statistical regression is a phenomenon in a pretest posttest experiment in which extremes of scores in an experiment (e.g. a subjects low pretest score and high posttest score) may be misjudged or misinterpreted as arising from treatment effect. The truth of any pretest-posttest design is, in part, that subjects in any comparative group who score highest on the pretest are likely to score relatively lower on the posttest while subjects in any of research groups being compared who score lowest on the pretest are likely to score higher on a posttest. Thus, the researcher should be aware that the subjects who scored lowest or highest in the pretest are not necessarily the lowest or highest scoring subjects. Therefore, regression as an internal validity threat occurs inevitably in any pretest-posttest design essentially because there is usually a regression of pretest-posttest means of the subject toward the overall mean of the entire group. Failure to recognize this regression results in wrongly attributing the observed experimental group‟s superior gains scores (difference between pretest and posttest scores) or any observed gain score differences between groups as a direct and entire consequence of the treatment effect experimental group subjects were subjected to when in fact gain score differences may be affected, even if by a small margin, by regression.

7. Selection Biases Arising from Differential Selection of Subjects: Even when a researcher may not be aware of this, when he selects and groups subjects, certain criteria unwittingly influence who he selects and puts in a particular research group. When this happens, as it is bound to happen, there is the occurrence of nonequivalent grouping of subjects prior to the commencement of the experiment. The general tendency, among unwary researchers, is for selecting and assigning better subjects into the experimental group, an early advantage which enables these better subjects to do better than the control group subjects who were worse candidates before the commencement of the experiment and who, in any case, would be expected to perform worse at the posttest than their experimental group counterparts. Under this condition, the researcher‟s selection biases threaten the internal validity of his results since his results may well not have been caused by the treatment but more so from the fact that, *ab iniitio,* the experimental subjects were favoured and consequently better than the control group subjects and so, as would be expected, did better than the control in the posttest result.

8. Influence of Earlier Treatment Experiences: Many researchers use subjects whose earlier history of exposure to other research conditions they do not know of and care to find out. Such earlier influences may well affect

experimental research finding either negatively or positively to all the research subject, selectively to members of the research subjects or selectively to members of a particular comparative research group. For instance, a researcher may unknowingly use and group into experimental group 1, more subjects who had just finished an earlier experiment on reading and therefore have more reading skills than the control group subjects most of whose members did not participate in the reading experiment project earlier completed by the earlier researcher. Because of this earlier treatment of reading skill on some subjects and none for other subjects, there is already an *ab initio* introduction of unfair advantage to the experimental group subjects and unfair disadvantage to the control group, for any research study they are used for, involving reading; an undeserved advantage or disadvantage especially when later experimental work involve word problems, as in mathematics, study which involve one‟s reading skills, and so on. To avoid this problem, researchers should find out earlier experiences of their subjects, ensure that these experiences are fairly well distributed in the population they want to work with and then randomly sample from that population. (Ali, 1996)

SELF ASSESSMENT EXERCISE 2

Identify the extraneous variables that constitute internal validity threats to experimental design studies.

3.3 External Validity threats to Experimental Studies.

In the last section, you were exposed to what constitute internal validity threats to experimental research design studies. It is hoped that you gathered that eight extraneous variables that comprise internal validity threats to any experimental studies have been identified. There are pretesting, History, maturation, instability of instrument, experiment mortality, statistical Regression, selection biases arising from differential Selection of subjects and influence of earlier treatment experiences.

It may interest you to know that just as we have internal validity threats, we also have external validity threats to experimental design studies. Eternal validity threats are those factors which reduce or spoil a study‟s usefulness relevance and practical application to real life situations. Then you may wish to ask the question: what use is an experimental study to educational media, if its findings have no practical value? Therefore, before engaging a study the researcher in educational media must ensure that the ultimate results and conclusions of his or her study can be generalized to the real life experiences, and as well useful, relevant and of practical application to the educational media setting. If the contrary is the case, then the researcher should not undertake the study. However, even when his or her research findings and conclusions are generalizable to the population, there are factors which

will threaten the external validity. We shall discuss these threats one after the other in this section as follows:

1. Hawthorne Effect: Situations under which experiments in education proceed need to be controlled so that experiments can go on as naturally as possible rather than going on under contrived conditions or subjects‟ response to novel conditions induced by an experiment. When experimental conditions are not adequately controlled, subjects‟ reactions and responses to experiments may become distorted by the mere introduction of the research conditions. By subjects becoming aware of the new situation created by the introduction of an experiment in their class, school, football team and so on, they may become resentful, feel preferred, feel rejected or inferior to other research group or even the population that was not used; some subjects may question, why us, not them? Any of these responses may have some effect on the subjects. The effects such responses have would depend on how the subjects were affected by the responses. Subjects‟ knowledge of their participation in an experiment as the treatment group may engender their contrived or biased response to the introduction of this new situation rather than as a result of the effect which the experimental treatment has on the experimental group subjects. When subjects respond to the newness effect of the experimental treatment rather than to the experimental treatment itself, this is referred to as Hawthorne effect and it is a serious external validity threat to an experiment. Similarly, when control group subjects respond to their knowledge of the fact that nothing is done to them (they are the control) while something is done to their classmates, such a response arises not as a result of the control condition but more so as a result of their knowledge that nothing was done to them or happening to them. This responses is the placebo effect on the control group subject. (Ali, 1996).

It is possible to minimize Hawthorne effect and other situations which contribute to external validity threats through a longer study, say, two or three years but it would result in the newness effect wearing off thus eliminating Hawthorne effect but this is unwise to do because of mortality, maturational, and historical problems arising from long studies and which then constitute themselves into internal validity threats). A more useful suggestion to minimize Hawthorne effect and other situational external validity threats is to hold all the situations affecting experimental and control groups constant; randomly draw and assign research samples or randomly assign treatment and control conditions to groups; and manipulate subjects to the extent that they do not know that any research work, as far as the independent variable is concerned, is in progress. There are several ways of holding experimental research conditions constant for all the subjects in an experiment. These include treating them alike on all things except with regard to the impendent variable. For instance on a teaching effective method study, duration of teaching;

actual teaching time; teacher qualification and personality; topics covered and their scope; tests; apparatus used; language of instruction; environmental conditions, etc must be the same for experimental as well as the control group. Again, if assistants are used in the research, they must be trained on what to do, how to do then with little distraction and how to do them effectively.

2. Population Validity: In order to be able to make a valid assertion, based on one‟s experimental results, about the population, the sample used in a study must be typical of the population from which it was drawn. Sometimes, the population experimentally accessible to the researcher may not truly represent the typical population; for instance primary school children from rich and affluent homes of Victoria Island, Lagos, do not typically represent the primary school population in Nigeria but the former group may be the one that is readily accessible to the experiment. Any generalisation to the Nigerian primary school population based on samples drawn from experimentally accessible population creates external validity threat. On the other hand a use of target population would permit valid generalisation, based on samples drawn, about the target population. Sample for a target primary school population would include pupils from a variety of socio-economic conditions; different parts of the country; school types and so on. Usually, to obtain a sample which reflects the target population is difficult. This can be overcome by identifying the population, the major attributes of the population and using the attributes of the identified population as zones and or clusters from each of which sample representations is drawn. For instance, if there are three categories of primary schools in Nigeria, say, well established, less well established and poorly established, each category is listed and samples representing the three categories of primary schools are drawn. If location is an attribute, then Nigeria may be zoned first into, say, five equal zones, and primary schools of the three categories mentioned earlier are identified and then randomly sampled from each of the five zones to which the country was divided.

However, there is a problem about the suggestion made above. It is that of logistical convenience. Clearly, zoning, identifying population criteria of a very large country is a difficult time-consuming task; difficulty whose implications are enormous in terms of times of time, cost, ability to manage the conduct of the study and so on. Despite these difficulties, if a study is going to be generalized to the target population it is better to have reliable knowledge about a more restricted population of this target, even on a zone by ozone basis (although even in the zones some areas may not be included in the sample) than to have a far more restricted unrepresentational sample (pupils of primary schools in Victoria Island, Lagos) and use conclusions from unrepresentational sample drawn from experimentally accessible population to make generalizations about the target population.

3. Experimental Environmental Conditions: The conditions under which the experiment takes place is equally important as the experiment itself. Environments of schools consist of several factors which influence experiments. Similarly, outcomes of experiments influence school environments. However, what is important to the researcher before proceeding with his research as far as the experimental environment of his study is concerned is making sure that the environment implicit in his study are those existing or attainable in typical schools in the area he is doing the study. An experimental environment in which calculators, photomicrographs, computer simulated teaching episodes are used in rich, well established surburban schools ignores the fact that such experimental environment do not may be impossible to attain in rural, small, local schools – and the latter schools are usually in the majority in developing countries.

Finally, all the types of threats discussed in the foregoing section highlight the research enormity of involvements and expectations of work that is of experimental nature, in educational media. Knowing what these threats are is important. But far more important are ways and means through which the researcher can control and minimize or eliminate their effects on the experiment carried out. These ways and means have been described in this section. Now test yourself with the question posed below

SELF ASSESSMENT EXERCISE 3

List the external validity threats to any experimental research study.

4.0 CONCLUSION

In this unit, you have learnt what internal and external validity threats to experimental studies are and how to control or eliminate them

5.0 SUMMARY

The main point in this unit include the following:

1. Different types of extraneous variables constitute themselves as internal or external threats to experimental design studies.
2. Various control measures were discussed.

ANSWERS TO SELF – ASSESSMENT EXERCISES

EXERCISE I

Internal validity threat and external validity threat.

EXERCISE 2

Pretesting, History, Maturation, Instability of instrument, Experimental Mortality, Statistical Regression, Selection Biases arising from differential selection of subjects, and Influence of Earlier Treatment Experiences.

EXERCISE 3

Howthone effect, population validity and experimental environmental conditions.

6.0 TUTOR MARKED ASSIGNMENT

How would you administratively control biases due to Howthone effect, instability of instrument in our experimental studies in educational media? When would you employ statistical control and why?

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EDT. 823 RESEARCH AND MEDIA MODULE 7

UNIT 3 NON-EXPERIMENTAL RESEARCH DESIGN

1.0 INTRODUCTION

In the last unit, you learnt the meaning of experimental research design and their forms. It is hoped you gathered that the basic plan of the experimental design in research in educational media has always been that the researcher deliberately interferes with the existing situation by manipulating the independent variable. You also learned that experimental designs may be classified into various forms on the bases of the power of the experimenter (you) to control extraneous variables that may bring about unwanted changes on the dependent variables. And as a consequence spoil the results of the experiment. You also learned the symbols and characteristics of the experimental design studies. In this unit, you will learn about Non-Experimental Designs, their meaning, nature and types. After studying this unit, you are expected to have achieved the objectives listed below.

2.0 OBJECTIVES

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

1. Define Non-Experimental Design research studies
2. Describe their nature.
3. Identify and explain their types.

3.0 MAIN CONTENT

3.1 What Is Non-Experimental Research Design?

Non-experimental research designs also called descriptive research designs describe and interpret conditions and relationships that exist; processes that are going on; effects that are developing (Best, 1970) Non – experimental research designs may also attempt to determine how the existing conditions are related to certain events that had already occurred in the past. (Nkemakolam, 1995)

Beyond these, descriptive research design studies are mainly concerned with describing events as they are without any manipulation of what is being observed. Indeed, any educational media research which seeks merely to find out what is, is a

descriptive design study. Case studies, survey, historical research, correlation research, evaluative research as well as developmental research and ex-post-facto. research design can categorized as described research designs (Ali, 1996). Having known what Non-experimental or descriptive research design means we shall now examine their nature in the next section. But before then answer the question posed below.

SELF ASSESSMNT EXERCISE 1

Differentiate experimental from Non-experimental design.

3.2 The nature of Non-experimental Research Design

In the last section, you were exposed to the meaning of Non-experimental research design. And in the discussion, you gathered that this research design is merely concerned with describing events as they are without manipulations of what is being observed. It does not seek cause-effect relationships between independent and dependent variables, in this section you will learn the nature of Non-Experimental research design..

Any study which seeks merely to find out from peoples‟ opinions or from documents what is, and describes it without controlling any independent or dependent variables is Non-experimental or descriptive research design. For example, a study in which you develop and validate a test for more accurate research instruments for use in media research is descriptive. In addition, educational media research studies which determines some of the reasons why teachers, do not make more use of educational media in their teaching is a Non-experimental or descriptive research design. Furthermore, any media research concerned with the physical characteristic of audiovisual media, such as the length of motion pictures, the quality of still pictures, or the sequence and organization of filmstrips etc. is a descriptive or non-experimental research design. Also, researches exploring utilization practices related to various educational media to determine which media are used most by teachers and why are non-experimental or descriptive research design. It may interest you to observe from the foregoing explanation that non-experimental or descriptive research design studies rely on observations and survey techniques for gathering information which is then described.

It may interest you also to note that descriptive studies are very useful as a basis of educational media management. Information system and decisions on media design, development, and effective utilization. But they have being often criticized for a number of reasons. Most of the reasons are not traceable to descriptive studies themselves but the researchers. For example, some researchers are not thoughtful and systematic in developing and using reliable and valid data-gathering instruments for collecting survey or observational data. Even when these condition is satisfied, there is also the problem of the inherent distortion of information based on data

collected as a result of researchers‟ over reliance on questionnaire, interview and case study data which to begin with are most likely to be unstable and should be taken with a grain of salt rather than been seen as stable. We will now discuss the different types of descriptive designs in the next section. But before that, test yourself with the question posed below.

SELF ASSESMENT EXERCISE 2

Choose one educational media research topic that is non-experimental or descriptive in nature.

3.3 Types of Non-Experimental Research Design

In the last section, you learnt the nature of non-experimental research design; and you understood that such studies merely observed and described what conditions existed. They do not control variables whatsoever. In this section you will learn the different types of descriptive study designs. Many such as historical research, case studies, Ex-post facto research, evaluation studies and descriptive (survey) research etc. have been identified descriptive or non-experimental research designs (Nkemakolam, 1995). We will now discuss some of them one after another in this section as follows:

1. Historical Research

A historical research could be said to be a scientific method by which we search for evidence relating to the establishment of the causal relationship about past events. The same objectives and systematic procedure employed in the conduct of the research designs described earlier are also use in historical research. In other words historical research involves the following steps:

- Selection of a problem with a narrow focus
- Review of literature which constitutes its main focus
- Specification of hypotheses to guide data collection
- Research design forgetting the data in line with the objectives
- Actual data collection involving a lot of skill in note taking
- Analyzing of data involving a critical evaluation to check historical documents for accuracy.

An important objective for doing historical research is to provide a moral framework for understanding the present from the past. This is in terms of their cherished values with which present media and indeed educational media variety existing today could be evaluated.

Historical research usually provides certain valuable information and insight into some problems in education that may be over looked by other kinds of research. Moreover historical research is invaluable in predicting the future trends through an examination of various past practices in a given area the principal historical research

student employs. In other words it should be borne mind that while in literature review is a preliminary step in other forms of research design. It infact the major step that provides the data.

Sources of data in a historical research could be from four types sources: documents, relics, quantitative records, oral history. Document are handwritten, types of printed materials presented in various forms. Quantitative records can be seen as a specialized form of documents complied in the numerical formal test score, attendants records in schools, budgets etc. On the other hands oral history involves information‟s from spoken words-some stored in songs of the past, other are obtained by interviewing persons. Relics are simply defined as any object whose physical or visual properties give information about the past.

Historical sources may also be classified into primary secondary sources. Primary sources of historical information are the original sources of data. These are contained in biographies school recorded, diaries and other forms of manuscript. On the other hand secondary data are references to primary sources than other secondary sources. Though primary sources are more valid they are after all rare and inaccessible for many kinds of problems. Secondary sources though cheaper and easily accessible are usually loaded by the other historians interpretation biases but, are good supplement for primary data (Nkemakolam 1995).

2. Case studies have been used for investigating a wide range of individuals, events, phenomena in educational media designs, development and utilization. However, despite its usefulness in developing our understanding of certain events and vast range of appeal it offer in terms of a large number uses which it servers, case study approach to research has some limitation, indeed it may be that its strength also provoke and creates its weakness. Because case studies emphasizes in-depth investigation, by doing this they inevitably lack breath when dig deeper we loose vision of what is on top and beneath other areas we do not dig. Also because of the opportunities to really dig deep on case study problem, on one-on one basis, there is the danger of researcher subjectivity arising room the research being a victim of his own prejudices, fears, mannerism and other personal factors such as his preconceived opinions. The case study research approach ,may appear simple but in reality it is a difficult and time consuming given that volumes of data are collected thorough painstakingly methodical skill-demanding counseling sessions, interview sessions, data shifting session, travels and so on, each of which requires efforts skills and patience because of the technical procedure of case studies and the fact that some researchers who use this design must use terms applicable in their profession such as I psychology, e.t.c, there is often the tendency for such case studies to be reported in constructs, terms, principles, behaviours that are undecipherable, difficult to confirm or refute

through repeated similar case studies let alone through empirical experimentation. Some case studies have tended to wrongly project their results as causative rather than those results merely being associated with the observed phenomenon if, for instants, a research studies the influences of different noise levels on students achievement in mathematics and found that sonorous low-level noise resulted in that students better result in mathematics, a conclusion of sonorous low-level noise causing superior achievement in mathematics is spurious because at best, this level of noise is related but not cause of superiority of mathematical achievements among students. Any efforts at establishing a causation based on a case study research conclusion results in Post Hoc Fallacy.

3. Ex-post Facto or causal comparative design. For one to reach a conclusion that one variable (x) causes another variable(y) to occur, three necessary conditions must be fulfilled. The first condition is that a statistical relationship between x and y has been established through alternative hypothesis testing that was upheld. Then, second, that x variable proceeded y in time. The third condition is that threat factors, having been taken care of through randomisation, experimental control, careful observation, techniques and manipulations, did not cause y. Only a true experiments satisfy these three necessary conditions this is why it enable us to inference causality between x and y, following the acceptance of a tested experimental hypothesis. Rarely in education it is possible, practical and thinkable to undertake experiments which would enable us fully and absolutely control x, i.e. certain variables (intelligence, aptitude, motivation) as we hold others at bay or constant while determining, through experimentation, the effects on other variables, y. under this circumstance, we can investigate the relationship between x and y descriptively. In doing this and unlike experimental study where x is manipulated under rigorous research conditions, here, the relationships between x and y are observed and reported. Because any relationships between x and y observed and reported were pre-existing in the subject and so x did not cause y, a descriptive study which determines the relationship between x and y is referred to as Ex Post Facto or Causal-comparative design. For instance, a researcher may notice a particular event (tallness) among his economics students and observed that such students do well in economics. In a causal-comparative design study, he would sample a group on economics achievement test. Using a test statistic for comparison of the significance of difference between the two groups independent means, he may in fact find that a significant difference occurs between both means in favour of all students. This significance enables him to establish that a relationship exist between height of students and their academic achievements in economics. The design here is expost facto or causal-comparative. Note that he cannot establish a cause-effect relationship

between tallness and economics achievements because he has not manipulated height experimentally, and controlled or kept all other variable at bay, to determined the effects of height on students achievements in economics. One of the most unfortunate problem of undertaken an ex-post-facto or casual-comparative study is the danger of using of an ex-post facto or casual-comparative study finding on a basis for reaching a conclusion of causality. It is wrong to do this and when a researcher does this, the problem of falsely making a causality conclusion rather than a relational conclusion, based on the findings in an ex post facto or casual-comparative design study, referred to as Post Hoc Fallacy will result. Even when there is high and significant relationship as measured by subject results on a dependent variable, all we can establish in an ex post facto design study is that the independent and dependent variables go together or are related; the independent variable has no effect on and does not cause changes in the dependent variable. (Ali, 1996).

From the foregoing, it should be apparent that there is need for caution whenever ex post factor or casual-comparative design is used in a research study. Caution is necessary so that the researcher is aware of the different between causation and prediction. Only experimental design studies enable the researcher reach conclusions for establishing causation (cause-effect relationship between X and Y variables). Ex post facto or causal-comparative design studies merely establish a relationship between x and Y (i.e. X and Y go together) in which case X predicts but X does not cause Y. once these sequences are understood, there is therefore no worry about Post Hoc Fallacy or the establishing a cause-effect relationship where none exists and only where X and Y are only related.

Ex post facto or casual-comparative designs are quite useful in educational media research. They are useful as a means of undertaking studies in which independent variables among the subjects (aptitude, personality, age, teacher, competence, intelligence, cultural traits and so on) cannot be manipulated or controlled for or in studies where subjects possessing these variables, at different and varying degrees, cannot be randomly assigned to treatment groups. It is also a design which allows the research to proceed with his work by looking at only one relational variable at a time.

4. Survey: A survey is a descriptive study which seeks to document and describe what exists or the present status of existence or absences of what is being investigated. Typical surveys develop a profile on what is and is it so; they do not relate on one variable to another. Rather information is gathered on the subject of investigation and described.

Which design should I Choose?

In this section we discussed a number of the different kinds of descriptive design. Clearly, we did not exhaust them and indeed no one book on research in education exhausts all the very many designs, there are with more and more advances in

research techniques new and hopefully better designs tare bound to emerge. Let us now turn to which design do I choose. Because there are many kind of experimental and descriptive designs, the researcher is sometimes confronted by the problem of choosing a research design which he deems appropriate and adequate for his research work. There are a number of important considerations which should guide your choice of an appropriate and adequate design for use in educational media research. The first of this consideration is a clear understanding of what the aim of the study is. Therefore the aim of the study should partly guide the selection of the research design. If one is intending to establish a cause-effect relationship between X and Y variables (independent and dependent variables) and experimental design should be selected. This is because experimental designs provide a systematic, scientific and incontestable basis for establishing cause-effect relationships. In experimental design, hypothesis are stated and tested using data obtained through systematic and planned controls, manipulation and observation. Experimental data are used for accepting or rejecting the stated hypothesis if on the other hand the aim of a study is to describe certain events naturally existing in the classroom, which favours or inhibits effective use of educational media in teaching and learning it is descriptive or non experimental design.

However, having decided to go experimental or descriptive based on the aim of your study, there is the important consideration of which specific design within the experimental or descriptive broad categorization you want to select and use. To do this you would take a close look at the different designs within experimental or descriptive framework and make a choice. Perhaps your choice may be a test-choice only, equivalent group design (a true experimental design) a nonrandomized control-group pretest-post design (a quasi-experimental design) or a census of intangible subject matter survey (a survey design). Having made this choice you need to be clear in mind that, like the man embarking on building a huge mansion, you have most, if not all, it takes to execute this enormous task successfully. Whatever design you choose, you must have the necessary resources of time, money and research skills to successfully execute the demands imposed by the chosen design for the particular study. Sometimes, research students select descriptive design work under the false and misleading impression that it is simple and easy to undertake descriptive studies. They tend to forget that descriptive studies are more than just asking opinions, views, and attitudes of respondents and reporting them.

Descriptive studies involve a lot of work including sampling, instrument construction and validation, training of research assistants to minimize inter-rater discrepancy, travels to administer instruments and retrieve them, and so on. If one wants to do a historical study on the roles of missionaries and their impact on education in Nigeria, one would be quite prepared to literally spend ages sifting through useful information from archival documents (legal and legislative documents, missionary records, memors), interviewing many people, and several

other in-built work; but on its face value, the topic seems simple enough as an easy work.

On the other hand, some research students adopt a true experimental design as a show-off of their supposed adeptness at doing empirical research. Among such students, little or no considerations is given to how they would meet the demands of an experiment as implicit in the chosen design. They may not be fully aware or even aware at all that experimental design impose several demands on the researcher including that of randomization of subjects; identification of distinct research conditions of experimental treatment and control as well as the systematic compliance not and manipulation of the treatment, ethical considerations, systematic development of test instruments for use in observation and recording of dependent variable, devoting time and resources to the setting up of a feasibility study to determine weather it is even feasible to set up an experimental condition as envisaged, knowing the kind of data to be collected and the appropriate analytic tools to use; as well as other demands.

Another important consideration which should guide the researcher‟s selection of a particular design for his study is that of basing his choice, in part, on his awareness of the advantages and disadvantages of each particular design. If a design is chosen, it is because the particular design is the one with the most advantages and the least disadvantages for what the study aims at accomplishing. For instance, a study which intends to provide a very rigorous experimental test of a cause-effect nature must eliminate the disadvantages of pretesting, selection of subjects and use of instruments whose psychometric properties are not high or even know. Therefore, the design advantage here vis-à-vis eliminating the earlier mentioned disadvantages is either the post test only, equivalent group design or the Solomon Four- Group Design. But because the Solomon Four-Group Design involves far more work than the post test only equivalent-group design, the former should be chosen

When the research student has chosen a research design for his work, he should then discus his choice with his supervisor. A discussion such as the one suggested here is necessary for a number of reasons. Firstly, the supervisor and his student need to agree on the design best suited for the students work so that there is no question of working at cross-purposes later. Secondly, the supervisor may have the need to make justified modifications, even if they are minor, to give a sharper focus to a planned study or some aspects of the research work already in progress. But ultimately, whatever design research chooses is his own prerogative. This is why it is important to give thoughtful consideration to such issues which will enable you successfully complete your study as well as achieve the aims of your study(Ali, 1996).

SELF ASSESSEMENT EXERCISE 3

What considerations would you think through before you finally choose a particular research project?

4.0 CONCLUSION

This unit is a very interesting unit, particularly as it has exposed you to the understanding of the meaning of non-experimental research designs, the nature, and the types of experimental or descriptive studies. You have also learnt some of the considerations you will make as preconditions to deciding on which research (experimental or descriptive) design to choose for a research essentially in educational media.

5.0 SUMMARY

The main points in this unit are as follows:

1. Research design is a blueprint or plan for activities in research in educational media which upon implementation would enable you investigate the problem of your study.
2. There are basically two types of research design, namely; the experimental and descriptive designs.
3. Certain considerations are important as preconditions to deciding on which research design to choose for a study. These considerations must be though through critically and systematically before you choose a particular research project.

ANSWERS TO SELF ASSESSMENT EXERCISES:

EXERCISE 1

Any study in which the researcher deliberately interacts with the situation by manipulating the independent variable and controlling certain conditions to produce some effects on the dependent variable is experimental design. While descriptive study does not manipulate or control any variable but merely concern itself with describing events as they are after observing them.

EXERCISE 2

The investigation of teaches interest and ability to use educational media under optimal conditions in senior secondary schools in Abia state.

OR

Analysis of the Rationale of primary schools teachers(imagined or real) concerning their use of educational media in teaching in Abia state.

EXERCISE 3

- The advantages and disadvantages of each are considered

- Which design will help one to successfully complete ones study as well as achieve the objects of the study.
- Which design will I have the time considering money and research skills to undertake.

6.0 TUTOR MARKED ASSIGNMENT

How was the design for your proposed research selected?

7.0 REFERENCES/FURTHER READINGS

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UNIT 4 Reporting Quasi-Experimental Study: A Sample for Praticum

The study by Obi (2008) evaluated the effects of multimedia approach in improving differing ability in student‟s retention in secondary school economics. A pretest–post-test control group quasi-experimental research design was used to determine if significant difference existed between experimental group taught economics with multimedia approach and control group taught with talk-chalk lecture approach using retention test in economics (RTE). 207 SS II Economics students from Nsukka Education Zone, Enugu State randomly sampled and assigned to experimental and control of 110 and 97 respectively participated in the study. Results revealed that levels of retention in economics concepts of students in the experimental group were higher than those of their counterparts in the control group. There is no interaction effect between media of instruction and ability of students at 0.05 level of significance. This findings has implications for enhancing retention in Economics.

Introduction

In Nigeria, one of the aims of teaching secondary school Economics is to equip students with the basic principles of Economics necessary for useful living and for higher education. The teacher‟s responsibility is to encourage the student to acquire and retain the knowledge imparted in school for future solution of economic problems of society, Nigeria developing countries and the world at large (Federal Government of Nigeria National Economics Curriculum for Senior Secondary Schools, 1985). But to the teachers greatest surprise, students‟ retention of what is learnt is at very low level. Awoniyi (1988) noted that “in most cases much teaching goes on in many classrooms though little retention takes place”. (P. 138). Dale (1969) observed that “helping students to remember is one of the great problems of teaching and learning” (p. 101). In Enugu State in particular, the low level of retention in secondary school Economics which cuts across the higher, middle and low ability students is persistent and has generated much concern among teachers.

On the basis of empirical studies, Albeck (1992) linked the unsatisfactory low level of students‟ retention in Economics to poor talk and chalk lecture approach of teaching adopted by teachers. The fact is that in secondary schools, particularly in Enugu State teachers of Economics have resorted to verbalizing their lessons, relying heavily on the use of only one medium the chalkboard otherwise called the talk and chalk lecture approach.

Obi (1992) argued that “the talk and chalk approach to teaching economics, which obviates the use of a variety of educational media of individualize instruction usually leads to rote learning” (p. 10). Indeed, teaching with talk and chalk approach

does not make abstract concepts very clear and does not organized subject matter meaningfully with cues to create a will to learn in the students. The resulting continued low level of students‟ retention in economics in secondary schools particularlly in Enugu state attests to the fact that the use of talk and chalk lecture approach is not appropriate for teaching secondary school economics.

Mcvey (1975) suggests the use of multimedia approach for effective teaching of economics to enhance students‟ retention in economics. The glossary of Educational technology Terms (1987) defined multi media approach as:

> a methodology based on the principle that variety of audio-visual media and experience correlated with other instructional materials overlap and reinforce the value of each other. Some of the materials may be used to motivate interest, others to communicate basic facts, still others to clear up misconceptions and deepen understanding. (p. 80).

Nelson (1976) asserted that "the multimedia approach is an effective method of generating greater students‟ active involvement and better organization of meaningful subject matter with cues in the process of acquisition and retention" (p.38). These claims of multimedia approach must not be made on inadequate research evidence. A scanty number of experiments directly investigating the effectiveness of multimedia approach have been carried out by Mcviy and McCoy (1973), Kenedy and Wikes (1975), and Oyediran, Agoro and Fabiyi (2004). A related has also been done by Ezeanya (1988). However, to the best knowledge of the researcher no study has specifically evaluated the effects of multimedia approach in Enugu state, Nigeria, hence this study was undertaken\

The purpose of the study was to investigate the effectiveness of multi media approach on a sample of SS 11 students of economics using a set of multi choice objective question based on retention gains on the three units taught.

Research Question

1. What is the retention of high, middle and low ability students exposed to multimedia economics instruction and the high middle and low ability student not so exposed as measured by their scores in an economics retention test?
2. Is there any interaction between media of instruction and intellectual ability of student to retain economics concepts as measured by their scores in an economics retention test?

$H0_1$: There is no significant difference at 0.05 level of significance of the mean retention scores of high, middle and low ability students exposed to multimedia economics instruction and high, middle and low ability students not so exposed as measured by an economics retention test.

HO_2: There is no significant interaction effect at 0.05 level of significance between media of instruction and ability of students as measured by their scores in Economics retention test.

Method

The method used in this research is described as follows:

The study employed a quasi-experimental design and specifically used the pre-test post-test control group design (Campbell and Stanley 1963). It involves experimental and control groups and the use of intact classes was used to avoid disrupting normal class activities in the schools involve in the study. The population of this study comprised the entire senior secondary school year two (SS II) Economics students in Nsukka Education Zone, Enugu State during 1991/92 school year.

The sampling technique used in this study was simple random without replacement. By using this technique, 207 (SS II) students of Economics seven intact classes from four schools were randomly drawn from 78 secondary schools in Nsukka Education Zone. The size of the sample was due to the fact that Economics is an elective subject and not a compulsory one. Mcvey (1975) asserts that "samples of 200 or more subjects are adequate for retention". By a simple random sampling technique without replacement, the four schools involved in the study were assigned to the experimental and control groups. One hundred and ten SS II were among students in the experimental schools became the experimental treatment group. Ninety seven SS II students as are in the control schools became the control to the treatment group.

Instruments

Three research instruments were used for data collection in this study.

1. A Retention Test in Economics (RTE). The retention test was a 50 item 5 option multiple-choice objectives test that was designed by the researcher to measure students‟ retention of Economics contents taught on the chosen topics for the study after treatment.
2. The Entry Behaviour Test in Economics (EBTE) was a 50 item 5 option multiple choice objective test designed to measure the entry skills which have been identified as being critical to the beginning of the instructional package (Dick and Carey, 1978). The EBTE test items provided the basis on which it was determined if both experimental and control groups have equivalent entry knowledge prior to commencement of treatment. It afforded also the premise justify the comparison of the treatment groups on an equal level.
3. The three units of instructional experiences selected from the 1991 SS II scheme of work, for economics are as follows: i) supply and demand for

labour ii) public finance ii) supply of and demand for money. It was established that these units of economics have not been done by the SS II students in the schools involved in the study. Oji (1988) found that these units were part of the content areas in economics that secondary schools students find very difficult to understand. It was therefore, hypothesized that the use of multimedia approach would add more concreteness to the concepts, and so make them clearer to understand and retain than when presented with the talk-chalk lecture approach.

Multimedia Components

The multimedia components determined by the instructional objectives for the study were:

- Realia-yam and cassava tubers, palm oil, knife, hoe, naira notes and coins, cheque leaves.
- Budget statement of any year, PAYE and other tax forms.
- Resource-persons Local Government staff, labour union leaders and tax collectors.
- Print media-Recommended textbooks (Obi & Nwaogu, 1989)
- Newspaper clippings, Hypothetical price level, wage rate and productivity data handout, programmed text, lesson notes, modules.
- Graphics-Pie and Bar charts for revenue and expenditure, graphs and drawing, cartoons, comics, diagrams, posters.
- Display media – chalkboard, flannel graph.
- Cassette, taped budget speeches, projectors and transparencies.

Validation and Reliability of the Instrument

The instruments (RTE), (EBTE) were face validated by experts in the fields. They checked the language and structure of each item of the instrument. They examined too, the extent the items reflected the objectives the research sought to achieve. The visual components of multimedia representation-graphs, charts, cartoons, comics, diagrams, pictures and posters were face validated on the basis of quality, relevance, authenticity to the lesson objectives cues and students needs. The performance of students in the pilot study test results showed evidence that the instruments were instructionally effective.

The content validity of the instrument went beyond relying on the expert opinions. The use of the table of specification was strictly based on the relevant content of the scheme of work. The computation of the psychometric qualities of the test items, and the selection of items which only satisfied the psychometric qualities assured the content validity of the instrument. The test-retest technique was used to establish the reliability of the instrument. Reliability co-efficient of r = 0.98 and or = 0.98 and or 0.99 were obtained for RTE and EBTE, respectively. The data were analyzed

using mean score, standard deviation and 2-way analysis of covariance (ANCOVA) with pretest scores used as a covariate to the post treatment scores.

RESULTS

Table 1 presents the mean scores and standard deviations of students‟ overall pre and post treatment retention scores by treatment and ability to answer the first research question: "What is the retention of high, middle and low ability students to multimedia economics instruction and the high, middle and low ability that students did not get exposed as measured by their scores is an economics retention test?"

Table I: Mean scores and standard deviations of students' overall pre and post retention scores by treatment and ability.

Ability levels of students	Groups	NO N	pretest Mean $\underline{X}$	STD	posttest Mean $\overline{X}$	STD	Pre & Posttests Mean diff.	Remarks
HIGH	Experimental	31	14.71	2.09	42.00	3.21	27.22	13.90 mean score gain
	Control	28	12.57	3.15	25.89	3.71	13.32	Less gain
MIDDLE	Experimental	53	13.64	3.21	40.77	13.17	27.13	13.93 mean score gain
	Control	46	12.15	2.40	25.35	3.19	13.20	Less gain
LOW	Experimental	24	12.25	3.65	39.00	4.59	26.75	15.92 mean score gain
	Control	23	12.34	3.18	23.17	3.38	10.83	less gain

The Result of analysis of data in Table I revealed that the high ability of students in the experimental group had 22.40 mean retention score more than the high ability students in the control group who had 10.29. The mean score difference of 11.71 between the groups shows that experimental high ability had a higher level of retention in Economics concepts taught. The middle ability students in the experimental group also had a higher mean retention score of 23.87 more than the control group with 9.22. The mean score difference of 14.65 between the group indicated that the experimental middle ability group had higher level of retention in economics subject matter taught. Similarly the low ability students in the experimental group, performed better with 23.28 mean retention score than their control low ability students, who had 8.23 mean retention score. The mean score difference of 15.05 between the group revealed that the experimental low ability students had a higher level of retention in economics concepts. In all cases, the level of retention of economics concepts of high, middle and low ability students exposed to multimedia approach economics instruction were higher than the controlled high, middle and low ability students exposed to talk-chalk lecture approach.

Table I also present differences between the experimental and control group retention mean score gains to answer the second research question: Is there any interaction between media of instruction and intellectual ability of students‟ retention of economics concepts as measured by their scores in an economics retention test? Result obtained showed that the experimental group high ability students taught economics with talk and chalk lecture approach with more gains in a mean retention score difference of 11.71. For the middle ability students, the experimental low ability students presented economics instructions with multimedia approach clearly did better than their control counterpart presented economics instruction with talk and chalk lecture approach with more gains in a mean retention score difference of 15.05. The 11.17, 14.65 and 15.05 mean retention score differences in favour of the experimental groups in all cases indicated interaction of media with ability to influence retention of economics concepts by students of varying abilities in this study.

Table 2 presents a 2-way analysis of covariance of students‟ retention scores by ability and treatment using pretest score as covariate for test of significance for the first null hypothesis HO_1: "There is no significant difference at 0.05 level of significance in the mean retention scores of high, middle and low ability students as measured by Economics retention test?". The result of the analysis revealed that the calculated F-ratio for ability was 2.896 which is less than a critical value of 3.04 at 0.05 level of significance, with 2df for the numerator and 200df for the denominator. As a result, the first hypothesis HO_1 of no significant difference in the mean retention scores of high, middle and low ability students was accepted.

Table II: Analysis for covariance of students' Retention Scores by Ability and Treatment

Source of Variation	Sum of Squares	Degree of freedom (df)	Mean Square	F-Cal	F-Table	Remarks
Covariates	1577.369	1	1577.369	135.094		F-ratio
Pretest	1577.369	1	1577.369	135.094		Was not
Main	10625.637	3	3541.879	303.345		Significant
Effects	10563.273	1	105663.273	904.694		at P/0.05
Treatment	67.636	2	33.181	2.896	3.04	$H0_1$ was
Ability						upheld
						F-ratio
2-way	27.168	2	13.584	1.163		was not
interactions	27.168	2	13.584	1.163	3.04	significant
Tri-Ability	12230.176	6	2038.363			at P/0.05
Explained	2335.215	200	11.676	174.576		H02 was
Residual	14565.391	206	70.706			upheld
Total						

Table 2 presents the 2-way analysis of covariance of interaction effect of multimedia and ability of students‟ retention in Economics using pretest scores as a covariate for test of significance for the second hypothesis $H0_2$: "there is no significant interaction effect at 0.05 level of significance between media of instruction and ability on the mean retention scores of students as measured by their scores in economics retention test". The result obtained showed that the calculated F-ratio was 1.163 less than the critical value of 3.04 at 0.05 level of significance and 2 df for the numerator and 200 df for the denominator. As a result of this therefore, the second hypothesis, $H0_2$ of no significant interaction effect was accepted. Thus there was no significant interaction effect between multimedia and intellectual ability of students to retain economics concepts.

DISCUSSION OF FINDINGS

This study revealed that multimedia approach was superior to talk and chalk lecture approach because it enhanced students‟ retention in secondary school economics. The superiority of multimedia approach over the talk and chalk lecture approach in the improvement of differing abilities in students‟ retention in Economics can be explained with reference to reinforcement theory of (Kimbler 1987) which states that "people will process information that promised to be rewarding and they will avoid information, which does not promise a reward" (p. 8). From this theory it seems that the multimedia approach presentation, organized subject matter meaningfully. Using a variety of media integrated to complement each other such that the whole is greater than the sum of its parts in immersing the students in multi-sensory economics learning experience. Presentation of lessons in economics using the multimedia approach made abstract concept clearer and meaningful for students to better learn and retain taught subject-matter. It also inform why multimedia approach presentation was more rewarding. The superior performance in retention of economics concepts of the experimental high, middle and low ability of students was ensured.

Macvey (1975) said that "multimedia approach provides cues for retention of what is learned and transfer of what is learned to new situation". (p. 16). The organization of multimedia approach economics instruction in forms of tables, graphs, diagrams, pie and bar charts, cartoons, comics and posters as used in combination which concrete media as a learning stimuli provided rich sources of cues that serve to enhance improvement of retention in economics of the experimental high, middle and low ability students more than those of talk and chalk approach control group. The findings of this study agrees with those of Kennedy and Wikes (1975) who concluded that "meaningful material as compared with the material learned by rote has advantage in being retained because of the availability of cues". (p. 22).

Arising from the foregoing results obtained hypothesis one and two were upheld. Thus, the influence of ability on students‟ retention of economics concepts was not significant. The interaction between the effect of multimedia and intellectual ability of students to retain economics concepts was not statistically significant. This finding is not a surprise. The plausible explanation is provided by Hoban (1974) hypodermic needle theory, which states that "messages enter directly into the blood stream of cognition, affection and conduct of a target audience". (p. 30). Macvey and Mecoy (1973) observed that "the postulate does not always hold true in the classroom communication process" (P. 10). Since a student who is hungry or sick may not find multimedia approach lessons rewarding. Furthermore, the relationship between the teacher and the student is another factor that can cause mediated communication failures. Multimedia approach is used to make abstract concepts clear for easy learning and retention and actively involving the students in class activities with a will to learn for improved retention. But when communication barriers exist with respect to poor teacher-student relationship, no matter how bright the student may be, the multimedia approach will be limited in its effect in the improvement of retention according to abilities.

Educational Implications

The superiority of multi-media approach over the more conventional approach in enhancing students‟ retention in secondary school economics suggested that the use of combinations of a variety of media in the instructional process is superior to using any one alone. A single medium of instruction will not suffice, even if only because it will become monotonous. Variety among instructional media seems to be more efficient than a monopoly of one. This finding questions the theoretical rational for the use of the chalkboard and teacher talk in the instructional system. Verbalism implicit in it, is also not appropriate for the teaching of secondary school economics. From reviewed literature, there was no theoretical rationale to sustain the use of only one medium the chalkboard with teacher talk in teaching economics.

In the light of the findings of this study, accepted practices that are inimical to effective teaching and learning of secondary school economics will be revised in favour of the findings. Multimedia enhanced retention in economics more than talk-chalk lecture approach. The feedback on the efficacy of multimedia approach on retention of differing ability students suggest its adoption as an intervention approach which will identify high, middle and low ability achievers so as to individualize their instruction to learn better and improve the retention of what is learned. The none significance of the influence of ability on students retention of economics concepts and interaction between effect of multimedia and intellectual ability of students to retain economics concepts stressed the need for good teacher-student relationship in the instructional process.

Conclusion

The limitations of this study include: The use of only SS II students and just three units of their scheme of work. Initial differences of teachers and intact classes may not have been completed taken care of by the statistical techniques used. The short period that the study was conducted, the scarcity of fund and materials were obvious limitations. These are likely to affect generalization of the findings and its validity. However, within the conditions and limitations of this study, it becomes reasonable to conclude that multimedia approach is superior to talk and chalk lecture approach in enhancing the improvement of differing ability students‟ retention in secondary school economics.

Recommendation

Teachers of economics in secondary schools should employ the use of multimedia approach in the improvement of the levels of students‟ retention. The findings of this study questions the rationale for the use of only the chalkboard and teacher talk approach, which is not appropriate for teaching secondary school economics and for improving retention. Teachers should therefore use a variety of media in teaching economics. In-service training programmes, workshops and seminars are suggested to be organized for teachers of economics. Resource centers should be established in secondary schools to encourage the use of multimedia approaches for teaching secondary school subjects.

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