NATIONAL OPEN UNIVERSITY OF NIGERIA

COURSE CODE : EDT 832

COURSE TITLE :
PREPARATION, UTILISATION AND INTEGRATION OF EDUCATIONAL MEDIA IN THE CURRICULUM

COURSE GUIDE

EDT 832

PREPARATION, UTILISATION AND INTEGRATION OF EDUCATIONAL MEDIA IN THE CURRICULUM

COURSE GUIDE

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1.0 INTRODUCTION

EDT 832: Preparation, Utilisation and Integration of Educational Media in the Curriculum is a third semester, two credit and 700 level core course. It will be available for all students offering M. Ed. Educational Technology.

This course will expose you to understanding of many of the concepts and theories in Educational Media and Curriculum. It will assist you to be able to apply these concepts and theories to the task and roles that you perform as a teacher, an educational technologist and a media consultant in the educational setting.

The course consists of 15 units, which include course guide, definition of educational media, preparation of audio media, preparation of visual media, production of audio-visual media, selection criteria for instructional media, utilisation of instructional media, integrating technology into the curriculum, curriculum organization, participants of curriculum development, curriculum planning and implementation and foundations of curriculum development.

This course guide tells you briefly what the course is about, what course materials you will be using and how you can work your way through these materials. It suggests some general guidelines for the amount of time you are likely to spend on each unit of the course in order to complete it successfully.

It also gives you some guidance on your tutor-marked assignments, which will be made available in the assignment files. There are regular tutorial classes that are linked to the course. You are advised to attend these sessions.

2.0 WHAT YOU WILL LEARN IN THIS COURSE

The overall aim of EDT 832: Preparation, Utilisation and Integration of Educational Media in the Curriculum are to introduce you to various educational media, their utilisation and the integration of these media into the curriculum. The context in which educational media can be used will also be explained. Criteria for the selection and utilisation of media will be examined; so also is the types of media. Curriculum organization, development, planning and implementation will be discussed. Foundations of curriculum development will also be examined.

The understanding of preparation, utilisation and integration of educational media into the curriculum is vital because it serves as a framework for the practice of education. From time to time, teachers and other stakeholders in the educational settings need to make decisions which will affect the quality of teaching-learning in our schools and such decisions include the use of appropriate media in the teaching-learning process.

During this course, you will learn about the factors to consider when choosing and using media. For maximum effectiveness you will also learn about the preparation and production of the discussed media.

3.0 COURSE AIMS

The aim of the course can be summarised as follows:

This course aims to give you an understanding of the meaning of educational media, what they are and how they can be prepared. It also aims to help you develop skills in the utilisation of these media and the necessary criteria needed for selecting media for classroom instruction. The need for curriculum planning and implementation is also aimed to make you know all that goes into developing a good curriculum for schools. All these will be achieved by aiming to:

- introduce you to definition, types and preparation of instructional media;
- demonstrate skills in utilisation of media for instruction;
- explain the integration of technology into the curriculum and also; explain the concept of curriculum organisation and implementation.

4.0 COURSE OBJECTIVES

To achieve the aims set out, the course sets overall objectives. Each unit also has specific objectives. The unit objectives are always included at the beginning of a unit; you should read them before you start working through the unit. You may want to refer to them during your study of the unit to check on your progress.

You should always look at the unit objectives after completing a unit. In doing so, you will be sue that you have followed the instructions in the unit.

Below are the wider objectives of the course as a whole. By meeting these objectives, you should have achieved the aims of the course as a whole. On successful completion of the course, you should be able to:

(1) Define educational media;

(2) Mention the characteristics of media;

(3) State the classification of media;

(4) Distinguish between the software and hardware aspects of educational media;

(5) Distinguish between the various categories of audio media used in education;

(6) Describe the instructional uses of each of the audio media studied;

(7) Describe how to make a good audio recording;

(8) Differentiate the following: overhead, opaque and slide projectors;

(9) Mention the software needed for overhead, opaque and slide projects;

(10) Describe how these software are produced;

(11) Distinguish between the various categories of audio-visual media used in education;

(12) Demonstrate competence in the use of audio-visual media;

(13) Mention the criteria for selecting educational media;

(14) Discuss the reasons for using media in education;

(15) Describe the preparation that are necessary for effective use of media for instruction;

(16) Describe the techniques for using radio in the classroom;

(17) Demonstrate competency in the use of radio and tape recorder for instructional purposes;

(18) Describe the basic processes of using projected media in the class models;

(19) Describe the steps to be taken in using the following in the class: models, posters, specimen, charts, flash cards, chalkboard, marker board, etc;

(20) Describe the procedure for effectively utilizing audio-visual media in the classroom;

(21) Identify variables that are very important when organising the curriculum;

(22) Discuss the problems of curriculum organisation using a particular type of organisation;

(23) Identify the participants in curriculum development;

(24) Explain why it is necessary that curriculum development activists should extend to people outside the school system.

5.0 WORKING THROUGH THIS COURSE

To complete this course, you are required to read the study units, read set books and read other materials provided by the National Open University of Nigeria (NOUN). Each unit contains self-assessment exercises, and at a point in the course, you are required to submit assignments for assessment purposes. At the end of the course, is a final examination. The course should take you about 16 – 17 weeks in total to complete.

Below you will find listed all the components of the course, what you have to do, and how you should allocate your time to each unit in order to complete the course successfully on time.

Below are the lists of all the components of the course:

6.0 COURSE MATERIALS

Major components of the course are:

- Course Guide
- Study Units
- References
- Assignment
- Presentation Schedule

7.0 STUDY UNITS

The study units in this course are as follows:

Unit 1: Definition and Types of Instructional Media
Unit 2: Preparation of Audio Media
Unit 3: Preparation of Visual Media (projected)
Unit 4: Preparation of Visual Media (non-projected)
Unit 5: Production of Audio Visual Media
Unit 6: Reasons for use of Media and Selection Criteria of Instructional Media
Unit 7: Utilisation of Audio Instructional Media
Unit 8: Utilisation of Visual Media (projected)
Unit 9: Utilisation of Visual Media (non-projected)
Unit 10: Organisation of Curriculum
Unit 11: Participants in Curriculum Implementation
Unit 12: Curriculum Planning

The first two units explain the important terms, concepts and meanings of instructional media, specifying the place of educational media and the various types of media used in educational setting. The next three units give insight and step-by-step procedure of preparation of various media for classroom instruction. The preparation of audio, visual (projected and non-projected) and audio visual media are discussed in detail.

The next unit explains the reason for use of media and criteria to be considered in selecting instructional media for classroom practices.

This was followed with four other units, which tend to describe the creative uses of a variety of media, skills and basic utilisation plan for using media.

The last five units describes the place of technology in curriculum organisation, planning, developing and implementing curriculum with specific reference to what operates in the educational system in Nigeria.

8.0 ASSIGNMENT FILES

There are nine assignments in this course. The nine-course assignment will cover:

(1) How can you distinguish between the hardware and software of educational media?

(2) Describe the instructional uses of each of the audio media studied and describe to make a good audio recording.

Make a 15 minutes audio recording on any subject are of your choice (unit 2).

(3) Develop a lesson of your choice and prepare at least four transparencies to aid your instruction (unit 3 – 4).

(4) Briefly describe the instructional uses of each of the audio-visual media studied and distinguish between the following audio-visuals: (a) television, (b) video tape recording (unit 5).

(5) What factors do you think can militate against effective use of projected media in your school (module 2, unit 1 – 2).

(6) How would you get your students to make use of educational television programs? (unit 3).

(7) What are the main problems of curriculum organisation, discuss these problems using a particular type of organisation (module 3, unit 1).

(8) Why is it necessary that curriculum development activities should extend to people outside the schools system?

(9) List and discuss the four stages of intellectual development of the child as identified by Piaget.

9.0 PRESENTATION SCHEDULE

The presentation schedule included in your course materials gives you the important dates for this year for the completion of tutor-marked assignments and attending tutorials. Remember, you are required to submit all your assignments by the due date. You should guard against falling behind in your work.

10.0 ASSESSMENT

There are three aspects to the assessment of the course: first are self-assessment exercises, second, are the tutor-marked assignments; and third, there is a written examination.

In tackling the assignments, you are advised to be sincere in attempting the exercises; you are expected to apply information, knowledge and techniques gathered during the course. The assignments must be submitted to your tutor for formal assessment in accordance with the deadlines stated in the **Presentation Schedule** and the **Assignment File**. The work you submit to your tutor for assessment will count for 40% of your total Course mark.

At the end of the course, you will need to sit for a final written examination of _three hours' duration. This examination will also count for 70% of your total course mark.

11.0 TUTOR-MARKED ASSIGNMENT (TMAs)

There are nine tutor-marked assignments in this course. You only need to submit five of the eight assignments. You are encouraged, however, to submit all eight assignments in which case the highest five of the eight marks will be counted. Each assignment counts 10% towards your total course mark.

Assignment questions for the units in this course are contained in the **Assignment File**. You will be able to complete your assignment from the information and materials contained in your reading, references and study units. However, it is desirable in all degree level education to demonstrate that you have read and researched more widely than the required minimum. Using other references will give you a broader viewpoint and may provide a deeper understanding of the subject.

When you have completed each assignment, send it together with a TMA (tutor marked assignment) form, to your tutor. Make sure that each assignment reaches your tutor on or before the deadline given in the **Presentation Schedule** and **Assignment File**.

If for any reason, you cannot complete your work on time, contact your tutor before the assignment is due to discuss the possibility of an extension. Extensions will not be granted after the due date unless there are exceptional circumstances.

12.0 FINAL EXAMINATION AND GRADING

The final examination for EDT722 will be of three hours' duration and have a value of 50% of the total course grade. The examination will consist of questions, which reflect the types of self-testing, practice exercise and tutor-marked problems you have previously encountered. All areas of the course will be assessed.

Use the time between finishing the last unit and sitting for the examination to revise the entire course. You might find it useful to review your self-tests, tutor-marked assignments and comments on them before the examination.

The final examination covers information from all parts of the course.

13.0 COURSE MARKING SCHEME

Total Course Marking Scheme

ASSESSMENT	MARKS
Assignment 1 – 9	Nine assignments, best five marks of the nine count @ 10% each = 50% of course marks
Final Examination	50% of overall course marks
Total	**100% of course marks**

14.0 COURSE OVERVIEW

This table brings together the units, the number of weeks you should take to complete them and the assignment that follow them.

Unit	Title of work	Weeks activity	Assessment (end of unit)
1	Definition and Types of Instructional Media	1	Assignment 1
2	Preparation of Audio Media	1	Assignment 2
3	Preparation of Visual Media (projected)	1	
4	Preparation of Visual Media (non-projected)	1	Assignment 3
5	Production of Audio Visual Media	1	Assignment 4
6	Reasons for use of Media and Selection Criteria of Instructional Media	1	
7	Application of Instructional Media	1	Assignment 5
8	Utilisation of Visual Media (projected)	1	Assignment 6
9	Utilisation of Visual Media (non-projected)	1	
10	Organisation of Curriculum	1	Assignment 7
11	Participants in Curriculum Implementation	1	Assignment 8
12	Curriculum Planning	1	Assignment 9
	Revision		
	Total		

15.0 HOW TO GET THE MOST FROM THIS COURSE

In distance learning, the study units replace the university lecturer. This is one of the great advantages of distance learning. You can read and work through specially designed study materials at your own pace, and at a time and place that suits you best. Think of it as reading the lecture that a lecturer might set you some reading to do, the study unit will tell you when to read your other materials. Just as a lecturer might give you an in-class exercise, your study units provide exercises for you to do at appropriate points.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit, and how a particular unit is integrated with the other units and the course as a whole.

Next is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit. You should use these objectives to guide your study. When you have finished the unit, you must go back and check whether you have achieved the objectives. If you make a habit of doing this, you will significantly improve your chances of passing the course.

The main body of the unit guides you through the required reading from other sources. This will usually be either from a **Reading Section** of some other sources.

Self-tests are interspersed throughout the end of units. Working through these tests will help you to achieve the objectives of the unit and prepare you for the assignments and the examination. You should do each self-test as you come to it in the study unit. There will also be numerous examples given in the study units, work through these when you come to them too.

The following is a practical strategy for working through the course. If you run into any trouble, telephone your tutor. Remember that your tutor‘s job is to help you. When you need help, don‘t hesitate to call and ask your tutor to provide it.

(1) Read this course guide thoroughly.

(2) Organise a study schedule. Refer to the course overview for more details. Note the time you are expected to spend on each unit and how the assignments relate to the units. Important information e.g. details of your tutorials, and the date of the first day of the semester will be made available. You need to gather all this information in one place, such as your diary or a wall calendar. Whatever method you choose to use, you should decide on and write in your own dates for working on each unit.

(3) Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their coursework. If you get into difficulties with your schedule, please let your tutor know before it is too late for help.

(4) Turn to unit 1 and read the introduction and the objectives for the unit.

(5) Assemble the study materials. Information about what you need for a unit is given in the _Overview‘ at the beginning of each unit. You will always need both the study unit you are working on and one of your references, on your desk at the same time.

(6) Work through the unit. The content of the unit itself has been arranged to provide a sequence for you to follow. As you work through the units, you will be instructed to read sections from your other sources. Use the unit to guide your reading.

(7) Well before the relevant due date, check your Assignment File and make sure you attend to the next required assignment. Keep in mind that you will learn a lot by doing the assignments carefully.

They have been designed to help you meet the objectives of the course and, therefore, will help you pass the exam. Submit all assignments not later than the due date.

(8) Review of the objectives for each study unit confirms that you have achieved them. If you feel unsure about any of the objectives, review the study material or consult your tutor.

(9) When you are confident that you have achieved a unit's objectives, you can then start on the next unit. Proceed unit by unit through the course and try to face your study so that you keep yourself on schedule.

(10) When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments, both on the tutor-marked assignment form and also written on the assignment.

Consult your tutor as soon as possible if you have any questions or problems.

(11) After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed in the Course Guide).

16.0 TUTORS AND TUTORIALS

There are 17 hours of tutorials provided in support of this course. You will be notified of the dates, times and location of these tutorials, together with the names and phone numbers of your tutor, as soon as you are allocated a tutorial group.

Your tutor will mark and comment on your assignments, keep a close watch on your progress and on any difficulties you might encounter and provide assistance to you during the course. You must mail your tutor-marked assignments to your tutor well before the due date (at least two working days are required).

They will be marked by your tutor and returned to you as soon as possible. Do not hesitate to contact your tutor by telephone, e-mail, or discussion board if you need help. The following might be circumstances in which you would find help necessary.

Contact your tutor if:

- You do not understand any part of the study units or the assigned readings.
- You have difficulty with the self-test or exercise.
- You have a question or problem with an assignment with your tutor's comment on an assignment or with the grading of an assignment.

You should try your best to attend the tutorials. This is the only chance to have face-to-face contact with your tutor and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study.

To gain the maximum benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participating in discussions actively.

17.0 SUMMARY

EDT 832 intends to introduce the preparation, utilisation and integration of educational media into the curriculum to you. Upon completing the course, you will be equipped with the basic knowledge of the important concepts and types of educational media, as well as concepts, types and implementation of curriculum. You will be able to answer these kinds of questions:

- What are educational media?
- Mention the characteristics of educational media.
- Mention the types of media.
- What are audio media?
- What are the instructional uses of audio media?
- How can you make a good audio recording?
- Mention the software needed for the following projectors: overhead projector, opaque projector and slide projector.
- What are visual media?
- Mention the various types of visual media.
- How can you produce visual media?
- What are audio media?
- Mention types of audio media.
- How can you prepare audio-media?
- Describe the techniques for using radio in the classroom.
- What are the basic processes of using projected media in the classroom?
- What are the basic processes of using non-projected media in the classroom?
- How can you use audio-visual media effectively in the classroom?
- What is curriculum?
- What are the variables that are very important when organising the curriculum?
- What are the problems of curriculum organisation?
- Mention the participants in curriculum development.
- What are the specific roles of participants in curriculum development?
- What is curriculum planning?
- Why do some developing countries omit the pilot or trial testing stage of curriculum implementation?
- What are the things that should be made available for any curriculum implementation?
- Discuss the sociological foundation of curriculum development.
- Explain philosophical foundation of curriculum development.
- Discuss the psychological foundation of curriculum development.

Of course, the list of questions that you can answer is not limited to the above list. To gain the most from this course you should try to apply the principles and concepts to your everyday life and practice of media use in educational settings.

We hope you enjoy your acquaintances with the National Open University of Nigeria (NOUN).
We wish you every success in the future.

COURSE DEVELOPMENT

EDT 832

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MODULE I: PREPARATION OF MEDIA

UNIT 1 DEFINITION AND TYPES OF INSTRUCTIONAL MEDIA

Table of Contents

1.0 INTRODUCTION

In this unit, you will be exposed to the meaning and definitions of instructional media and also to the various types of instructional media.

This is to enable you clear some doubts about what instructional media are and give you details of the various families into which instructional media are classified.

As a specialist in educational technology, you need this knowledge. You will no doubt enjoy reading through the unit.

2.0 OBJECTIVES

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

(1) define educational media;

(2) mention the characteristics of media;

(3) state the classification of media;

(4) distinguish between the hardware and software aspects of educational media.

3.0 MAIN CONTENT

3.1 Definition and Types of Instructional Media

The term media merely refers to a collection of materials and equipment that can be used effectively for communication. They include non-projected and projected; hardware and software; print and non-print; ―little media‖ and ―big media‖. Also, media can be seen as channels through which messages, information, ideas and knowledge are disseminated (Abimbade, 1997).

Whenever a collection of materials and equipment are used for teaching and learning so as to promote effective communication in a classroom setting, then, we refer to them as educational media. In other words, educational media may be defined as a collection of teaching-learning materials that constitute an integral component of an instructional or training process and are utilised in delivering educational information to the learners. Educational media are manipulated, seen, heard and talked about.

Educational media are either used for individual, small or large group of learners. There is a need to emphasise that educational media are designed, prepared, produced, evaluated and utilised mainly to facilitate learner's understanding of the topics being taught. Basically, educational media are learner-centred.

3.2 Characteristics of Media

There are five main characteristics of media.

1. By nature, some are audio e.g. radio, loudspeaker, telephones, talking drum, human voice etc. Some are visual e.g. slides, transparencies, maps, charts, models, mock-ups etc. Yet, others are audio-visual in nature, that is, they combine both sound and vision e.g. motion pictures and television.

2. Some are big while some are small or little. Big media are usually very complex, sophisticated and expensive. Examples include television, sound films, and computer-assisted instructions. Small media are less complex, less sophisticated and expensive. Examples are charts, slides, films, maps etc.

3. Some are static while some are dynamic. Examples of static ones include pictures, photographs and maps. Examples of dynamic ones are motion films and television.

4. Some are in the realm of mass media such as the press, radio and television.

5. Some are locally designed and produced by local classroom teachers while others are commercially produced by companies with the sole aim of maximizing profit. Each has its merits and demerits.

While locally produced ones are designed to suit immediate classroom needs and cost less, the commercially produced ones may not suit immediate classroom use completely and they usually cost more.

It should, however, be pointed out that locally designed and produced media can become commercially produced if they are mass produced and have big network distributions.

3.3 Classification of Media

It is difficult, if not impossible, to undertake a watertight compartmentalization of media due to the fact that some media materials do not lend themselves to any rigid form of classification. However, three systems of classification will be examined.

Under the first one, all forms of media are divided under two broad categories, namely:

(a) Print media, and
(b) Electronic or Technological media

Print media include textbooks, reference books, journals, newspapers, posters, bulletin, handouts and hand bills through which man acquire facts, information, knowledge, skills, principles and enlightenment.

Electronic media are simply information carrying devices which can be used for disseminating information. These could be sub-divided into two, namely: big media and small media. This form of classification looks rather simple, and if it is to be stuck to, many forms of media which do not readily fall under any of the two may be left out completely (Abimbade, 2006).

The second system of classification of media groups or forms of media falls under:

(a) realia
(b) print
(c) hardware, and
(d) software

Realia simply means real objects. Examples include car, dog, fly, specimen, chair etc.

Print media include textbooks, journals, newspapers, posters etc.

Hardware are the machines, equipment, tools or gadgets upon which the software will be transmitted. They can be used times without number, without damaging easily and when they do, they are usually repairable.

Software are the materials. They are the consumables or the disposables. They wear and tear as they are used. They are relatively cheaper than the hardware.

The two (hardware and software) are indispensable. The table below shows examples of hardware and the software accompanying each of them.

S/N	Hardware	Software
1.	Audio cassette recorder	Audio cassette
2.	Video cassette recorder	Video cassette
3.	8mm Film projector	8mm film
4.	16mm Film projector	16mm film
5.	Slide projector	Slide
6.	Film strip projector	Film strip
7.	Overhead projector	Transparency

The third system of classification categorizes all media under three broad subdivisions, namely:

(i) Audio media
(ii) Visual media
(iii) Audio-visual media

Audio Media – These forms of media carry sound alone. They are teaching and learning devices that mostly appeal to the sense of hearing. They include tape recorder, compact disc, records, public address system, talking drums, telephone, human voice.

Visual Media – These are teaching and learning devices that mostly appeal to the sense of seeing only (pictorial ones). These can also be subdivided into two namely:

Projected and Non-projected visuals – The project visuals require electricity for projection, e.g. filmstrips, slides, transparencies, using their projectors. The non-projected visuals do not need light source and these can be further divided into the two-dimensional and three-dimensional non-projected visuals.

The two-dimensional non-projected visuals have only length and breadth and these include posters, charts, prints: textbooks, journals, bulletins etc. while the three-dimensional non-projected visuals are those with length, breadth and height/volume and they include real objects, models, mock-ups, puppets, globes etc.

Audio-Visual Media – Another name for audio-visual media is transmitted media. They refer to those instructional materials, which provide the learners with the opportunity of seeing and hearing at the same time. Examples are instructional or educational television, closed circuit television, computer etc.

Self-Assessed Exercises

How can you distinguish between the hardware and software of educational media? Give five (5) examples of each.

4.0 CONCLUSION

Educational media has become a useful resource to both the teachers and learners. The quality of teaching is being enhanced by the varieties and availability of the media. This unit has looked into what media is, types and characteristics of media and why they are used in instructional process.

5.0 SUMMARY

In this unit, we have successfully explained the meaning, types, and characteristics of instructional media. You will recall that media is explained as ―anything that are used to make the teaching of any topic, concept or idea meaningful, be it in any form, can rightly be regarded as instructional media‖. Because, they are found in different shapes, forms and types, they are classified differently. Thus, we have audio, visual, audio-visual, projected, non-projected, small, big, realia, specimen, diorama etc. representing different kinds of media.

6.0 TUTOR MARKED ASSIGNMENT

1. Define the term ―educational media‖.
2. Briefly mention the characteristics of media.
3. Explain the major classification of educational media.

Answer to SAE Question

Hardware are the machines, equipment, tools or gadgets upon which the software will be transmitted. They can be used times without number, without damaging easily and when they do, they are usually repairable.

Software are the materials. They are the consumables or the disposables. They wear and tear as they are used. They are relatively cheaper than the hardware.

S/N	Hardware	Software
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6.	Film strip projector	Film strip
7.	Overhead projector	Transparency

7.0 REFERENCES AND FURTHER READING

Abimbade, A. (2006). Theory and Practice of Educational Technology, ―Spectrum Books, Ibadan.

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UNIT 2 PREPARATION OF AUDIO MEDIA

Table of Contents

1.0 INTRODUCTION

We shall attempt in this unit to discuss audio-media as one of the classification of instructional media. You will find this unit useful as a teacher because audio-media are considered essential in an attempt by a teacher to bring about effective teaching-learning process.

In this unit also, you will get to know that there are different types of audio-media. The methods as well as the skills needed in production of the audio media shall be acquired by you in the course of going through this unit.

2.0 OBJECTIVES

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

(1) Distinguish between the various categories of audio media that we use in education;
(2) Describe the instructional uses of each of the audio media studied;
(3) Describe how to make a good audio recording.

3.0 MAIN CONTENT

3.1 Meaning of Audio Media

Audio media are forms of media that carry sound alone. They are teaching and learning devices that mostly appeal to the sense of hearing (Salawu, Afolabi, Adedapo and Adeyanju, 2006).

Audio media include tapes (tape recorders), records, radio broadcasts, language laboratory, compact disc (CD) player, laser disc player, stereo system, public address system, microphones, amplifiers, sound mixers, head phone, telephone, etc.

Audio media can be used for vocabulary practice, dictation, direct, instruction and gathering of information from different categories of people. Audio media appeal to the ear. They present stimulating verbal messages to the learners. The illiterates and blind learners can easily learn from audio media. Audio media are cheaper to procure, readily available and versatile in application. The technical equipment required to record, playback or edit audio communications are easy to operate too.

Every teacher must be concerned about learner's listening skills – the physical ability to hear, the intellectual ability to profit from, and to improve upon the learning through listening and the ability to use the listening equipment (hardware) and materials (software) to the best advantage.

3.2 The Radio in the Classroom

By definition, radio is the transmission and reception of signals by means of electric waves without the use of connecting wires (Ajelabi, 2005). It is one of the most potent methods of mass communication.

Although radio is an integral part of the lives of Nigerians, many homes have and do listen to radio each day but many schools in Nigeria do not make use of radio in the classrooms. This is due to the absence of electric power, lack of suitable education programmes and cost (Oguntunse, 2005). At times, these programmes are not aired during the school sessions, but late in the afternoon or frequently in the evening.

Notwithstanding these, the potential of radio as an education medium is enormous. The teaching qualities of radio include immediately, realism, the conquest of space and time, emotional impact, authenticity and inexpensiveness. If the radio programme is properly used in the classroom, it can provide learners with information, increase discernment of social significance, develop desirable attitudes, increase appreciation of aesthetic values, stimulate interest and further study, as well as arouse learners to think and act.

3.3 Tape Records

Tape recorders do make instantaneous recording valuable. It gives the teacher and the learners opportunities to assess and approve all classes of oral work. It is useful in speech training, reading, composition, comprehension, drama, discussion, singing, poetry, music, dancing etc. Among the audio media (radio, CD, records and audio tapes), the only one where it is really practical for teachers and lecturers to produce their own materials is the audio tapes.

How sound is recordings on audio tape?

In the recording process, the first stage takes place in the microphone. Here, the incident sound waves cause a membrane of some sort to vibrate, and these mechanical vibrations are converted into a weak electrical signal whose amplitude follows the amplitude of the original sound. Next, record amplifier of the tape recorder, where it is increased in strength and (in most cases) also has its frequencies artificially enhanced in order to increase the signal to noise ratio in the final recording. The signal is then fed into the record head, an electromagnet that produces between

its poles a magnetic field whose intensity varies in exactly the same way as the amplitude of the electrical sound signal.

In the playback process, exactly the opposite chain of transformation takes place.

3.4 The Equipment needed for Audiotape Recording

Microphones: Microphone come in various types, and like most other items of audio visual hardware, vary enormously in quality and price. Thus, when buying or selecting a microphone, it is important to choose one that is of a suitable type to do the job that one has in mind and is also of a quality that matches the rest of the equipment.

Microphones differ both in terms of the basic physical principles on which they operate and in terms of their directional characteristics. With regard to characteristics, we can distinguish four main types:

- Omni directional microphones, which are equally sensitive in all direction when suitably mounted; suitable for recording group discussions.

- By-directional (or figure-of-eight) microphones, which are sensitive in two opposite horizontal directions. They are suitable for recording interviews involving two people, with one on either side of the microphone.

- Cardioids microphones are highly sensitive in one direction. They are not sensitive at all in the opposite direction and are suitable for recording a single speaker.

- Gun (or rifle) microphones are highly directional in their sensitivity. They only pick up sound within a narrow cone and are suitable for picking up sound from a single source located some distance away.

Tape Recorders: These are of two basic types, namely: open reel recorders and cassette recorders. The former make use of detachable open reels as feed and take up spools, and generally need to have the tape threaded manually through the tape head and drive mechanism before use. The latter make use of sealed tape cassettes that contain both the feed and take up spools, and are loaded simply by fitting the cassette into place in the machine. Apart from this, however, the two types of recorders work in exactly the same way, and can be used to do more or less the same things.

3.5 How to make a Recording

The way in which one set about making a recording on an audiotape will obviously depend, to a large extent, on the nature of the material to be recorded and the purpose for which it is to be used (Bates, 1981). There are, however, some general rules that should always be observed:

(1) Make sure that what you are recording is of the highest possible quality. In most cases, the key to producing high quality original material is careful preparation both in terms of planning and writing the materials and in term of making sure that rehearsal is conducted before the final production.

(2) Try to optimize the recording environment. The environment must be free from noise (extraneous noise). This background noise that is hardly noticed at the time a recording is being made can prove intolerable when the resulting recording is played back. Also, the environment should have appropriate acoustic properties.

- Use appropriate equipment and materials.

- Use an external microphone (not one built into the tape recorder) of sufficient quality to do justice to the rest of the equipment – preferably one with directional properties suitable for the job you want to do.

- Use the best tape recorder available, assuming it is suitable for the job in hand and bearing in mind that open-reel machines are generally much more suitable for making original recordings than cassette machines.

- Use good quality tape of suitable grade and of sufficient length to give the required playing time at the tape speed you intend using.

- Get the most out of your equipment and materials.

Even if you buy the finest equipment in the market, you will only obtain good results if you use the equipment correctly. Thus, if you want to get the most out of your equipment and materials, you should:

(1) Select a tape speed that is sufficiently high to produce the quality of recording you require.

(2) Set the recording level correctly. Some machines have a facility that allows this level to be controlled automatically. However, other machines require that the recording level should always be set manually.

(3) Use the ‗pause' control for starting and stopping the tape during recording rather than the ―lay‖ and ―stop‖ controls.

3.6 Presentation of Content on Tape

- Introduce the subject of tape from the onset.

- Use conversational rather than textbook dictation.

- Talk to the recorder as if you are talking to a friend.

- Do not lecture.

- Keep the tape short even if it is to be used by adult students.

- You can also involve your listeners in meaningful learning activities, for example, you can supply a study guide or worksheet for use along with the tape.

- Try to provide ample space for students to take notes while listening to the tape.

Self Assessed Exercises

1. Describe the role of recorded sound in education.
2. Mention the various types of audio media used in education.
3. Mention and explain the equipment needed for audiotape recording.

4.0 CONCLUSION

The audio media are very useful teaching tools at all levels of education. Therefore, it requires adequate preparation in producing a quality and effective audio instructional media for teaching and learning.

5.0 SUMMARY

In this unit, you have studied the audio media as one in the broad family of educational media. Attempts were made to acquaint you with a wide range of examples of audio media with their descriptions. In this unit also, you were provided with the technical details of how to package information in audio form for effective teaching-learning situation.

6.0 TUTOR MARKED ASSIGNMENT

(1) Describe the instructional uses of each of the audio media studied and describe how to make a good audio recording.

(2) Make a 15 minutes audio recording on any subject area of your choice.

Unit 2 Answer to SAE Question

Audio media can be used for vocabulary practice, dictation, direct, instruction and gathering of information from different categories of people. Audio media appeal to the ear. They present stimulating verbal messages to the learners. The illiterates and blind learners can easily learn from audio media. Audio media are cheaper to procure, readily available and versatile in application. The technical equipment required to record, playback or edit audio communications are easy to operate too.

Audio media include tapes (tape recorders), records, radio broadcasts, language laboratory, compact disc (CD) player, laser disc player, stereo system, public address system, microphones, amplifiers, sound mixers, head phone, telephone, etc.

Microphones: Microphone come in various types, and like most other items of audio visual hardware, vary enormously in quality and price. Thus, when buying or selecting a microphone, it is important to choose one that is of a suitable type to do the job that one has in mind and is also of a quality that matches the rest of the equipment.

Microphones differ both in terms of the basic physical principles on which they operate and in terms of their directional characteristics. With regard to characteristics, we can distinguish four main types:

- Omni directional microphones, which are equally sensitive in all direction when suitably mounted; suitable for recording group discussions.

- By-directional (or figure-of-eight) microphones, which are sensitive in two opposite horizontal directions. They are suitable for recording interviews involving two people, with one on either side of the microphone.

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Tape Recorders: These are of two basic types, namely: open reel recorders and cassette recorders. The former make use of detachable open reels as feed and take up spools, and generally need to have the tape threaded manually through the tape head and drive mechanism before use. The latter make use of sealed tape cassettes that contain both the feed and take up spools, and are loaded simply by fitting the cassette into place in the machine. Apart from this, however, the two types of recorders work in exactly the same way, and can be used to do more or less the same things.

7.0 REFERENCES AND FURTHER READING

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UNIT 3 PREPARATION OF VISUAL MEDIA (PROJECTED TYPES)

Table of Contents

1.0 INTRODUCTION

It is necessary and highly essential for any teacher wishing to teach for effectiveness to use instructional media during teaching-learning process. As important as instructional media usage is, preparation of such media precedes their usage. Instructional media can be made available through many sources. It can be sourced for through procurement, adaptation, adaptation, loan from media centres or libraries, and through improvisation.

In this unit, however, emphasis would be placed on the skills and techniques needed in the production of the itemised visual media above.

2.0 OBJECTIVES

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

1. Distinguish between overhead, opaque and slide projectors.
2. Mention the software needed for overhead, opaque and slide projectors.
3. Describe how these soft wares are produced.

3.0 MAIN CONTENT

3.1 Preparation of Visual Media

Visual can be classified into projected and non-projected visuals.

3.2 Overhead Projector

The utilisation of overhead projector has made a tremendous impact among trainers and teachers since its discovery as projected visual equipment. This projected medium is a very valuable accessory to a programme of visual education. A powerful light in the body of the machine passes through the transparent glass as well as through the transparency being used. The image appears in the mirror above the machine, an in turn is reflected on the screen situated at the back of the teacher.

The equipment project transparencies in either monochrome (black and white) or coloured. It can also traces of mechanical or architectural drawings.

Advantages of the Overhead Projector

1. The image it projects is so bright that blackout is quite unnecessary.

2. The teacher can write directly on the transparency with the overhead projector transparency markers as the object is being projected.

3. Overhead projector enables the teacher to face his/her learners from the front of an illuminated room and project on the screen above and behind him.

4. The teacher can write, sketch and erase as he is presenting his lecture.

5. Transparencies can be prepared in advance and used at the discretion of the teacher with no dual operation.

6. Progressive disclosure can be easily achieved by simply covering that portion of the transparency which is not to be seen.

3.3 Preparation of Transparencies

Transparencies can be prepared by:

(1) Writing or drawing directly on the transparency with a felt pen.
(2) Photocopy
(3) Computer printing.

3.4 Slide Projector

The slide projector is an opto-mechanical device to view photographic slides. The projector is an example of diascopic projection.

Transparent films are used which allows light to pass through them. The basic parts of a slide projector are:

1. The lamp which is the source of light.

2. The reflector which is a mirror that causes all the light from the lamp to be thrown in the forward direction.

3. The condenser which concentrates the rays of light to the lens.

4. The heat filter protects the film from too much heat.

5. The projection lens inverts the image before magnifying and focusing it on the screen.

6. The fan that cools the lamp from heat.

The use of a single slide can vitalize an entire teaching session; one slide can make a topic or a lesson remain vividly in the memories of learners. Carefully selected slides or just one slide can attract attention, arouse interest, assist lesson development; test learner‘s understanding, review instruction, present the next lesson or subject and facilitate student-teacher participation. The versatility, easy means of selection, low cost and ease of preparing slides make them important teaching tools.

3.5 Production of Slides

Slide formats are of two types. There is the older 3½ by 4 inch slides and the newer 2 b 2 inch. The 2 by 2 inch is more popular and regularly used in educational settings.

Slides can be made with cellophane, etched glass, plain glass and photographic prints. Most of these materials may be purchased in any stationery store or photo chop. It may be in monochrome (black and white) or coloured (kodachrome).

All teaching slides are easy to produce. However, that of photographic type requires special ability, and, unless one has a knowledge of photography and access to darkroom, it would be advisable and less expensive to borrow; rent or purchase these slides. Notwithstanding, the teacher will find it valuable preparing or producing the slides that accompany his/her lecture.

(a) **Cellophane Slides** – in order to produce cellophane slides, the following materials are required: 2 by 2 inch sheet of plain or coloured cellophane, a 4 by 4 inch sheet of carbon paper, two pieces of 2 by 2 cover glass, a typewriter and a binding tape.

At the onset, lay out the slide on a 2 by 2 inch of scrap paper. Be sure to leave half inch margin on all sides. Then fold sheet of carbon in half, and place cellophane in centre. Insert carbon and cellophane into typewriter and adjust machine for stencil position. Type material on cellophane through the carbon. Remove cellophane and place it between two pieces of cover glass. Then, secure glass cover with building tape. With slide in correct position, place a thumb mark in lower left-hand corner. However, instead of using the typewriter, transparency marker (fine or medium tip) may be applied directly to the cellophane. In this case, it is suggested that one places the cellophane over the drawing or sketch, and merely trace it on the transparency.

(b) **Binding Slides** – all permanent slides are to be made with two pieces of frames, held tightly with tape.

This is the direction for binding slides:

(i) Cut the tape;

(ii) Place tape upon a flat surface with adhesive side on top;

(iii) Holding the two pieces of frames firmly with all edges even, set one side in the centre of the tape, starting at one end;

(iv) With firm pressure, roll the slide along the tape until all edges are covered;

(v) Press down the edges of the tape on both sides of frame;

(vi) Make corners even by folding one side under, and the other side over.

3.6 Filmstrip Projectors

The filmstrip is a continuous strip of film consisting of individual frames and pictures arranged in sequence, usually with explanatory title. The filmstrip is considered as one of the most potent type of instructional materials. The use of the filmstrip and the filmstrip projector in practically any learning situation will give satisfactory result. Each picture on the filmstrip can be readily projected on the screen for any length of time. Teachers and learners can then discuss the content as exhaustively as may be required. If used properly, the filmstrip will increase learner‘s interest, clarify lessons and save considerable teaching time.

3.7 Production of Filmstrip

With a good 35mm camera, a simple filmstrip can be made since it is merely a series of individual picture arranged in a specific order on a strip of film.

When preparing the filmstrip, it is important that one should:

(i) Prepare a script;
(ii) Plan each _shot‘;
(iii) Arrange each picture in the proper sequence;
(iv) Photograph each scene in the proper order;
(v) Store film in a filmstrip container, and
(vi) Title and file each filmstrip on the tip of the container.

In order to plan and produce your own filmstrip, you need to:

(1) Decide the main purpose of the filmstrip, what it is to tell or explain;

(2) Determine the audience to which the filmstrip will be shown as well as their attitude and experience level;

(3) Plan the character of the presentation. Is it to be humorous, sober or informative? and

(4) Outline the story or message.

3.8 Opaque Projector (Episcope)

The opaque projector is a predecessor of overhead projector. It is the simplest and least expensive of all various devices for projection purposes. It is designed to project any kind of non-transparent flat surface matter such as pictures, photographs, cartoons, drawings, magazine illustrations or other small objects. Solid objects are not excluded.

The machine operates with reflected light; the lamp illustrates the material and the image is reflected by a mirror through the lens to the screen. Its effectiveness is based on the reflective power of mirrors. A considerable amount of light is lost through the reflection process and therefore, the room in which the opaque objects are to be projected must be as dark as possible, although, the equipment may be used without complete darkness.

Advantage of Opaque Projectors

(1) It can be used in teaching all school subjects involving printed tables, diagrams, charts, pictures etc.

(2) Solid objects like watches, coins, specimens, etc. may be projected thereby becoming larger.

(3) It is most suitable for instructional purposes because it is still projection and provides opportunity for close observations and discussion.

(4) It stimulates attention, arouses interest, clarifies information and helps learners retain knowledge for a longer period of time.

(5) It saves laborious hours of chalkboard writing and sketching.

(6) It can be used to introduce subject/topics, present specific information, test knowledge and ability as well as review of instructional problems.

Self Assessment Exercise

Differentiate between the following:
1. Preparation of transparencies and preparation of filmstrip
2. Filmstrip projects and opaque projector (episcope)

4.0 CONCLUSION

In this unit, we have introduced you to the skills and techniques needed in the production of the under-listed visual media:

(1) Preparation of Visual Media
(2) Preparation of Projected Visuals
(3) Preparation of Transparencies

(4) Production of Slides
(5) Filmstrip Projectors
(6) Production of Filmstrip
(7) Opaque Projector (Episcope)

5.0 SUMMARY

In this unit, you have learnt about preparation of visual media, preparation of projected visuals and preparation of visual transparencies. We also discussed production slides, filmstrip projectors, production of filmstrip and opaque projector (episcope).

6.0 TUTOR MARKED ASSIGNMENT

Write a short note on the following:

(i) Preparation of Visual Media
(ii) Preparation of Projected Visuals
(iii) Preparation of Transparencies
(iv) Production of Slides
(v) Filmstrip Projectors
(vi) Production of Filmstrip
(vii) Opaque Projector (Episcope).

Unit 3 Answer to SAE Question

1.. Transparencies can be prepared by:

(1) Writing or drawing directly on the transparency with a felt pen.
(2) Photocopy
(3) Computer printing.

When preparing the filmstrip, it is important that one should:

(i) Prepare a script;
(ii) Plan each _shot‘;
(iii) Arrange each picture in the proper sequence;
(iv) Photograph each scene in the proper order;
(v) Store film in a filmstrip container, and
(vi) Title and file each filmstrip on the tip of the container.

2. The opaque projector is a predecessor of overhead projector. It is the simplest and least expensive of all various devices for projection purposes. It is designed to project any kind of non-transparent flat surface matter such as pictures, photographs, cartoons, drawings, magazine illustrations or other small objects. Solid objects are not excluded.

The filmstrip is a continuous strip of film consisting of individual frames and pictures arranged in sequence, usually with explanatory title. The filmstrip is considered as one of the most potent type of instructional materials. The use of the filmstrip and the filmstrip projector in practically any learning situation will give satisfactory result. Each picture on the filmstrip can be readily projected on the screen for any length of time. Teachers and learners can then discuss the content as exhaustively as may be required. If used properly, the filmstrip will increase learner's interest, clarify lessons and save considerable teaching time.

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UNIT 4 PREPARATION OF VISUAL MEDIA (NON-PROJECTED)

Table of Contents

1.0 INTRODUCTION

In this unit, you will learn preparation of visual media (projected types). You will also learn the distinguishing factors between overhead, opaque and slide projectors. Mention will be made of the software needed for these projectors while describing how these softwares are produced.

2.0 OBJECTIVES

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

1. Distinguish between overhead, opaque and slide projectors.
2. Mention the software needed for overhead, opaque and slide projectors.
3. Describe how these softwares are produced.

3.0 MAIN CONTENT

3.1 Non-Projected 3-Dimensional Visuals

These are non-projected visuals that have length, breadth and height / volume. Examples of instructional media of this categorisation are models, specimen and diorama.

1. **Model:**

Models are recognizable three dimensional representations of real things or abstract systems. They play useful role in a wide range of instructional situations (Fakomogbon, 1989). They are, however, particularly useful in three specific roles, namely:

(i) as a visual support materials in mass instruction;
(ii) as objects for study or manipulation in individualized learning, and
(iii) as construction projects for individuals, small groups or even the entire class.

The learners do not only see it but also touch it, examine it closely and operate it.

Models vary greatly in form, depending on the purpose for which they are designed. Models may be classified into three groups:

(1) **X-ray** – used mainly to reveal internal construction, such as cross sectional or cut out model.

(2) **Solid** – used mostly for their external features.

(3) **Workings** – They show how things work. They are difficult to make and require the services of an expert.

Production of Models

Note: Photographs / diagrams of **models** should be inserted – Mammalian Eye, body, etc.

The ranges of methods available for making models for instructional purposes are enormous, but some of the following standard techniques are useful.

- Use of commercially-available kits of parts, such as the ball-and-spring systems that are used to make models of molecules and the various types of tube-and-spigot systems that can be used to make models of crystals.

- Use of construction systems such as _meccano‘ and _fisher‘ – Price to make working models.

- Use of inexpensive materials such as cardboard, hardboard, wood and wire to make up static models of all types (models of buildings, geometrical bodies, 3-dimensional shapes etc).

- Use of materials like modelling clay and plastacine to produce realistic models of animals, anatomical demonstrations and so on.

- Use of materials like Plaster of Paris and papier-mâché to produce model landscape.

2. **Specimen**

Specimens are small pieces, segments, parts or samples of the real object, or the materials used in their preparation.

Production of Specimen

It is not necessary that one should produce specimens for teaching and learning. Large numbers of specimen may be obtained from local plants, stores or farms. Learners may even be encouraged to collect specimens. Generally, specimen as a term means a sample of objects or something. It is a true representative of a collective group of objects. Thus, in a biology class, we talk of specimen of type of bone, flower/plant etc.

3. **Diorama**

These are still-display systems that combine a three-dimensional foreground of model buildings, figures etc. with a two-dimensional painted background, thus creating a highly realistic effect.

They can be used in the teaching of a wide range of subjects, including:

- history, drama, religious studies (representation of historical or dramatic scenes, stage sets, battles etc).

- architecture, geography and geology (representation of buildings, towns, landscapes, pre-historic landscapes and scenes etc).
- biology and natural history (representations of plants or animals in their natural habitats).

Production of Diorama

Although sophisticated dioramas of the type that are seen in museums can be extremely expensive, time consuming and difficult to make, it is perfectly possible for anyone possessing a little knowledge of graphic and artistic skills to produce highly effective displays (Ajelabi, 2005 and Abimbade, 1997 and 2006). This can be done as follows:

- Make a semi-circular base of the required size out of the clipboard, hardboard, thick card or some other suitable material;

- Make a strip of thin white card of suitable height that is capable of extending all the way round the curved side of the base, draw and/or paint the required background scene on this and fix it to the base (e.g. with drawing pins);
- Build up any landscape required in the foreground using plaster of Paris or papier-mâché, and paint this in the required colours, and

- Produce or acquire any materials that are required for the foreground and set them in a position; such materials can include model figures (cardboard, cut-outs, plasticine models etc). Model buildings, model trees, model ships, tanks or other vehicles, pieces of rock, and any other material that you feel will enhance the realism of the scene being depicted.

3.2 Non-Projected 2-Dimensional Visuals

These are non-projected visuals that have only length and breadth. These include posters, charts, diagrams and flashcards.

1. **Poster**

Poster is designed to convey information vividly, attractively and economically. Poster may be anything ranging from simple printed announcement of a dance in the village hall to a complicated picture to persuade a reader to buy a product.

It is an effective means of putting across certain ideas such as safety habits of workmanship, courtesy and citizenship. Posters are either teacher-made or commercially produced. However, teacher-made posters are better. A good poster should possess the following qualities:

(1) It is based on one theme and should be related to the specific topic;

(2) The poster should be plain, simple and direct. Viewers should not be left in doubt about the message;

(3) It should be colourful – (vivid, bold colours to draw attention and focus);

(4) Large enough to be easily seen and understood at a glance;

(5) Brief captions are essential to clarify the meaning; and

(6) It must promote action.

Production of Posters

In order to produce a good poster, the following materials are required: drawing pencil (HB) eraser, long and short rulers, cardboard papers, drawing papers, markers and poster-colours.

The systematic steps involved in the production are:

(1) Ensure or identify the topic to be taught. It must require the utilisation of a poster in order to present it in a meaningful form;

(2) Have an idea of what you want to do and have a clear objective;

(3) Make a working sketch on a drawing paper;

(4) Get the required materials;

(5) Present one central idea with a brief caption;

(6) Start the pencil work with:

- marking of border lines which should be one inch from the edge of the cardboard;

- block lettering of the title using the appropriate dimension. Calculate to ensure centralization of the title;
- draw object boldly (using pencil) and ensure that it is centralized;
- paint the work in its real colour;
- clean all the pencil work thoroughly;
- trial test it for proper visual;
- mount on the display board for classroom use.

2. **Charts**

Chart is one of the information-carrying graphic display materials that is utilised in a governmental, business and educational settings in delivering information. An important purpose of concepts which are likely to be difficult to understand if presented in oral or written form are usually illustrated through the use of charts. In other words, chart is used in the instructional programme as a means of breaking down information into a language that can be understood by the learners.

The following are types of charts available:

1. Bar chart
2. Pie chart
3. Flow chart
4. Pictorial chart
5. Organisation / Administration chart
6. Classification chart
7. Life chart

We should provide examples of each of the types of charts.

A good chart is expected to possess the following qualities:

1. It must be big enough to be seen by the whole class or group.

2. It must be simple. Complexity of situation and a comprehensive, detailed representation may lead to confusion.

3. It must be attractive enough to capture and hold the learners‘ attention.

4. The information must be accurate and authentic.

5. It should employ colour with discretion and

6. The title should be brief.

Production of Charts

In order to produce a good chart, the following materials are required: drawing pencil (HB) eraser, long and short rulers, cardboard papers, drawing papers, markers and poster-colours.

The systematic steps involved in the production are:

(1) Ensure or identify the topic to be taught. It must require the utilisation of a poster in order to present it in a meaningful form;

(2) Have an idea of what you want to do and have a clear objective;

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- marking of border lines which should be one inch from the edge of the cardboard;
- block lettering of the title using the appropriate dimension. Calculate to ensure centralization of the title;
- draw object boldly (using pencil) and ensure that it is centralized;
- paint the work in its real colour;
- clean all the pencil work thoroughly;
- trial test it for proper visual;
- mount on the display board for classroom use.

3. **Flash Cards**

Flash card is a small, compact card which is to be ―flashed‖ before the entire class members to explain an idea or information. The message that the card contain is brief, clear and to the point. It may be picture, written message or any other information.

Production of Flash Cards

It is very easy producing flash card. Simple flash card may be produced by writing or printing the contents on a plain sheet of paper or cardboard. However, the production of a good, attractive and appealing flash card goes beyond this level. Good lettering should be applied. Block letter is the best for preparing excellent flash card. If picture is to be included, it must be well drawn, bold and beautiful.

The procedure:

(1) Get the required materials like pencil (HB), eraser, short ruler, cardboards and markers ready;

(2) Prepare flash card roughly on a piece of paper;

(3) Rule grid lines (in centimeter), measure and rule space for each letter;

(4) Draw lines for each letter faintly with pencil so that it may be removed with an eraser;

(5) Construct letters in pencil;
(6) Trace with marker; and

(7) Use attractive but contrasting colour of the writing material like the cardboard. Where pictures are involved, draw the pictures first, paint them and construct the letters below them.

4. **Diagrams**

Diagram may range from lines showing the process of a product to a highly technical drawing of a thirty-storey building construction, or an illustration of how to operate certain appliances. Today, the use of diagram is becoming increasingly important in our classrooms for teaching and learning.

Production of Diagram

1. Get the materials like pencil, ruler, compass, eraser etc.
2. Prepare diagram accurately to scale.
3. Make the title clearly visible.
4. Leave ample space between lines.
5. Present the diagram in simple form.
6. Make lines clear and eliminate all non-essentials, and
7. It should be large enough so that all learners can see it.

3.3 Non-Projected Visual Displays

Non-projected visual displays are the backbone of the whole range of classroom visual materials. These visual displays serve a lot in the classroom setting. They require no electric power or light source. They are in various shapes, sizes and colours.

1. **Chalkboard**

Chalkboard is considered as a part of learning environment. The chalkboard is a piece of instructional material, which in the hands of the teacher, can be made to convey visual messages. The teacher makes his/her own impression on it.

It is the most commonly and generally accepted medium of visual instruction in the classroom, language laboratories and science laboratories. It is also one of the quickest, easiest and often the only means of illustrating an important point. It is an effective visual material that permits, contrasts and do help the learners in their note-takings.

Production of Chalkboard

Teachers or learners do not necessarily need to produce chalkboard on their own. It is available everywhere and at a very low cost. Some are made of wood, hardboard, plastic, slate, glass or even painted wall. Also, it comes in a variety of colours – green, yellow, white, black etc.

2. **Marker Board**

This board, which is also known as white board, is common in training rooms and is sometimes now fitted in teaching rooms. Appropriate felt pens, markers or crayons, are used along with it in as much the same way as the chalkboard.

It has, however, a number of advantages over the chalkboard.

There is first of all, none of the mess that always results when chalk is used.

Second, a wider variety of colours and tone strength can be used, and the resulting display is invariably sharper, better-defined and clearer than is possible using chalk.

Third, a marker board – unlike a chalkboard – can double as a projection screen if required.

It is strongly advisable to use only the types of marker pens that are recommended by the manufacturer of the particular board that one is using. This is to avoid difficulty in cleaning the surface properly so that _ghost‘ marks are not left behind.

Production of Marker Board

Marker board is available in audio-visual shops at affordable price. In addition, it comes in various sizes, so there may not be a need to produce it, rather it could be acquired.

3. **Flannel Board**

Flannel board (also known as felt board) is a stationary or portable surface covered with a rough, flannel like cloth made from wool, cotton or hair, which is tightly stretched over a long backing of plywood, masonite or celotex. Shapes cut out of felt, flannel or similar fabrics will adhere to display surfaces covered with similar material. Also, various objects like pictures, magazines or newspaper _cut-outs‘ graphs, drawings, text-materials and other illustrations with similar rough _flannel-like‘ backing are placed on the board. The objects on the board adhere to it without the use of thumb tacks, pins or tapes.

Production of Flannel Board

Although several companies produce both the flannel board and cut-out materials to use with them, teachers can make their own board without difficulty. It is inexpensive and easy to make. It can be produced in any shape or size.
This is the systematic procedure:

(1) Get the required materials which are:

(a) a piece of mounting board of scolex or masonic of the desired size;

(b) a piece of heavy cardboard (as the base);

(c) a piece of flannel of a neutral colour which should be four inches longer than the board;

(d) a roll of masking tape or thumb tacks for binding and

(e) a thin sheet of metal wire screening (if magnet are also to be used);

(f) cut the base to the desired size;

(g) cut the flannel, felt or suede material with a rough surface at least four inches cloth before attaching it to the board to make sure that it will hold objects placed on it;

(h) stretch the cloth over the board. Fold corners on the reverse side of the board and attach securely to the back of the board with thumb tacks. Fold neatly at the corners; and

(i) plan to use board on the easel. If an easel is not available, hinge a piece of plywood to the back of the board in such a way that it will be possible to place the board on a desk or table.

4. **Bulleting Board**

Bulletin board is a section of the wall (at times) made of some kind of composition material, upon which we tack notices and announcement and other materials of interest. It is a teaching display which is useful in all levels and fields.

Production of Bulletin Board

Bulletin board may be purchased or produced by the teacher. There are various types: soft woods, cloths, masonite boards, fibre boards or celotex. The size of bulletin board will depend on the classroom. It may be attached to the wall. At times, an improvised board may be justified. A portable bulletin board can be easily moved from one section of the room to another.

5. **Flip Chart Board**

This constitutes a simple and highly effective method of displaying information to a class or small group. Such charts consist of a large number of sheets of paper, fixed to a support bar, easel or display board by pining or clamping them.

Production of Flip Chart Board

Flip chart board is available for sale in all audio-visual shops. The price is reasonable. Alternatively, one may contact a local welder to help in building one.

Self Assessment Exercises

1. What contributions can projected visuals make to your teaching?

2. Describe how you can produce the following:

   (a) slides
   (b) filmstrips

4.0 CONCLUSION

In this unit, you have learnt preparation of visual media (projected types). You have also learnt the distinguishing factors between overhead, opaque and slide projectors. Mention was made of the software needed for these projectors while the unit described how these softwares are produced.

5.0 SUMMARY

Visuals generally form an important ingredient of quality teaching, this is because they permit effective development of cognitive, affective and psycho-motor skills. Visuals provide direct and purposeful experience, which form a solid foundation for learning.

6.0 TUTOR MARKED ASSIGNMENT

Develop a lesson of your choice and prepare at least four (4) transparencies to aid your instruction.

Answer to Self Assessment Exercises

Advantages of Projected Visuals to Teaching

(1) It can be used in teaching all school subjects involving printed tables, diagrams, charts, pictures etc.

(2) Solid objects like watches, coins, specimens, etc. may be projected thereby becoming larger.

(3) It is most suitable for instructional purposes because it is still projection and provides opportunity for close observations and discussion.

(4) It stimulates attention, arouses interest, clarifies information and helps learners retain knowledge for a longer period of time.

(5) It saves laborious hours of chalkboard writing and sketching.

(6) It can be used to introduce subject/topics, present specific information, test knowledge and ability as well as review of instructional problems.

Production of Slides

Slide formats are of two types. There is the older 3½ by 4 inch slides and the newer 2 b 2 inch. The 2 by 2 inch is more popular and regularly used in educational settings.

Slides can be made with cellophane, etched glass, plain glass and photographic prints. Most of these materials may be purchased in any stationery store or photo chop. It may be in monochrome (black and white) or coloured (kodachrome).

All teaching slides are easy to produce. However, that of photographic type requires special ability, and, unless one has a knowledge of photography and access to darkroom, it would be advisable and less expensive to borrow; rent or purchase these slides. Notwithstanding, the teacher will find it valuable preparing or producing the slides that accompany his/her lecture.

(c) **Cellophane Slides** – in order to produce cellophane slides, the following materials are required: 2 by 2 inch sheet of plain or coloured cellophane, a 4 by 4 inch sheet of carbon paper, two pieces of 2 by 2 cover glass, a typewriter and a binding tape.

At the onset, lay out the slide on a 2 by 2 inch of scrap paper. Be sure to leave half inch margin on all sides. Then fold sheet of carbon in half, and place cellophane in centre. Insert carbon and cellophane into typewriter and adjust machine for stencil position. Type material on cellophane through the carbon. Remove cellophane and place it between two pieces of cover glass. Then, secure glass cover with building tape. With slide in correct position, place a thumb mark in lower left-hand corner. However, instead of using the typewriter, transparency marker (fine or medium tip) may be applied directly to the cellophane. In this case, it is suggested that one places the cellophane over the drawing or sketch, and merely trace it on the transparency.

(d) **Binding Slides** – all permanent slides are to be made with two pieces of frames, held tightly with tape.

This is the direction for binding slides:

(i) Cut the tape;

(ii) Place tape upon a flat surface with adhesive side on top;

(iii) Holding the two pieces of frames firmly with all edges even, set one side in the centre of the tape, starting at one end;

(vii) With firm pressure, roll the slide along the tape until all edges are covered;

(viii) Press down the edges of the tape on both sides of frame;

(ix) Make corners even by folding one side under, and the other side over.

Production of Filmstrip

With a good 35mm camera, a simple filmstrip can be made since it is merely a series of individual picture arranged in a specific order on a strip of film.

When preparing the filmstrip, it is important that one should:

(i) Prepare a script;
(ii) Plan each _shot‘;
(iii) Arrange each picture in the proper sequence;
(iv) Photograph each scene in the proper order;
(v) Store film in a filmstrip container, and
(vi) Title and file each filmstrip on the tip of the container.

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UNIT 5 PREPARATION OF AUDIO-VISUAL MEDIA

Table of Contents

1.0 INTRODUCTION

As a follow-up to your understanding of the production of visual-media in Unit 4, this unit is prepared to intimate you with the knowledge and the skills that you need to enable you prepare audio-visual media. Recall that audio-visual media are so called because they possess the features of audio media plus those of visual media simultaneously.

In this unit, therefore, the production of a variety of specific media in this category shall be discussed in detail.

2.0 OBJECTIVES

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

1. Distinguish between the various categories of audio-visual media used in education.

2. Describe the instructional uses of each of the audio-visual media studied.

3. Demonstrate competence in the use of each of the following audio-visuals:

   (a) television

   (b) video tape recording.

3.0 MAIN CONTENT

3.1 Preparation of Audio-Visual

This topic is discussed under the following sub-topics.

3.1.1 Meaning of Audio-Visual

Audio-visuals are those instructional materials which provide the learners with the opportunity of seeing and hearing at the same time (Salawu, Afolabi and Adedapo, 2006).

Examples are instructional or educational television, closed-circuit television, videotape recorders, multimedia projector, computer etc. Most people consider them as expensive equipment, and so they are not commonly used for teaching and learning.

Nowadays, schools, organisations and training centres now incorporate the use of audio-visual media in their presentations. This is because they are found to be versatile and easy to use (Kemp, 1983).

3.2 Television

Television is without doubt one of the most versatile audio-visual materials ever developed. It can be transmitted over a long distance and its signals recorded and played back instantly. Its ability to convey an event _live' will have a profound influence upon what teachers and learners think and do in the future.

The television offers vitality and newness which attracts attention, creates interest and stimulates a desire to learn. Consequently, many progressive educators are using television as an educational tool (Ajelabi, 2006). It is now easily accessible for use in education not only via the over-the-air broadcasts, but also by means of closed-circuit and cable television system, all of which may be linked to the satellite. Other unique qualities of the television include concreteness, immediacy, variety, versatility, reinforcement of existing ideas and information. That apart, programmes are not available for watching on the screen via the video-cassette and video disc.

3.3 Preparation to use Television Programme in the Classroom

There is need to adequately prepare to use a television programme. All the physical factors should be adequately checked. This includes selecting the type of television set and size of the screen. However, this is determined by the size, shape and number of learners in the classroom. The larger the size of the screen of the television set, the better for a large number of learners to observe at one time.

There is need to check the lighting ventilation, seating and the television before the group convenes. With respect to lighting, total darkness is not necessary. Enough light should be provided so that learners can take brief notes on the broadcast programme.

3.4 Videotape Recorder

Many training establishments and schools do make use of videotapes as well as video cassette recorders to record lessons and training session for later presentation. Videotape recorders are used effectively in teacher-training programmes for micro teaching sessions. It is equipped to dub, playback and edit (Ekere, 2001). With the advent of videotape recorder into the television industry, it has gradually revolutionized television reviewing and production. Video sender also makes it possible to record classroom lessons and enable viewers to see it on the screen at the same time.

3.5 Production / Recording of Video Instruction

In a good production, the focus is on teaching – learning goals. Distracting information or irrelevances should be avoided. There should be good sound, vision, perceived control matters that provide opportunities for learners to respond to what they are learning (and so get immediate feedback) and properly labelled information. Consequently, the teacher should be self-prepared for the task of making use of video instructional lessons (Ajelabi, 2005).

The following basic steps are to be taken to achieve effective recording of an instruction video production:

1. Start with an idea.

2. Express this idea in terms of clearly stated instructional objectives.

3. Write the script.

4. Build into the script opportunities for learner‘s participation and questions where appropriate.

5. Before recording, make sure the environment is well lit.

6. The recording crew (technicians and cameramen) must be on ground to assist the instructor.

7. Next is the preparation for the recording.

8. Slide the camera/videotape recorder selector covers close so that it covers the tape running buttons.

9. Slide the operation on/off switch backward to turn the VHS movie on.

10. Insert a video cassette with the erasure prevention tap intact.

11. Set the white balance mode selection to auto.

12. Place VHS movie in the shooting position.

13. Grasp the handgrip and adjust the length of the grip belt with the tape closure to the size of your hand.

14. Attach the lens cap to the grip belt.

15. Press the start/stop button. The recording indication _REC‘ is displayed in the _RUF‘ and recording starts.

16. To temporary stop the recording (recording pause), press the start/stop button again.

17. To finish the recording, put the movie camera in the recording pause mode and then slide the operation on/off switch backward again to turn the VHS movie off.

3.6 Computer Assisted Instruction (CAI)

Commercially produced software packages are available in some subjects. However, one may need to design his/her own software package in teaching some school subjects or topics. However, there is a need to state that the computer software production is a team effort involving the system programmes or analyst and the instructional designer.

Stages in the production of computer programmes include:

i. functional specification of requirements;
ii. systems specification;
iii. programme specification;
iv. writing and testing of the programmes; and
v. acceptance by user.

3.7 The Internet

The Internet is the base of information that we expect to revolutionise our society, and take man to a higher level of civilization. It provides information on all aspects of human endeavour – politics, history, religions, culture, economy, education, etc. This is why the military, government, companies, organisations, parastatals, institutions and individuals input and output related information from the Internet.

Recall that you were introduced into many useful concepts and functions that you can perform through your Internet exposure in a related course in this programme. If you are in doubt, you would do well to go over the course content again.

3.8 The Multimedia System

This is the latest audio-visual media that trainers and presenters now use for lectures and conferences, seminars and workshops. A multimedia system is combination of different but

interrelated devise (audio and visual media) which are integrated into a structured systematic presentation. Multimedia computer system combines digital, video, audio, graphics, animation and text in a single delivery system. The devices work together cooperatively and interactively as a single medium so as to enhance the presentation of programmes.

Depending on the situation, it consists of a video/data projector, laptop or a micro-computer, microphones and a projector screen or television. The choice of media depends on the type of lecture or seminar to be presented. However, the most commonly used system includes – the computer, video/data projector and the screen. With reference to inaugural lectures, video camera, laptop, screen, remove control, laser pointer, microphones and electric power supply units are utilised.

3.9 Terminals of a Multimedia System

The projector has many terminals through which various signals are sent into it. They are:

1. **Two Audio Signal Terminals:** It is used for connection the microphone for the purpose of sending in audio signals.

2. **Video Signal Terminals:** Through these terminals, video signals are sent into the projector for appropriate action of converting them to pictures and focusing them on the screen.

3. **The Laptop Computer:** This is connected to the projector. It is used to send already printed instructions from the hard disc to the projector. Pictures are also scanned into the laptop computer. These scanned pictures are, in turn, through the projector, focused on the screen.

4. **The Video Camera:** It is used to pick life pictures of the presenter and the audience. It translates pictures into electric signals which are eventually sent into the projector for the purpose of focusing on the screen.

5. **Remote Control Unit:** This device is used to control the programme of the presenter. Depending on the stage of the lecture and instructions given to the operator, the remote control is used to change from one signal channel to another. It can change from video signal to audio or printed signal.

Self Assessment Exercises

1. What potentials do the audio-visuals have for teaching and learning in our schools?

2. Explain the recording process of video instruction.

3. Discuss the steps involved in the classroom preparation of television instructional programme.

4.0 CONCLUSION

The audio-visuals are particularly useful for dynamic actions processes as they occur in motion. They are appropriate for subjects which require adding visual association, visual identification and demonstration. They also provide factual information and can therefore be used for total teaching at all levels in virtually all subjects.

5.0 SUMMARY

In this unit, you have learnt about the various categories of audio-visual media that are used in education. Such media include the television, videotape recorder, computer assisted instruction, the Internet and the multimedia system.

In addition, you have been provided information as to the uses of each of the mentioned audio-visual media. You are expected to visit the Educational Technology Centre of the institution where your study centre is located or make a visit to any Educational Technology Centre with a view to familiarizing yourself further in the usage of the mentioned audio-visual media. In case you have problem as to how to locate one, feel free to ask your facilitator.

6.0 TUTOR MARKED ASSIGNMENT

Briefly describe the instructional uses of each of the audio-visual media studied and distinguish between the following audio-visuals:

(a) television
(b) videotape recording.

Unit 6 Answer to SAE Questions

1. Audio-visuals are those instructional materials which provide the learners with the opportunity of seeing and hearing at the same time (Salawu, Afolabi and Adedapo, 2006).

2. The following basic steps are to be taken to achieve effective recording of an instruction video production:

a. Start with an idea.

b. Express this idea in terms of clearly stated instructional objectives.

c. Write the script.

d. Build into the script opportunities for learner‘s participation and questions where appropriate.

e. Before recording, make sure the environment is well lit.

f. The recording crew (technicians and cameramen) must be on ground to assist the instructor.

g. Next is the preparation for the recording.

h. Slide the camera/videotape recorder selector covers close so that it covers the tape running buttons.

i. Slide the operation on/off switch backward to turn the VHS movie on.

j. Insert a video cassette with the erasure prevention tap intact.

k. Set the white balance mode selection to auto.

l. Place VHS movie in the shooting position.

m. Grasp the handgrip and adjust the length of the grip belt with the tape closure to the size of your hand.

n. Attach the lens cap to the grip belt.

o. Press the start/stop button. The recording indication _REC‘ is displayed in the _RUF‘ and recording starts.

p. To temporary stop the recording (recording pause), press the start/stop button again.

q. To finish the recording, put the movie camera in the recording pause mode and then slide the operation on/off switch backward again to turn the VHS movie off.

3. There is need to adequately prepare to use a television programme. All the physical factors should be adequately checked. This includes selecting the type of television set and size of the screen. However, this is determined by the size, shape and number of learners in the classroom. The larger the size of the screen of the television set, the better for a large number of learners to observe at one time.

There is need to check the lighting ventilation, seating and the television before the group convenes. With respect to lighting, total darkness is not necessary. Enough light should be provided so that learners can take brief notes on the broadcast programme.

7.0 REFERENCES AND FURTHER READING

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UNIT 6 REASONS FOR USE OF MEDIA AND SELECTION CRITERIA OF INSTRUCTIONAL MEDIA

Table of Contents

1.0 INTRODUCTION

A course in Preparation, Utilisation and Integration of Educational Media in Curriculum could not be regarded as complete without a discourse on the reasons for recommending the use of educational media and the establishment of the selection criteria. This unit focuses on this aspect of the course. You would find it as interesting as ever.

2.0 OBJECTIVES

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

1. Mention the criteria for selecting educational media.
2. Discuss the reasons for using media in education.
3. Describe the preparations that are necessary for effective use of media for instruction.

3.0 MAIN CONTENT

3.1 Instructional Media: Definition

Educational media is a collection of teaching-learning materials that constitute an integral component of classroom instructional process and are utilised in delivering educational information to the learners (Balogun, 1995; Abimbade, 1997). It is learners centred.

3.2 Reasons for using Educational Media

According to Ajelabi (2005), the underlisted are some of the reasons for using media in teaching and learning:

(i) Educational media make learning to become real and concrete.

(ii) By using educational media, learning effectiveness is increased as learners are more likely to retain and recall with ease a greater percentage of what they hear, see and manipulate.

(iii) They help in focusing attention and motivating learners, when appropriate educational media are used to introduce, develop or conclude a teaching-learning session. Learner's interest is aroused and developed through the lesson.

(iv) Educational media give learners the opportunity to learn at their own pace, rate and convenience – media cater for individual differences.

(v) Educational media help in magnifying or reducing objects for classroom use.

(vi) They provide experiences that may not otherwise be available to learners.

(vii) Educational media give chance for teacher participation in the design and development of meaningful curriculum.

3.3 Criteria for Selecting Educational Media

1. **Instructional Objectives –** This is one of the major determinants of selection. This is usually based on the topic to be taught. The instructional objectives are to be stated in behavioural, specific and measurable terms.

2. **Availability –** Before selecting any educational media, one must be sure that such material or equipment is available and easy to purchase, borrow or produced.

3. **Cost –** The financial implication of the educational media that the teacher wants to select is of topmost importance.

4. **Content Accuracy –** The educational media must present authentic, valid and current information or latest ideas.

5. **Suitability –** The age, ability and character of the learners must be taken into consideration when selecting media for classroom use.

6. **Size of the Class –** If learners are large in number, bold visuals should be used. This would lead to consideration of the size/dimension of the media to be selected. It may also make a teacher to provide for more of the media so selected. This is because, in a situation whereby the class is large, visibility factor has to be given consideration. Thus, the question of quantity and quality set in.

   As for the quantity, the teacher may need to provide for media that will go round each of the learners in the class. Whereas as regards quality, it involves preparation of bold media to allow for all the learners in the class to view it.

7. **Operating Facilities –** The facilities for operating the equipment should be functional and available. Also, the teacher should be able to manipulate effectively the material or equipment for teaching and learning.

8. **Interactivity –** Learner-learner, Learner-media, Learner-teacher, teacher-media interactions should be promoted as a result of using the educational media.

3.4 Media and Instructional Process

For media to be effective in the instructional process, teachers must:

i. be prepared ahead of time;

ii. prepare environment e.g. light, electricity, air, ventilation;

iii. prepare the class, arrange the seats so that there would be no hindrance in visualizing objects that are displayed;

iv. the learners themselves must be prepared for the learning experiences they are about to be exposed to.

Self Assessment Exercise

1. Mention and discuss five criteria for selecting educational media.
2. Briefly discuss the reasons for using media in education.

4.0 CONCLUSION

It has been a long established fact that the use of appropriate media in instructional process is a must by the teachers. Therefore, no teacher that is to act professionally would have any excuse for non-utilisation of appropriate educational media in his/her effort to assist learners learn. You are, therefore, by going through this unit challenged to making sure that you make use of educational media in carrying out the task of teaching-learning process.

5.0 SUMMARY

Education and training processes are becoming more and more media-based in many parts of the world, making media-facilitated learning possible. However, the following must be considered in selecting media for instructional purpose: instructional objectives, cost, content accuracy, suitability, interactivity, teacher competency, operating facilities amongst others.

6.0 TUTOR MARKED ASSIGNMENT

Mention and explain in detail five (5) criteria you must consider before choosing any media for classroom instruction.

Unit 7 Answer to SAE Questions

The five criteria to be considered before choosing any media for classroom instructions are:

(a) **Instructional Objectives –** This is one of the major determinants of selection. This is usually based on the topic to be taught. The instructional objectives are to be stated in behavioural, specific and measurable terms.

(b) **Availability –** Before selecting any educational media, one must be sure that such material or equipment is available and easy to purchase, borrow or produced.

(c) **Cost –** The financial implication of the educational media that the teacher wants to select is of topmost importance.

(d) **Content Accuracy –** The educational media must present authentic, valid and current information or latest ideas.

(e) **Suitability –** The age, ability and character of the learners must be taken into consideration when selecting media for classroom use.

Some of the reasons for using media in teaching and learning:

(i) Educational media make learning to become real and concrete.

(ii) By using educational media, learning effectiveness is increased as learners are more likely to retain and recall with ease a greater percentage of what they hear, see and manipulate.

(iii) They help in focusing attention and motivating learners, when appropriate educational media are used to introduce, develop or conclude a teaching-learning session. Learner‘s interest is aroused and developed through the lesson.

(iv) Educational media give learners the opportunity to learn at their own pace, rate and convenience – media cater for individual differences.

(v) Educational media help in magnifying or reducing objects for classroom use.

(vi) They provide experiences that may not otherwise be available to learners.

(vii) Educational media give chance for teacher participation in the design and development of meaningful curriculum.

7.0 REFERENCES AND FURTHER READING

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MODULE II UTILISATION OF AUDIO INSTRUCTIONAL MEDIA

UNIT 7 APPLICATION OF INSTRUCTIONAL MEDIA

Table of Contents

1.0 INTRODUCTION

The creative uses of a variety of media will no doubt increase the probability that students will learn more, retain better what they learn, and improve their performance of the skills they are expected to develop.

It should be noted however that just the use of media in instructional activities will in no way guarantee results in student learning if the media are not skillfully utilised (Hellyer, 1970).

Much more is involved, to help you achieve results from your use of media, we explain clearly in these and other units the processes and techniques of planning to utilise media effectively in the classroom.

In this unit, you will be introduced to the general basic steps in the utilisation of media, techniques for using radio in the classroom and the use of radio and tape recorder for instructional purposes.

2.0 OBJECTIVES

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

1. Explain the general basic steps in the utilisation of media;
2. Describe the techniques for using radio in the classroom;
3. Demonstrate competency in the use of radio and tape recorder for instructional purposes.

3.0 MAIN CONTENT

3.1 Basic Utilisation Plan for Media

The basic plan for utilizing educational media are to ―prepare, present and follow-up‖. This simple formula involves five steps, as follows:

1. **Prepare Yourself:** You need to preview the film, listen to the recording, sort through and examine pictures comprising a picture set. Study available guides, take note during previewing and develop a plan to use the media. You must describe how you will introduce it, what you will do and ask your students to do during and after using it.

2. **Prepare the Environment:** Arrange necessary materials and equipment required for proper viewing or hearing. See that the equipment is on hand and properly set up.

3. **Prepare the Class:** Introduce the media by making it clear why it is being used at the particular time, briefly describe what it covers, and stress what is important to be learnt from it. Tell learners what they are expected to do after using the media.

4. **Use the Media:** Show the film properly. Be sure that images are projected above the heads of viewers and that they are in proper focus. Be sure that the sound volume and tone are properly adjusted so all may hear. End the showing professionally.

5. **Follow-up:** After use, invite and answer (or discuss) questions about the media presentation. Review the experience, perhaps give a test. Supervise learners' performance or demonstration of skills expected to be learned from the experience.

This simple, almost classic five-step procedure is sometimes recommended as the basic guide to media utilisation.

3.2 Utilisation of Audio Media

Classroom Utilisation of Radio Programmes

According to Abimbade (1997), the techniques for using the radio in the classroom depend on the subject matter, class, number of learners in the class and the time allotted to the lesson. In order to effectively utilise radio programmes in our classrooms, we need to follow these steps:

(i) **Secure a radio:** Any radio set may be used as long as it receives the desired station and can be heard clearly by every learner.

(ii) **Secure advance notice of radio programmes:** In order to plan your lessons carefully, find out the dates and times of specific programmes by contacting the radio station.

(iii) **Secure advance information:** Since it is almost impossible to preview a radio programme, it is essential that you secure all possible information about the programme before the broadcast.

(iv) **Arrange the class for listening:** It is not necessary that you should have a special room to use the radio. However, the room should have an acoustically treated, well ventilated, lighted with electric outlets and table for radio as well as other classroom facilities.

(v) **Check the radio before the class meets:** Test the radio and ensure that it is working by tuning in to the proper station. This should be ready before the class meets.

(vi) **Arouse learners' interest:** As an introduction, arouse learners' interest by telling them how they will benefit from the broadcast. The learners should know what to listen to and watch out for.

(vii) **Present the broadcast:** The learners now listen to the educational broadcast. The teacher may write the major points of the programme on the chalkboard during the broadcast. The educational media that relate to the purpose of the programme such as maps, charts, demonstration materials etc. should be on hand.

(viii) **Discuss the information given in the broadcast:** Immediately after the broadcast, discuss the major points. Encourage each learner to participate in the discussion.

(ix) **Check the learners' understanding of the programme:** A test may be conducted to find out the extent by which the lesson was understood. A lengthy test is unnecessary.

3.3 Classroom Utilisation of Tape Recorders

The tape recorders as teaching tools have many uses. Tape recorders can accompany slides, filmstrips, or motion films. They can also be used entirely on their own. (Ajelabi, 2005).

The steps to be followed in its utilisation are the same as the radio programmes earlier discussed. You would be doing the correct thing by reflecting on the nine points earlier discussed. You can also go over the nine steps again.

Self Assessment Exercise

1. List the basic utilisation plan for media.
2. What are the steps to be followed in classroom utilisation of tape recorders?

4.0 CONCLUSION

Audio media are very useful tools in the classroom. It requires proper preparation for effective use. Audio media help to store and retrieve classroom interaction easily.

5.0 SUMMARY

In this unit, we have endeavoured to discuss the basic steps that are germane to media utilisation for instructional purposes. Attempts were also made to put forth cogent steps to be taken into consideration in using audio media like the radio and the tape recorder.

6.0 TUTOR MARKED ASSIGNMENT

How would you promote the use of educational radio in your school?

Unit 7 Answers to SAE Questions

The basic plan for utilizing educational media are to ―prepare, present and follow-up‖. This simple formula involves five steps, as follows:

1. **Prepare Yourself:** You need to preview the film, listen to the recording, sort through and examine pictures comprising a picture set. Study available guides, take note during previewing and develop a plan to use the media. You must describe how you will introduce it, what you will do and ask your students to do during and after using it.

2. **Prepare the Environment:** Arrange necessary materials and equipment required for proper viewing or hearing. See that the equipment is on hand and properly set up.

3. **Prepare the Class:** Introduce the media by making it clear why it is being used at the particular time, briefly describe what it covers, and stress what is important to be learnt from it. Tell learners what they are expected to do after using the media.

4. **Use the Media:** Show the film properly. Be sure that images are projected above the heads of viewers and that they are in proper focus. Be sure that the sound volume and tone are properly adjusted so all may hear. End the showing professionally.

5. **Follow-up:** After use, invite and answer (or discuss) questions about the media presentation. Review the experience, perhaps give a test. Supervise learners' performance or demonstration of skills expected to be learned from the experience.

In order to effectively utilise tape recorders in our classrooms, we need to follow these steps:

(i) **Secure a radio:** Any radio set may be used as long as it receives the desired station and can be heard clearly by every learner.

(ii) **Secure advance notice of radio programmes:** In order to plan your lessons carefully, find out the dates and times of specific programmes by contacting the radio station.

(iii) **Secure advance information:** Since it is almost impossible to preview a radio programme, it is essential that you secure all possible information about the programme before the broadcast.

(iv) **Arrange the class for listening:** It is not necessary that you should have a special room to use the radio. However, the room should have an acoustically treated, well ventilated, lighted with electric outlets and table for radio as well as other classroom facilities.

(v) **Check the radio before the class meets:** Test the radio and ensure that it is working by tuning in to the proper station. This should be ready before the class meets.

(vi) **Arouse learners' interest:** As an introduction, arouse learners' interest by telling them how they will benefit from the broadcast. The learners should know what to listen to and watch out for.

(vii) **Present the broadcast:** The learners now listen to the educational broadcast. The teacher may write the major points of the programme on the chalkboard during the broadcast. The educational media that relate to the purpose of the programme such as maps, charts, demonstration materials etc. should be on hand.

(viii) **Discuss the information given in the broadcast:** Immediately after the broadcast, discuss the major points. Encourage each learner to participate in the discussion.

(ix) **Check the learners' understanding of the programme:** A test may be conducted to find out the extent by which the lesson was understood. A lengthy test is unnecessary.

7.0 REFERENCES AND FURTHER READING

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UNIT 8 UTILISATION OF VISUAL MEDIA (PROJECTED)

Table of Contents

1.0 INTRODUCTION

This unit is a continuation of attempts at assisting you to acquire the necessary knowledge and skills in the application of educational media in a real life classroom situation.

The necessary steps to aid effective utilisation of visual media – overhead projector, slid projector, filmstrips, opaque projector, models, specimens, posters/charts, diagrams and chalkboard will be elaborately provided for your understanding.

Welcome to this unit and happy reading.

2.0 OBJECTIVES

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

1. Describe the basic processes of using projected media in the class.

2. Describe the steps to be taken in using the following in the class:

    (a) models
    (b) posters
    (c) specimens
    (d) charts

(e) flash cards

3.0 MAIN CONTENT

3.1 Classroom Utilisation Overhead Projector

There are four major steps to be taken in order to make use of the Overhead Projector (OHP). These are:

1. Arrange the classroom environment:

   (i) get a projection screen and set it up in front of the class;
   (ii) place the projector on a suitable stand facing the screen;
   (iii) arrange the classroom seats for proper viewing of the projected information, and
   (iv) ensure that there is electricity power supply for operating the overhead projector.

2. Test equipment and preview information on transparency:

   (i) connect the OHP to the source of electricity supply;

   (ii) place the transparency on the horizontal glass surface on the OHP and switch on the equipment;

   (iii) focus the image on the screen by turning the focus knob which moves the projector‘s head upward or downward until the image comes into sharp focus;

   (iv) if the upper part of the image is enlarged more than the lower part, the distortion is called keystone effect. Correct this by tithing down the screen a little or adjusting the projector head so that the light beam and the screen forms angle 90^0; and

   (v) switch off the projector.

3. Present subject matter:

   (i) when the learners are seated, switch on the projector and project only the topic;

   (ii) briefly explain the objective of the lesson. If lesson notes are already available on transparency, project only the aspect being discussed and give the learners enough time to copy the notes;

   (iii) the notes/information may be written on the transparency for the learners to read as the lesson progresses;

(iv) if an overlay transparency is being used, the layer at the base is first projected and discussed. The others are placed on it one at a time until the visual information is complete.

4. Carry out evaluation

After projecting all the transparencies, switch off the overhead projector. Handle with care. Find out how much the learners have benefited from the lesson by asking questions, giving written tests or assignments.

3.2 Classroom Utilisation of Slide Projector

Before going to the class, check through the lesson plans and note specific spots where the use of slides would materially help in the improvement of the instruction. Record the type and number of slides required for the specific lesson. Check each slide and ensure that you know exactly what you will say or do with each slide. Then, arrange the slides in proper showing order. Set up the projector and the screen.

Next is the testing of the slide projector. Project a slide on the screen and check it for clarity, and centrality.

The next main stage is the presentation of subject matter on slides. After preparing the learners, the teacher should briefly state the problem to be solved. The slides and the instructions should be presented one step at a time in a logical and orderly manner. Proceed from the known to the unknown.

Immediately after the slides and information have been presented, the teacher should test for factual information. The test can be oral or written, but it should be brief, specific and to the point.

Review the lesson if you discover errors during testing. Do not hesitate to display the teaching slides again.

3.3 Classroom Utilisation of Filmstrips

At the onset, you should know the specific topic that could be clarified by the use of filmstrip. After this, you check all physical features in terms of the classroom, seating arrangement and projection. With reference to the classroom, there must be sufficient ventilation. Unrelated visual materials must be removed, electrical outlets must be working and ensure that there is no glaring light that may cause poor visibility.

The next major step is the projection of the filmstrip. The room should be darkened. The screen should be placed in a position where direct rays of outside light will not interfere. If possible, use a white screen. The project must be placed high enough to extend over the head of the group.

Following this is the presentation of content on the filmstrip. This involves the same process (prepare learners, present film for instruction, apply teaching, test learners, review subject) as discussed under overhead and slide project.

3.4 Classroom Utilisation of Opaque Projector

First of all, you need to prepare the material to be used in the classroom ahead of time. A section of a newspaper, a photograph, a textbook, an actual three-dimensional object as well as many other opaque materials may be projected without special preparation.

Secondly, you need to arrange the classroom environment. Get the projection screen, and set it up in front of the classroom. Place the projector on a suitable stand facing the screen. Arrange the classroom seat for proper viewing of the projected information. Block out unwanted day light to ensure good projection. You also need to darken the room.

Thirdly, test equipment and preview information. When the learners are seated, you have to inform them on how they will benefit from the instruction, what to look for in the illustration and what knowledge will be tested at the completion of the showing. Present each picture in proper sequence. Briefly still, show important points in each illustration.

Finally, you need to carry out evaluation. The learners should be able to explain each step. The results obtained will be used to correct errors. Objective or essay type questions may be set. Based on the result, you may need to show those that are pertinent again.

3.5 Classroom Utilisation of Models

Models are very useful for teaching and learning. To use model effectively, Ibe-Bassey (1992) as cited by Abimbade (2006), involves:

(i) **Prepare Learners:** Allow an initial fiddling with the models. Let the learners have an in-depth examination of the models. The moment the lesson takes off, direct the learners' attention to the specific things to observe.

(ii) **Present Models:** Present the models to the learners, one at a time, step by step, pointing out each important item or part in a logical, sequential order.

(iii) **Apply Knowledge:** After the model has been presented, it should be discussed immediately. Permit the learners to handle the models.

(iv) **Test Learners:** Learners' application should be followed by either oral or written test. Their performances should be checked and errors should be detected.

(v) **Revise Lesson:** All errors in performance, knowledge and attitude should be corrected, in a constructive manner. Do not hesitate to replay the model so as to clarify the point.

3.6 Classroom Utilisation of Specimens

Specimens are small pieces, segments, parts or samples of the real object, or the materials used in their preparation.

The utilisation of specimens, dioramas and the real objects (realia) follows the same steps as models discussed above.

3.7 Classroom Utilisation of Posters and Charts

Posters and charts may be used not only to decorate the classrooms that lack colour or paints of interest, but also to stimulate interest in the teaching and learning of school subjects.

A poster/chart may be used to:

i. introduce
ii. present; and
iii. review the topic or subject.

Regardless of when the poster/chart is used, the following steps are essential:

1. **Prepare the learners:** You need to arrange the classroom before teaching.

2. **Present the poster:** The poster is an effective way of introducing a new topic. Display the poster on an easel in a conspicuous place in front of the classroom.

3. **Apply the information:** After a brief introduction, explain the purpose of the poster. Throw a spotlight on the poster. Present the steps in a topic. Each step or idea in a poster is to be carefully presented to the learners in proper order. Tell and show each step, if possible, correlate the poster with other visual materials.

4. **Test the learners:** Before the end of lesson, remove the poster to avoid distractions. Ask the learners some questions immediately after this.

5. **Review the subject or problem:** If the test reveals misunderstanding, have a brief review by reading each step or idea to the learners.

3.8 Classroom Utilisation of Diagrams

The following steps are involved in classroom utilisation of diagrams:

(i) prepare the learners;
(ii) present the diagrams to the learners;
(iii) display the diagrams for them to see;
(iv) stand beside the diagram;
(v) use a pointer to illustrate;

(vi) speak to the class;
(vii) test the learners, and
(viii) if need be, review the important points.

3.9 Classroom Utilisation of Chalkboard

Effective use of the chalkboard does not come by accident, some planning and technicalities are called for. To effectively use the chalkboard, note the following steps:

(i) Prepare materials on the chalkboard in advance of the class period so as to save the time of both yourself and the learners. Get everything you need for the chalkboard before the lesson. These include pieces of chalks, rulers, dusters, etc. Also, a series of drawing and sketches on the chalkboard should be prepared ahead of time.

(ii) Clean all the content on the chalk before use. Partition the board into two or three manageable parts depending on the size of the chalkboard. This will help in presenting your letters in a neat and orderly appearance.

(iii) Make the statement concise, brief and simple.

(iv) Print all captions and drawing on a large scale. The information must be clear and visible to all students/learners.

(v) Use chalk of different colours for emphasis.

(vi) Erase all unrelated materials on the chalkboard because this may distract attention. Erase with duster not your palm.

(vii) The teacher must not stand or block the view of the learners. Stand to a side of the chalkboard and use a long pointer.

(viii) Avoid talking to the chalkboard, or talking and writing at the same time, and

(ix) The chalkboard must be easily visible to every learner in the class. It must be in good light so that all work is seen without strain.

3.10 Classroom Utilisation of Flannel Board

Effective utilisation of the flannel board involves the following:

1. **Preparation:** It is important that adequate preparation be made before the class starts. The guide has to be developed and prepared; also material must have been cut out or procured. The teacher must ensure that all flannel board cards are arranged in the proper order and placed around the table so that they will be accessible easily. It is also necessary to rehearse the presentation to be certain that the materials can be covered within the time allotted.

2. **Presentation:** At the beginning of the lesson, it is essential and important to stress the purpose of the lesson and the importance of the use of the flannel board. The first few cards placed on the flannel board should arouse the interest of the learners.

3. **Application:** After the interests of the learners have been aroused, the teacher then presents the information step-by-step. The cards could be used in a dramatic way, but care should be taken so that each point is clearly presented to the learners as much as possible. The lesson and the guide could also be prepared to encourage group discussion.

4. **Evaluation:** It is also important to evaluate the effectiveness of the presentation. This could be done by giving short written test, an objective test or any other type as deemed fit by the teacher. This will help to determine the effectiveness of use of flannel board presentation.

3.11 Classroom Utilisation of Flip Chart Board

The use of flip charts can be done in two basic ways:

(i) They can be used to display a succession of prepared sheets, which can be shown in the required order by flipping them into view from the back of the suspension system one by one. It must be noted that in using this method, the sheets should be clamped to the display system in reverse order of showing i.e. with the one to be shown last uppermost.

(ii) The second method can be displayed by revealing each successive sheet by flipping the previous one over the back of the suspension system out of the way. In this second method, the sheets should be clamped to the display system in the correct order of showing.

Self Assessment Exercise

Mention the basic steps involved in using the following in the class:

(a) Overhead projector
(b) Slide projector
(c) Models
(d) Posters / Charts

4.0 CONCLUSION

Visual media generally help to enrich our teaching, demonstrate things to learners and provide purposeful experiences which form solid foundation for learning.

The steps for utilizing visual media were analysed.

5.0 SUMMARY

This unit is a continuation of attempts at assisting you to acquire the necessary knowledge and skills in the application of educational media in a real life classroom situation. The necessary steps to aid effective utilisation of visual media – overhead projector, slid projector, filmstrips, opaque projector, models, specimens, posters/charts, diagrams and chalkboard were elaborately provided in the unit.

6.0 TUTOR MARKED ASSIGNMENT

What factors do you think can militate against effective use of projected media in your school?

Answers to SAE Questions

There are four major steps to be taken in order to make use of the Overhead Projector (OHP). These are:

1. Arrange the classroom environment:

   (i) get a projection screen and set it up in front of the class;
   (ii) place the projector on a suitable stand facing the screen;
   (iii) arrange the classroom seats for proper viewing of the projected information, and
   (iv) ensure that there is electricity power supply for operating the overhead projector.

2. Test equipment and preview information on transparency:

   (i) connect the OHP to the source of electricity supply;

   (ii) place the transparency on the horizontal glass surface on the OHP and switch on the equipment;

   (iii) focus the image on the screen by turning the focus knob which moves the projector‘s head upward or downward until the image comes into sharp focus;

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3. Present subject matter:

   (i) when the learners are seated, switch on the projector and project only the topic;

(ii) briefly explain the objective of the lesson. If lesson notes are already available on transparency, project only the aspect being discussed and give the learners enough time to copy the notes;

(iii) the notes/information may be written on the transparency for the learners to read as the lesson progresses;

(iv) if an overlay transparency is being used, the layer at the base is first projected and discussed. The others are placed on it one at a time until the visual information is complete.

4. Carry out evaluation

After projecting all the transparencies, switch off the overhead projector. Handle with care. Find out how much the learners have benefited from the lesson by asking questions, giving written tests or assignments.

Slide projects:
Before going to the class, check through the lesson plans and note specific spots where the use of slides would materially help in the improvement of the instruction. Record the type and number of slides required for the specific lesson. Check each slide and ensure that you know exactly what you will say or do with each slide. Then, arrange the slides in proper showing order. Set up the projector and the screen.

Next is the testing of the slide projector. Project a slide on the screen and check it for clarity, and centrality.

The next main stage is the presentation of subject matter on slides. After preparing the learners, the teacher should briefly state the problem to be solved. The slides and the instructions should be presented one step at a time in a logical and orderly manner. Proceed from the known to the unknown.

Immediately after the slides and information have been presented, the teacher should test for factual information. The test can be oral or written, but it should be brief, specific and to the point.

Review the lesson if you discover errors during testing. Do not hesitate to display the teaching slides again.

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(ii) **Present Models:** Present the models to the learners, one at a time, step by step, pointing out each important item or part in a logical, sequential order.

(iii) **Apply Knowledge:** After the model has been presented, it should be discussed immediately. Permit the learners to handle the models.

(iv) **Test Learners:** Learners' application should be followed by either oral or written test. Their performances should be checked and errors should be detected.

(v) **Revise Lesson:** All errors in performance, knowledge and attitude should be corrected, in a constructive manner. Do not hesitate to replay the model so as to clarify the point.

Posters and charts may be used not only to decorate the classrooms that lack colour or paints of interest, but also to stimulate interest in the teaching and learning of school subjects.

A poster/chart may be used to:

i. introduce
ii. present; and
iii. review the topic or subject.

Regardless of when the poster/chart is used, the following steps are essential:

1. **Prepare the learners:** You need to arrange the classroom before teaching.

2. **Present the poster:** The poster is an effective way of introducing a new topic. Display the poster on an easel in a conspicuous place in front of the classroom.

3. **Apply the information:** After a brief introduction, explain the purpose of the poster. Throw a spotlight on the poster. Present the steps in a topic. Each step or idea in a poster is to be carefully presented to the learners in proper order. Tell and show each step, if possible, correlate the poster with other visual materials.

4. **Test the learners:** Before the end of lesson, remove the poster to avoid distractions. Ask the learners some questions immediately after this.

5. **Review the subject or problem:** If the test reveals misunderstanding, have a brief review by reading each step or idea to the learners.

7.0 REFERENCES AND FURTHER READING

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UNIT 9 UTILISATION OF AUDIO VISUAL MEDIA (NON-PROJECTED)

Table of Contents

1.0 INTRODUCTION

This unit is designed to further sharpen your skill and knowledge of classroom application of audio-visuals. You are expected to further digest the information and put into practice whenever the opportunity arises. Welcome to another inspiring unit in the series.

2.0 OBJECTIVES

At the end of this unit, you should be able to describe the procedure for effective utilisation of audio visual media in the classroom.

3.0 MAIN CONTENT

Just like other family of media, there are established steps to be taken by the teacher in order to maximize the potentials of audio-visual media.

3.1 Classroom Utilisation of the Television

The utilisation of television programme requires proper preparation. There is need for you to secure all the scripts and all other related printed materials that will be used for the broadcast.

This is essential because it will guide you and will also be of help to the learners in the follow up activities after the broadcast.

To obtain the best result, the following steps should be followed:

(i) **Prepare the learners:** The interest of the learners should be aroused so that they will get as much as possible from the broadcast. Explain to them the important points to observe in order to gain the best of the broadcast.

(ii) **Present the television programme:** The television should be switched on at the exact time of the broadcast. Learners should note the important points during the broadcast and you should allow the learners to complete their notes.

(iii) **Discuss the Subject / Topic:** Immediately after the broadcast, the topic should be discussed. Each learner should be allowed to mention areas they didn't understand in the broadcast. It is important that you guide the discussion and also summarise the lesson.

(iv) **Test the learners:** There is a need to evaluate the learners in order to discover learners' weakness and errors on the televised subject.

(v) **Review the topic:** There is need to review the televised topic briefly in order to correct all weaknesses or errors observed from the test. The television programme can be replayed if recorded.

3.2 Classroom Utilisation of Vide Tape Recorder

The effective utilisation of video recorder involves the following:

(i) **Prepare the Class:** This involves arranging the seats and placing the equipment properly for optimum recording and viewing.

(ii) **Test equipment:** There is need to test and adjust the equipment before the programme starts. Everything should be in perfect working conditions.

(iii) **Presentation:** There is need to introduce the topic, describe what the programme covers and the important things to be learnt from the programme should be stressed. The presentation should be done on video and the learners should watch and listen attentively.

(iv) **Evaluate the learners:** The class teacher should arrange question and answer session for the learners after viewing the programme. Revision should be done based on the feedback of learners' assessment.

3.3 Classroom Utilisation of Computer-Assisted Instructional Programme

In order to utilise the programme effectively, the following should be observed:

- All the sockets and systems to be used should be tested to ensure that they are in perfect working condition.
- Provision of enough system in a conducive atmosphere i.e. computer laboratory.
- The seats should be well arranged with each learner or a small group of learners facing the computer terminal.
- The teacher needs to explain to the learners what the topic is all about. There is also the need to motivate the learners to learn.
- Presentation: The topic is now presented via the computer. The teacher may be around to observe them and assist them if necessary.

Self Assessment Exercise

Mention and explain the procedure for effectively utilising television and video tape recorder for classroom instruction.

4.0 CONCLUSION

From the interaction with the content as presented in this unit, you must have further sharpened your skill and knowledge of classroom application of audio-visuals. The expectation is that you would further digest the information and put into practice whenever the opportunity avails itself. Remember the saying – ―practice makes for perfection‖.

5.0 SUMMARY

The procedures for effective utilisation of audio-visuals were analysed. Audio-visuals are very useful for enrichment and supplementary teaching.

6.0 TUTOR MARKED ASSIGNMENT

How would you get your students to make use of educational television programmes?

Answer to SAE Question

The utilisation of television programme requires proper preparation. There is need for you to secure all the scripts and all other related printed materials that will be used for the broadcast.

This is essential because it will guide you and will also be of help to the learners in the follow up activities after the broadcast.

To obtain the best result, the following steps should be followed:

(i) **Prepare the learners:** The interest of the learners should be aroused so that they will get as much as possible from the broadcast. Explain to them the important points to observe in order to gain the best of the broadcast.

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(i) **Prepare the Class:** This involves arranging the seats and placing the equipment properly for optimum recording and viewing.

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(iv) **Evaluate the learners:** The class teacher should arrange question and answer session for the learners after viewing the programme. Revision should be done based on the feedback of learners' assessment.

7.0 REFERENCES AND FURTHER READING

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MODULE III INTEGRATING TECHNOLOGY INTO THE CURRICULUM

UNIT 10 ORGANISATION OF CURRICULUM

Table of Contents

1.0 INTRODUCTION

Today, we cannot deny we live in a technological world, and technology is rapidly changing our world and the way we live. It is almost impossible to ignore the pervasiveness of information technology within education as technology has become a valuable resource to educators.

The computer as a tool for students and teachers is not going to disappear from our world; not from business, not from home use and not from the school. Yet even with that knowledge many teachers are still concerned and uncomfortable with finding ways in which a variety of technology-based experiences can expand and enhance what is happening in their classrooms (Butter and Sellbom, 2002).

In order to alleviate these concerns and discomforts, the learning community made up of teachers and students need to find new ways of working and learning together. These changes are not easy though, but it is important for the school administration to provide the time, support and infrastructure necessary for teachers to explore and experiment with the range of ways the technologies can be woven and integrated into the school environment and curriculum.

2.0 OBJECTIVES

At the end of the unit, students should be able to:

(a) identify variables that are very important when organising the curriculum;
(b) identify main problems of curriculum organisation;
(c) discuss the problems of curriculum organisation using a particular type of organisation.

3.0 MAIN CONTENT

3.1 Curriculum Organisation: Its Nature

Curriculum organisation apart from being complex and difficult requires the application of such variables as the nature of knowledge, child growth and development and learning theories.

In organising the curriculum, logic of the subject matter and psychological order of learning should be considered. Thus, the learning content will be organised in a way that variety of behavioural objectives such as the acquisition of a way of thinking and relevant attitudes are developed. Also, the content should be organised so that the basic principles are acquired by the learner.

According to Taba (1962), the problem of curriculum organisation is of two dimensions:

(1) Organisation of content;
(2) Organisation of learning experiences.

For logical organisation of curriculum, the content and the list of subjects and topics will be involved, while the psychological organisation involves the sequence of topics and learning experiences. Thus, ―a typical curriculum framework not only list the subjects and the topics to be covered, but also indicates a sequence for these topics‖.

The following three main factors have been identified as problems of curriculum organisation:

(1) Sequence
(2) Cumulative learning / continuity
(3) Integration

Sequence: This deals with the vertical arrangement of the content and materials into some sort of order. It deals with ―what follows what and why‖. In sequencing, the following could be involved:

(i) Arrangement in form of simple to complex. Here explosion of the content is the primary concern. Such subjects like chemistry, biology, geometry can be arranged by using this format.

(ii) Arrangement based on pre-requisite learning. This principle is based on the fact that the learning of a particular concept at a lower level of sophistication will lead to the understanding of another concept at a higher level. Subjects with laws and principles fall into this category e.g. physics, geometry and grammar. For instance, the theorems in geometry bear a particular logical relationship to one another.

(iii) Sequences from whole to the part. Here it is possible to start from a global content to a specific one e.g. geography. For instance, students are introduced to the globe, learning time and seasons.

(iv) Chronological sequencing. Facts and ideas especially in history and literature are arranged in terms of sequence. Apart from the above sequencing mode, learning experiences could be arranged in different order of difficulties. Such arrangement could be:

a. known to unknown
b. simple to complex
c. familiar concept to unfamiliar ones
d. concrete to abstract
e. analysis of concrete experiences to developing generalisations.

Cumulative Learning / Continuing: This refers to how learning materials progressively increases in terms of volumes of contents, level of abstraction and precision required in using it. For instance, the following could be in order of cumulative learning:

(a) Extended and Nuclear families – primary school
(b) Structure and function of the family – secondary school
(c) The homes as a socialising agent – higher institutions.

Cumulative progression can be applied to all learning – cognitive, affective and psychomotor-thinking, attitude and skills. Cumulative learning leads to more mature understanding, more penetrating analysis and deeper insight.

Integration: This deals with the application of facts and principles from one field to another, in order to show their relationship. For instance, some areas in mathematics can enrich the perceptions gained from the study of physics. Integration does not recognize boundaries, fragmentation and compartmentalization of knowledge

In using integration as a concept or organisation, two principles are involved:

(1) Horizontal Relationship: There is horizontal relationship of the various areas of the curriculum to each other. For instance, such relationship can be found in biology, physics, earth science and chemistry. This has led to the organisation of science curriculum into integrated science. Also, the relationship between such disciplines as history, sociology, religious knowledge, economics has led to the design of a curriculum known as social studies.

(2) Vertical relationship: This shows the sequence arrangement of content from one level to another.

3.2 Types of Curriculum Organisation

1. **Subject or Discipline centred curriculum:** This curriculum organisation has to do with departmentalization of subject matter and emphasises the understanding of key concepts in each subject, and of a particular way of thinking about these concepts and of the structure of the relationships of the subject e.g. physical and health education.

The fused subject-centred curriculum: This is a version of the subject or discipline-centred curriculum that is more or less the same. A good example is mathematics as a subject which can still be subdivided into arithmetic, trigonometry, calculus, algebra, geometry suggests that there could be fusion within just one subject.

This represents the school educational programme of studies. It is concerned with orderliness; each subject has its own design and method. Since this kind of organisation emphasises cognitive development, its critics have said that this may encourage parrot learning whereby learners just merely memorize facts, concepts, generalisations without adequately caring for such material that can facilitate the development of initiative, creativity and such other learning experiences for a cultured person.

The subject-centred curriculum organisation is the oldest, dating back to classical curriculum of the medieval periods. When an organiser takes a specific subject e.g. social studies, he/she ensures that he/she covers all the important areas of the structure of the given society and masters that which takes care of the full scope of education. According to Taba (1962), _the essence of subject organisation is that it follows a logic of the pertinent discipline – that is, both the content and the learning experiences related to acquiring it are divided and are organised by the logic of the respective subject areas.

2. **The Broad Field Curriculum:** The Broad field curriculum is intended to encourage interdisciplinary approach to learning. With this organisation, such subjects like history, geography and civics combined into social studies. Reading, spelling, composition and handwriting are combined into language arts while physics, chemistry, biology and other science subjects are combined into integrated science.

   The actual merits of this curriculum design include the permission of greater integration of subject matter and a broader coverage and allowance of the elimination of excessive factual detail which seemed necessary when the units of study were laid out in smaller segments.

   The broad field curriculum has come under fire. People have argued that the organisation has always been in theory and that rather than being an interdisciplinary approach, more often than not, it has been a multidisciplinary design. For example, a historian by previous training who finds himself/herself in social studies may tend to be influenced by history in his teachings. The same thing could explain an integrated science teacher who has his/her previous training in physics, chemistry or biology.

3. **Spiral or Integration Curriculum:** The idea is from Jerome Bruner. Literally, _spiral‘ means a curve formed by a point winding round a centre and getting always closer to or further form it‘. The idea is hypothetical in the sense that it assumes that an earlier learning should make a later one more easily understood, if the same idea is concerned with; provided such an earlier learning has taken care of the learner‘s age and ability.

   Since Bruner‘s emphasis is on the structure of knowledge, he opines that going by Piaget‘s stages of intellectual development, a child is capable of learning a well graduated

part of a body of knowledge. If one respects the ways of thought of the growing child, if one is courteous enough to motivate him/her, then it is possible to introduce him/her at an early age to the idea and styles that will make him/her an educated person later in life.

3.3 The Core Curriculum

Basic to core curriculum organisation is the realization that fragmentary method of knowledge acquisition and distribution has more to be desired. Therefore, core curriculum is an attempt to unify and integrate learning experiences such that there will be an end to piecemeal learning.

It also attempts to provide answers to some social problems having considered the social role of education and having analysed such social functions. Since individuals live and make up the society, their interests and needs are thereby taken care of.

Core curriculum has characteristics which are essential to it and distinguishes it from other forms of curriculum organisations. These include among others:

(i) its emphasis on social values, that is, it takes care of what is of significance to any given society;

(ii) it focuses on problems of social living, its structure is fixed by broad social problems of themes within the society;

(iii) core curriculum represents core areas or general education which are required of all learning such that everyone undergoing a particular programme has a common social academic orientation, thus fostering same social integration.

Self Assessment Exercise

1. Identify the variables that are very important when organising the curriculum.

2. How are the variables mentioned above affected in both spiral and activity-oriented curricula?

4.0 CONCLUSION

Curriculum organisation though complex, requires the application of such variables as: the nature of knowledge and theories. The logical organisation involves the lists of subjects/topics and the psychological organisation, which involves the sequential arrangement of these topics and learning experiences.

Thus, the following three main factors have been identified as the problems of curriculum:

(1) sequence
(2) cumulative learning – continuity
(3) integration.

5.0 SUMMARY

In organising the curriculum, the following types of organisation have been identified: subject or discipline-centred curriculum and core curriculum, broad-field curriculum, spiral or integrated curriculum and experience or activity curriculum.

6.0 TUTOR MARKED ASSIGNMENT

What are the main problems of curriculum organisation? Discuss these problems using a particular type of organisation.

Answer to SAE Question

1. In organising the curriculum, logic of the subject matter and psychological order of learning should be considered.

2. **Spiral or Integration Curriculum:** The idea is from Jerome Bruner. Literally, ‗spiral' means a curve formed by a point winding round a centre and getting always closer to or further form it'. The idea is hypothetical in the sense that it assumes that an earlier learning should make a later one more easily understood, if the same idea is concerned with; provided such an earlier learning has taken care of the learner's age and ability.

Since Bruner's emphasis is on the structure of knowledge, he opines that going by Piaget's stages of intellectual development, a child is capable of learning a well graduated part of a body of knowledge. If one respects the ways of thought of the growing child, if one is courteous enough to motivate him/her, then it is possible to introduce him/her at an early age to the idea and styles that will make him/her an educated person later in life.

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UNIT 11 PARTICIPANTS IN CURRICULUM DEVELOPMENT

Table of Contents

1.0 INTRODUCTION

Of recent, there have been cries about the weakness of the school system and in particular, the inadequacy of the school curriculum. In developing the curricula therefore, the influence of many sectors of the society should be taken into consideration.

In order to take care of these different interests, a sure way is to provide opportunity for them so that they are made to participate in curriculum development. Therefore, in developing a particular curriculum, the administrators, teachers, the general public, learners, industrialists and the academics should participate (Ivowi, 1997 and Dada, 1998).

2.0 OBJECTIVES

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

(a) identify the participants in curriculum development;

(b) state the specific roles of participants in curriculum development; and

(c) explain the reasons why it is necessary that curriculum development activities should extend to people outside the school system.

3.0 MAIN CONTENT

3.1 The Administrators

The administrators coordinate curriculum planning at the state and national levels. In some cases, officials of the Ministry of Education do prepare some programmes without inviting outsiders. Such programmes might not be appropriate and suitable, since most ministries may

lack the experts in curriculum. However, what is done at the national level is for the ministry to invite experts from several places – universities, research centres, secondary schools and states ministries of education to participate in the curriculum development. For instance, the development of the national curriculum for Junior Secondary Schools involved participants from all the institutions mentioned above.

3.2 The Teacher

The teacher can be invited to participate in curriculum development either at the national, state or local level. This participation is necessary because the teacher at any point in time is the life-wire of any curriculum programme. They organise the programme at the school level.

At times, the school can organise her own curriculum in some areas. For instance, before the development of the national curriculum, such areas like gardening, crafts or handiwork and music were planned by the school. With the present trend in curriculum development, it is the teacher that could select the necessary learning experiences for action in the classroom.

However, the problem in Teachers' prepared curriculum is that each teacher has interest in his/her field of specialization other than in their children or the community in which they teach. Again, today's teachers who are teaching in the rural areas of developing countries in most cases live mostly in urban areas. Since they do not live in the communities where they teach, they might not be able to design appropriate programme or select appropriate learning situation for that particular society.

3.3 The General Public

Every member of the public either as parents and/or employers has a stake in ensuring the success of any curriculum programme. Members of the public pay tax which is one of the sources of revenue for financing education.

It is universally acknowledged that the school belongs to the general public. With this in mind therefore, the values which the general public wants to be included in the curriculum could be so done in order to improve the relationship between the school and the community. Another aspect is that even at the implementation level, members of the public can become resource persons. Roadside mechanics and other artisans could be made use of, in the implementation of a particular programme. One question that can however be asked is, how do the general public participate in developing a particular programme?

This is done through Parents/Teachers Association meetings. For instance, some parents may want some particular subject taught to their children. This could be done through necessary arrangement amongst members. This kind of request will enrich the school's programme of studies.

Parents can also ask in a meeting why it has been difficult for the school to be involved in some school sports and clubs activities. This in essence, will affect the programme of activities of the

school. Such a discussion like the need for the child to get employment after schooling will surely affect programme of studies.

3.4 The Learners

In developing a particular curriculum, the nature of the learner is one of the factors to be considered. Therefore, their participation can enrich the curriculum. As far as their nature is concerned, the content to be imparted and the ways and means of imparting the content should be modified to be in line with their nature. Thus at the implementation level of the curriculum, strategies to be employed should be tuned towards understanding the concept and principles (Amadi, 1990). Students' representative council can also influence curriculum development by asking the authorities to include some subjects or activities as part of things to be learned.

3.5 The Universities

Within the universities, there are curriculum experts. Thus, with their expertise, they can on their own develop curriculum. For instance, primary science programme in Yoruba was developed by experts from the (Obafemi Awolowo University) University of Ife. In developing any curriculum therefore, whether ministry-based or otherwise, the experts from the universities are always involved (Adeyemi, 1995).

Self Assessment Exercise

Identify any three participants in curriculum development and state their specific roles.

4.0 CONCLUSION

The roles of the participants in curriculum development are quite enormous and very important. Failure to integrate them in the development of the curriculum may spell doom for the curriculum right from the onset. You are therefore to note that success or failure of a curriculum either at the development stage or at the implementation stage may not be attributable to just one monocausal, but multicausal factors.

5.0 SUMMARY

The dynamic nature of the society and the current interest generated on curriculum development has made it necessary for some individuals and groups to take part in it. The participants are:

(1) The Administrators
(2) The Teachers
(3) The General Public
(4) The Learners, and
(5) The Universities

Each of these participants has their specific roles to perform and some problems militating against their effective participation.

6.0 TUTOR MARKED ASSIGNMENT

Why is it necessary that curriculum development activities should extend to people outside the school system?

Answer to SAE Question

The Administrators

The administrators coordinate curriculum planning at the state and national levels. In some cases, officials of the Ministry of Education do prepare some programmes without inviting outsiders. Such programmes might not be appropriate and suitable, since most ministries may lack the experts in curriculum. However, what is done at the national level is for the ministry to invite experts from several places – universities, research centres, secondary schools and states ministries of education to participate in the curriculum development. For instance, the development of the national curriculum for Junior Secondary Schools involved participants from all the institutions mentioned above.

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At times, the school can organise her own curriculum in some areas. For instance, before the development of the national curriculum, such areas like gardening, crafts or handiwork and music were planned by the school. With the present trend in curriculum development, it is the teacher that could select the necessary learning experiences for action in the classroom.

However, the problem in Teachers' prepared curriculum is that each teacher has interest in his/her field of specialization other than in their children or the community in which they teach. Again, today's teachers who are teaching in the rural areas of developing countries in most cases live mostly in urban areas. Since they do not live in the communities where they teach, they might not be able to design appropriate programme or select appropriate learning situation for that particular society.

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Every member of the public either as parents and/or employers has a stake in ensuring the success of any curriculum programme. Members of the public pay tax which is one of the sources of revenue for financing education.

It is universally acknowledged that the school belongs to the general public. With this in mind therefore, the values which the general public wants to be included in the curriculum could be so done in order to improve the relationship between the school and the community. Another aspect is that even at the implementation level, members of the public can become resource

persons. Roadside mechanics and other artisans could be made use of, in the implementation of a particular programme. One question that can however be asked is, how do the general public participate in developing a particular programme?

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Parents can also ask in a meeting why it has been difficult for the school to be involved in some school sports and clubs activities. This in essence, will affect the programme of activities of the school. Such a discussion like the need for the child to get employment after schooling will surely affect programme of studies.

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UNIT 12 CURRICULUM PLANNING AND IMPLEMENTATION

Table of Contents

1.0 INTRODUCTION

Curriculum implementation could be described as the ways and means by which the designed programme is being translated at the classroom level (Dada, 1998).

The procedure, by which this is done in most countries especially developing ones, has not been in line with what curriculum experts envisage. For instance, there are two stages of curriculum implementation – pilot or trial testing stage and total implementation or installing stage. In some developing countries, the pilot stage is omitted for one or all the following reasons:

(a) Government insensitiveness to the need to trial tests the curriculum.
(b) Financial constraints.
(c) Lack of experts

For curriculum implementation to be successful at both pilot and installing stages, the following should have been adequately developed or made available:

(a) Learning units and textual materials.
(b) Infrastructure, facilities and equipment.
(c) Evaluation strategy for the programme, especially at the pilot stage.

2.0 OBJECTIVES

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

(a) Explain curriculum planning and implementation.
(b) Discuss the reasons why some developing countries do omit the pilot or trial testing stage of the curriculum implementation.

(c) Identify things that should be made available for any curriculum implementation to succeed.

3.0 MAIN CONTENT

3.1 Developing Units and Textual Materials

For curriculum implementation, the first task to be faced is that of developing units of study that can metamorphose into textual material. The following steps for planning a unit, recommended by Taba (1962) cited by Ivowi, (1997) could be regarded as adequate.

(1) Diagnosing needs: here the curriculum developer identifies the problems, difficulties and conditions of individuals for whom and the society for which the units of the curriculum are being developed.

(2) Formulating specific objectives: objectives formulated should contain materials from each of the following:

(a) concepts of ideas to be learned;
(b) attitudes, feelings and other emotional dispositions that could be developed;
(c) thinking mode to be reinforced, strengthened or initiated.
(d) skills and processes to be acquired.

(3) Selecting content: in developing a unit, the first task is that of writing out the topics. This represents the selection of basic ideas. The ideas should be significant, valid and learnable.

(4) Organising the content: here, the contents should be arranged in a logical and sequential order.

(5) Selecting learning experiences: this is selection of learning activities at the classroom level.

(6) Organising learning experiences: learning activities should be organised in sequential order.

(7) Evaluating: the evaluation of the units is based on the stated objectives. However, a continuous assessment built into the instructional procedures could be better.

(8) Checking for balance and sequence: after completing the outline for a unit, the next is to check for balance.

You should note that the house-style of development of course material in the National Open University of Nigeria follows the eight steps of unit development as recommended by Taba (1962).

3.2 Total Implementation or Installing Stage

This is the stage at which designed programme is introduced into or installed in schools. However, the following are considered before such an exercise is embarked upon by the government or her agents:

(a) Assumption made for total implementation.
(b) Evaluation and introduction of the programme into schools.

Before introducing the programme into schools, the agent for such an activity should have consulted the curriculum developer on the input assumed to be in place. For instance, the curriculum expert should be consulted to evaluate the following for total implementation:

(i) facilities and infrastructure – extent of adequacy.
(ii) teacher – availability in quality and quantity.
(iii) instructional materials – extent of availability.

3.3 Making necessary facilities, infrastructures and equipment available

Curriculum cannot be adequately implemented without the availability of necessary infrastructures, facilities and equipment (Amadi, 1990). For instance, if curricula are developed for physics, chemistry or biology, it is necessary to provide laboratory facilities and equipment needed for implementation. Failure to do this could lead to non-achievement of the intended objectives.

3.4 Training of Teachers

No matter the amount of inputs – infrastructural facilities and equipment on a programme, such is bound to fail, if teachers in quality and quantity are not provided for the implementation of the programme. Therefore, in order to achieve the intended objective, teachers to implement the curriculum at the classroom level should be appropriately trained. For instance, one of the major reasons affecting the implementation of Integrated Science and Social Studies in schools is that of the teaching staffs. In most cases, teachers of biology, physics, chemistry, home economics are made to teach the subject. Also, teachers of history, economics, geography, religious studies are made to teach social studies.

However, research findings have established that unless teachers are specifically trained for the subject (integrated science and social studies), the intended objectives might not be achieved.

3.5 Planning Evaluation Strategy for the Programme

Once a curriculum has been developed, strategies for evaluating it during the implementation period should be planned. In fact, the trial run of any programme should continuously be accompanied by evaluation to making sure that the intended objectives are achieved. Some of the areas that can be evaluated include the following:

(i) Textual materials

(ii) Facilities and equipment

(iii) The learner: his/her cognitive, affective and psychomotor achievements in terms of the curriculum he/she has been exposed to.

(iv) The teacher: his/her competency for and disposition towards the subject. Analysis of method of teaching being employed.

(v) Administrative problems.

3.6 Stages of Curriculum Implementation

There are two main stages for curriculum implementation. These according to Amadi (1990) and Adeyemi (1995) are:

(i) Pilot or trial –testing stage.
(ii) Total implementation or installing stage.

The Pilot Stage

This is the stage at which the designed curriculum should be trial tested to making sure that the stated objectives are achieved, ideas are tried out, modified and retried. At this stage, few schools are selected. For instance, if the pilot stage will cover the whole country like Nigeria, a school per five local government areas or all the Federal Government Secondary Schools in the country can be selected. These schools should be provided with the necessary inputs in terms of human and materials resources. For a science programme e.g. integrated science, apart from the textual materials, laboratory facilities and adequately trained teachers should be provided, the teacher – pupil ratio should be in line with what is recommended in the design of the programme.

This stage could be said to involve the following:

(a) Situation Analysis and the Determination of Entry Behaviour: Before introducing a new programme, critical analysis of the present situation in terms of the current practices, procedures and policies should be done. If it is a social studies programme, the evaluation should determine the status of textual material, classroom practices and level of students' achievement in the subject before the introduction of a new programme. This, in essence, leads the curriculum developer to an evaluation process of the situation.

Consequently, he/she identifies variables of the curriculum implementation for which he/she intends to determine the entry behaviour.

(b) Transactional Activities and Guided Orientation Evaluation: This section of curriculum development deals with the various kinds of interactions and activities that take place

during the development and presentation of the necessary inputs – instructional materials, the teacher, and the facilities are put into effective use and are periodically evaluated.

(c) Decision for Trial Implementation of the programme: For decisions on total implementation to be made, the curriculum developers, after various modifications and retrials in the areas of textual materials, teacher training, teacher-material, pupils interactions and so on, should feel satisfied that the programme is ready for introduction into schools. This does not mean that the ongoing evaluation will stop at this stage.

Self Assessment Exercise

What strategies are involved in curriculum implementation?

4.0 CONCLUSION

Curriculum implementation is a critical stage in the realization of the objectives for which the curriculum was designed. At this stage, all hands must be on deck to making sure that the curriculum is implemented according to the envisaged mission of the curriculum developers.

The teacher who acts as the direct implementer of the curriculum at the classroom level should make sure that he/she understands the objectives of the curriculum to be implemented very well. He/she should be able to demonstrate mastery of the knowledge of the curriculum contents which are broken down into topics, units, modules, scheme of work, lesson plan, and lesson note.

An effective implementation of the curriculum calls for the selection and use of appropriate and adequate instructional materials. It becomes imperative for the teacher to be highly methodical and be sensitive during the delivery of the lesson. Appropriate learning experiences must be selected and integrated if the curriculum is to achieve the purpose for which it was designed. It should be equally stressed that the integration of both formative and summative evaluation in the process of implementing the curriculum is highly essential.

5.0 SUMMARY

Curriculum implementation is summarised as the ways and means by which the designed programme is being translated at the classroom level. Two major activities are compulsory in the proper implementation of the curriculum. These are pilot or trial testing and total implementation or installing stages. For the curriculum to be effectively implemented, necessary human and non-human resources needed for the implementation should be provided.

6.0 TUTOR MARKED ASSIGNMENT

(a) What do you understand by the term curriculum implementation?
(b) How does curriculum implementation differs from curriculum design?
(c) Justify the statement that ―the teacher is the key element in the successful implementation of the curriculum‖.

Answer to SAE Question

Once a curriculum has been developed, strategies for evaluating it during the implementation period should be planned. In fact, the trial run of any programme should continuously be accompanied by evaluation to making sure that the intended objectives are achieved. Some of the areas that can be evaluated include the following:

(i) Textual materials

(ii) Facilities and equipment

(iii) The learner: his/her cognitive, affective and psychomotor achievements in terms of the curriculum he/she has been exposed to.

(iv) The teacher: his/her competency for and disposition towards the subject. Analysis of method of teaching being employed.

(v) Administrative problems.

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MODULE IV CASE STUDIES ON INTEGRATION OF MEDIA IN THE CURRICULUM

UNIT 13 CURRICULA INTEGRATION OF SIMULATIONS IN NEUROSCIENCE

CONTENTS

1.0 INTRODUCTION

Simulations of neural models are valuable tools for researches and students in neuroscience. They provide insights in complex and dynamic processes that could not be generated by laboratory experiments alone. For researchers, modeling and simulation are indispensable methods for theory building, prediction, hypothesis testing, and hypothesis generation. For students, simulations provide new opportunities by an active exploration on neural mechanisms. Students can experience dynamics and complexity of neural processes in a way hardly achievable in laboratory courses alone. Even though basic neural principles, like the generation of action potentials, are accessible by relatively simple experiments for students – an action potential simulation offers much more explorable parameters and allows a much more profound knowledge on the topic. Hence, for students simulations can be an illustrative and interactive learning media.

Teachers are faced with the problem to present simulations that are suitable for students, especially for novices in the field. A common way to introduce simulations in neuroscientific teaching is a direct mapping of research situations involving simulations into classroom situations. This is not necessarily appropriate for all students. Many students have much less background knowledge not only in the neuroscientific domain but also in procedural and intuitive aspects necessary for a successful application of experiments. Hence, they need a specific access to simulations that include an instructional embedding. A closer look at findings from educational research reveals some perspectives for a successful integration of simulation as interactive learning media.

In empirical educational research the use of simulation as an education tool is associated with learning about complex processes (which are hard to verbalize for teachers) as well as exploration and active learning. These concepts are subsumed as discovery learning (de Jong & van Joolingen 1998 , Williams 2003), directly supporting the acquisition of intuitive knowledge (Swaak & de Jong 2001). Swaak and de Jong, characterize learning with simulations to be " […] always a combination of concept-driven with action-driven and perception-driven processes" and that "especially the action-driven and perception-driven elements […], which are partly implicit, lead to intuitive knowledge" (p. 286). Especially the fact that neural information processing is much easier to demonstrate by simulation than by verbalization is motivation enough for many teachers to use simulation as an illustrative and interactive tool for learning neural concepts. Moreover, especially for novice learners, many neuroscience teachers see a main learning target in getting a feel for the simulation and the simulated system.

To facilitate the use and integration of simulations as educational tool, educational research offers approaches of cognitive scaffolding for discovery simulations, e.g. based on instructional components like expository instruction, model progression, assignments, explanations (de Jong 2006) to support the intuitive learning process. The combination of explorative and, hence, interaction based simulations and their cognitive scaffolding is also known as guided exploration or guided discovery learning (Leutner 1993 , de Jong 2005) [1]. Horstmann and Lorenz have developed a related framework of educational simulations for neural information processing (Horstmann & Lorenz 1999 , Lorenz et al. 2004). Additionally, they add features like interactive and dynamic model representations by combining action-driven and perception-driven elements within one interface, as well as the systematic exploration path of a simulations parameter space. The following sections describe strategies and examples for the design and integration of simulations in neuroscience teaching exemplified by different types of educational use of simulations as well as by concrete curricular examples. Basic principles will be revealed, applicable to all areas of scientific education. Firstly, a closer look at different educational approaches to simulation in the neurosciences provides a classification of different learning objectives, target groups as well as educational and instructional prerequisites. A specific example of an educational simulation is given, revealing some basic instructional principles for creating explorable interactive media as explanatory tools. Secondly, possibilities of curricular integration are introduced as examples of both, technical and instructional perspectives. The examples cover a specific e-learning environment for curricular integration of scientific tools and media as well as two examples of practical courses at the Master- and Bachelor-level, respectively.

2.0 OBJECTIVES

At the end of this Unit, you will be able to;

- explain the term simulation
- discuss the educational values of simulation
- describe the various types of simulation
- note and explain the scientific approach to the adoption of simulation
- demonstrate how simulation could be integrated into the teaching and learning of neuroscience
- discuss the limitations of simulation as a teaching strategy

3.0 MAIN CONTENT

3.1 Educational Approaches to Simulation in Neuroscience Teaching

Simulations became an accepted powerful explanatory tool in neural and cognitive sciences to analyze the complexity and dynamics of neural information processing models. In courses on neural and cognitive sciences, students have very heterogeneous background knowledge within the continuum of computationally sophisticated to computationally novice. To face this problem, at least two different approaches can be taken focusing on different skills to learn while working with models and simulations and focusing on different types of learning: intuitive learning, i.e. getting a feeling for a given simulation and procedural learning, i.e. learning how to simulate.

Nearly all approaches to the educational use of simulations in the neurosciences emerge as a byproduct of neuro-scientific simulations in research, and are not a direct product of educational research (for an overview, see this volume). Only a few approaches in neuroscience teaching at university level are inherently educational (Horstmann & Lorenz 1999, Lorenz et al. 2004, Stuart 2008). Both approaches have been accelerated by neuroscience researchers, without the help of experts from educational research, and are triggered by the demand of educational tools for both, simulations as a method (procedural knowledge) and simulations as an explanatory tool (intuitive knowledge). This process evolves quite naturally, since in universities research and teaching are connected closely.

Observing educational praxis in neuroscience teaching, three different approaches to simulation can be described: the scientific simulation approach, the precompiled simulation approach, and educational simulation approach. A closer look at these different educational approaches to simulation clarifies the differences in their learning objective, their target group, and the educational setting.

3.1.1 Scientific Simulation Approach

The easiest way for teachers to introduce simulations in university education is to adopt the use of simulations in science for the classroom. In research, simulations are part of the scientific workflow (fig. 1a). Understanding simulations as computer based experiments leads to a

variation of the scientific workflow by drawing a scientific simulation cycle (fig. 1b). A typical educational scenario in computational neuroscience now develops instructional steps derived from the scientific simulation workflow. This way allows students to reproduce and reflect the work done by researchers to obtain useful data produced by simulation. Commonly, this process is supported by a simulation tool, providing predefined model units and data visualization options. Organized as a practical course with only a small number of participants, teachers can reuse their research tools and examples and, in this way, guide students in learning scientific work.

Figure 1: (a) Circular scientific workflow, adapted from (Horstmann 2003, p. 160): "(1) Theory: system specification, problem analysis, hypothesis, prediction. (2) Design: methods, experimental protocols, problem operationalisation. (3) Experiment: concrete setup, preparation, data acquisition. (4) Evaluation: data analysis, statistics, conclusion, discussion", having its effects to theory building (1). (b) A scientific simulation workflow can be derived from (a), resulting in an adapted cycle consisting of (1) model, (2) implementation (3) simulation (4) evaluation, having an impact for further theoretical consideration (1).

The scientific simulation approach is applicable to a small group of advanced students only, coming from computer science with a strong bias for neural computation or future neuroscientists with interest in gaining computational skills. From whatever knowledge domain the students come from, employing this approach requires a basic knowledge in applied mathematics (e.g. differential equations and linear algebra) as well as computational (i.e. programming) skills or even concepts (Yang 2001). Numerical models have to be understood as mathematical expressions and have to be implemented in a specific programming language, in some cases already simplified by providing a scripting language, e.g. as in GENESIS (Bower & Beeman 1998, 2005), in NEURON (Hines and Carnevale 1997) and some other tools (e.g. see this volume). Students have to become familiar with the graphical user interface (GUI) and overall functionality of the respective simulation tool, which may need some days of practice. Furthermore, the scientific simulation approach requires a basic knowledge of discipline-specific (i.e. neural) principles, since the major learning objective is to apply these principles to the method of simulation.

From the students' perspective, the scientific simulation approach is the most complex one. It confronts students with simulations as a scientific method, their development and application. Students have to reflect each step of the scientific workflow cycle just like a researcher. Hence, the major goal of the scientific simulation approach is to learn to design and implement a neuroscientific model derived from theory or experiments, to explore the simulation

(experiment) and to evaluate and interpret the simulation (evaluation). Students not only gain content-related knowledge, i.e. neural principles and concepts via simulation. They mainly learn how to do science with simulation, exemplified by the domain of neurosciences, by implementing models and running simulations within a professional simulation tool. Hence, the scientific simulation approach qualifies for procedural computational skills not needed by most of the students learning neurosciences.

Summary Scientific Simulation

Major learning objective	Simulation as method in neural and cognitive sciences, scientific working. Learner as author.
Target group	Advanced graduate level; background knowledge in mathematics and neural and/or cognitive sciences; computer skills; programming skills (or at least large interest); interested in specializing for computational neurosciences and/or cognitive sciences.
Educational setting	Practical Course of several days duration, ~10 participants, ~2 tutors.
Instructional setting	Computer and scientific simulation software, manuals, hand-out with instructions for creating models and simulations. Support by tutors essential.
Main learning type	Procedural knowledge, intuitive knowledge

3.1.2 Pre-compiled simulation approach

A first step into an educational transformation of simulations as a knowledge resource is to provide students with pre-compiled simulations previously developed within a scientific simulation tool or by providing Java applets. Following this approach, the design-step including its knowledge domains can be omitted. Students can directly explore a simulation and evaluate the obtained data. By omitting the design part, students without in-depth background but basic knowledge in applied mathematics and programming become part of the target group. Instead of reproducing the scientific simulation workflow, the learning objective shifts to _how to explore and interpret a neuroscientific simulation‘ to 'gain insights in neural processes by using simulations'. Hence, in the pre-compiled approach, learning shifts from the procedural knowledge domain (technical perspective) to the intuitive knowledge domain (content-related perspective).

Figure 2: Reduced workflow associated with the pre-compiled simulation approach. The part _design‘ or _implementation‘, respectively, is omitted in this workflow (cf. Fig. 1).

Nearly all common tools for computational neuroscience or cognitive science support this approach (GENESIS, NEURON, PDP++, SNNAP, MatLab©, to name only a few of the common tools). By providing precompiled simulations, the need to learn about the functionality of a given simulation tool is reduced to a minimum. Rather, exploration of the behavior of the simulation becomes the central learning objective.

Learning about the model before using the simulation can hardly be omitted in this approach, since many of the given tools neither provide a self-explaining model representation nor a comfortable user interface. Parameters sometimes have to be varied by rewriting scripts rather than by using clearly arranged parameter windows. Hence, it is important for students to understand the mathematical model representation and to be able to assign parameters in the model to their representation in the programming script. Therefore, it is essential to discuss the model in detail in the classroom before exploring the simulation.

Compared to the scientific simulation approach, teaching with pre-compiled simulations allows the exploration of a variety of systems (models) in the same amount of learning time. This implies a shift in the learning objective as a first attempt to use simulation mainly as scientific media (content-related perspective) instead of a scientific method (technical / methodological perspective). This development is shaped by the educational simulation approach in the next section. The effort for teachers in preparing courses increases, since they have to provide previously implemented simulations. In some cases, they may draw on simulations they have already used in research.

Since this approach is based on the same tools as the previous approach, both approaches can be combined in a given course.

Summary Pre-compiled Simulation

Major learning objective	Working with simulations as explanatory tool; get a feeling for dynamic system behavior; Simulation as learning media
Target group	Advanced bachelor-level and master-level; background knowledge in neural and/or cognitive sciences; basic computer skills
Educational setting	Practical course day – selective use between real experiments possible, ~20 participants, ~3-4 tutors; also suitable for self-learning; complete practical course possible, demonstration in lectures and seminars.
Instructional setting	Computer and precompiled simulations (running in scientific software), hands-out with instructions for exploring simulation and explaining simulation behavior. Support by tutors is essential.
Main learning type	Intuitive knowledge, procedural knowledge

3.1.3 Educational simulation approach

In contrast to the previously described approaches, educational simulations are self-contained learning units that can not only be explored directly (i.e. without or with minimum prior knowledge), simulations are also embedded in an instructional context that is integrated in the

learning unit itself (and not provided by external resources). This approach does no longer follow the scientific workflow, since only the action 'simulation' and 'evaluation' remain (fig. 3). Educational simulations differ from educationally reused scientific simulations in being originally designed for education. They highlight simulations as explorable media, focusing on the phenomenology of a given model. The learning objective is to get a feeling for the simulated system rather than learning about its formal description or its implementation.

Figure 3: Educational simulation approach. Within this approach, the scientific workflow is not only further reduced (cf. fig. 2) but instructionally embedded in an e-learning environment, i.e. enriched with contextual and instructional information as well as equipped with special GUI features, like model progression. For details see text.

Following this approach means re-designing simulations: It focuses no longer on scientific functionality but on educational functionality. This approach requires a high fidelity graphical user interface (GUI) with reduced complexity, providing an interaction model that leads to a self-explaining sequence of user actions to obtain a simulation result. Furthermore, an instructional design of simulations should be established, like model progression and model representation, enriched with contextual information (background knowledge, motivation for the model, mathematical formulation) and instructional information (i.e. how to systematically explore) as well as integrated assignments. The results are educational units based on guided discovery learning or guided exploration, that allow for learner centred learning without technical or mathematical barriers and, hence, are open for a much broader audience.

Summary Educational Simulation

Major learning objective	Getting a feeling for simulation and the simulated system; using simulation as explanatory tool, simulation as learning tool.
Target group	From first semester (Bachelor-level) and higher; no background knowledge required.
Educational setting	Practical course day, ~30 participants, ~4 tutors; self-learning; complete practical course possible; demonstration in lectures and seminars.
Instructional setting	Computer and educational simulation environment. Support by tutors beneficial
Main learning type	Intuitive knowledge, definitional (declarative) knowledge

3.2 Example for Educational Simulations: the Rubin Project

A special type of educational simulation for neural information processing has been introduced by the so-called Rubin project (Horstmann & Lorenz 1999). Rubin is a Java-application-based learning environment for authoring of, teaching, and learning with educational simulations. It provides a prototype for an electronic textbook based on 6 chapters (neuron, networks, sensory networks, motor networks, behavior, learning) with currently 50 educational simulations (see also Ulrich, Lorenz, Pelz & Menzel 2005, including large parts of chapter 6 as stand alone-application). All simulations are based on a modeling approach mixing cybernetic system theory and neural networks (for details see Cruse, 2006). They mainly use a qualitative approach by operating with relative units rather than with exact physical units. The Rubin authoring mode allows for the rapid configuration not only of the structure and content of educational simulations but also of functionality and GUI of the simulation itself. Additionally, all educational simulations as well as the instructional approach developed in the Rubin project are re-usable .

3.2.1 Instructional Embedding

Educational simulations for the neurosciences, as have been introduced by the Rubin project, are structured simulations that require a minimal background in computational and mathematical skills both for the teachers and students. This is due to the educational structure of the simulation itself and its instructional embedding in contextual information. Whereas the structure of the simulation includes educational strategies like model representation and interaction, model progression (or parameter reduction, respectively) and data visualization, the instructional embedding is related to the overall structure of the learning unit and the integrated contextual information, like content-related subsumption as well as instructions and assignment for learners. To connect both, learning unit and simulation are intertwined within a page structure (i.e. to allow for model progression and a systematic exploration of a given simulation) and additional sub-pages, to provide related information from different domains on each page of the learning unit (content-related, instructional, assignments, notes). Figure 4 provides an overview of objects constituting an educational simulation. The composition of these objects leads to a spatiotemporal educational framework for simulation, as is illustrated in figure 5. This composition can be reused as a template for authoring this type of educational simulations.

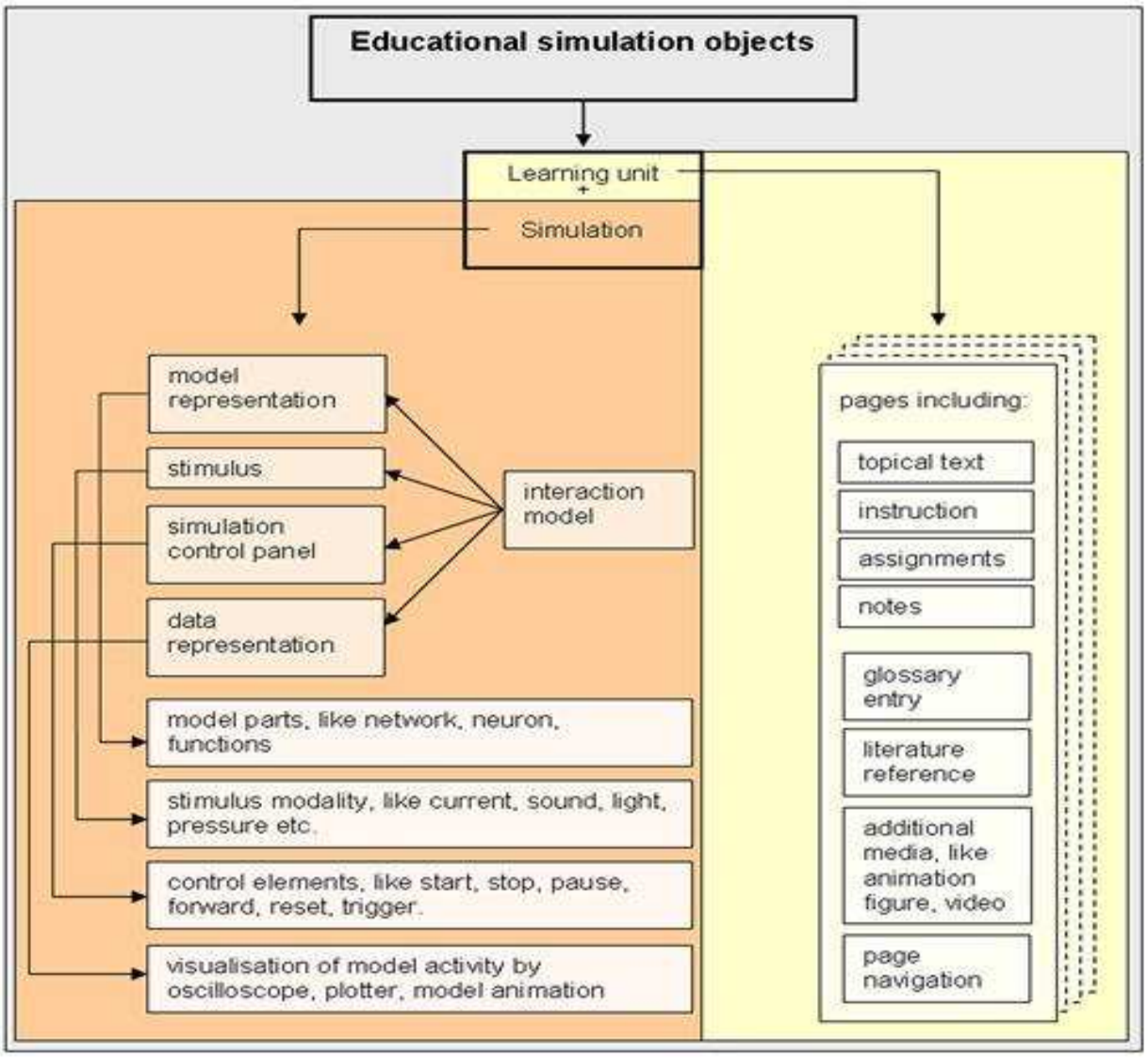

Figure 4: Overview of objects to construct an educational simulation for neural and cognitive sciences. It combines structural elements, like pages and sub-pages (on the right), with one or more simulation setups, each consisting of different types of elements (on the left). Each type has implemented a general interaction model, guiding the exploration of a simulation.

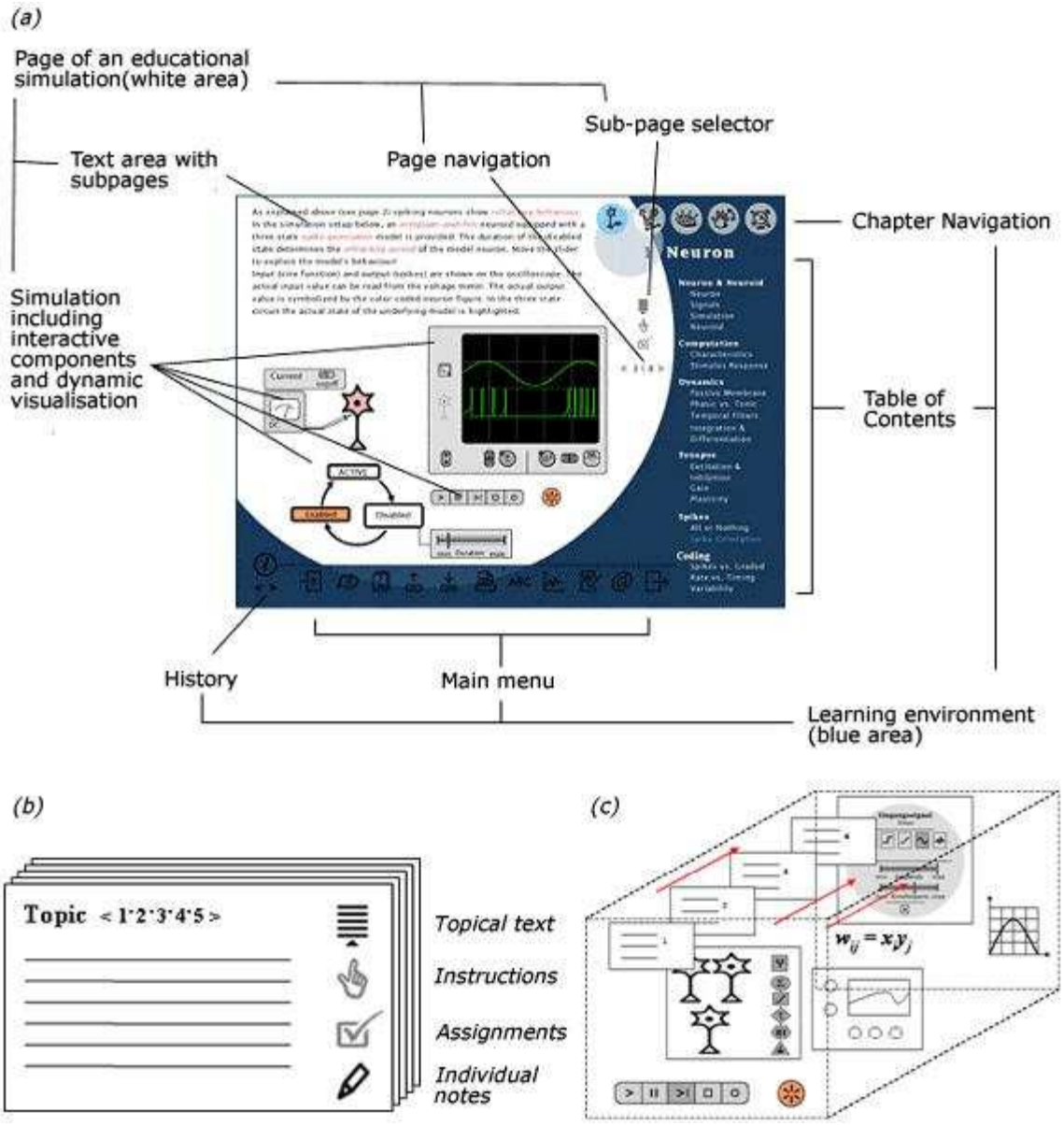

Figure 5: (a) Screen structure of educational simulations in Rubin. The simulation area (white) consists of contextual information (text area) and the simulation itself. (b) Sub-pages. One page is divided each in four sub-pages, providing topical text, instructions for simulation handling, assignments for simulation exploration and individual notes, made by students during learning. Switches between sub-pages (click on the appropriate symbol) are possible while the simulation remains visible. (c) The Combination of simulation and page structure leads to a spatio-temporal structure enclosing a learning path for one unit.

3.2.2 Simulation Interface and Interaction Model

The user interface to the simulation has implemented an interaction model that combines pseudo-realistic graphics (neuron, current inducer, oscilloscope, and electrode) with a formal representation of the neuron, called neuroid, a panel which gives access to all model functions

and parameters (fig. 6). A current generator injects current into the neuron and an electrode measures the resulting voltage change in the output region of the neuron, visualized by an oscilloscope. The neuron representation is both, GUI element and visualization element. As visualization element, it shows the activity of the neuron by a color coded scheme (blue: low activity – red: high activity). As GUI element the neuron provides access to the neuroid, being a model neuron consisting of a sequence of functional domains. The sequence of functional domains defines the order of computation. Each functional domain is initialized with a pre-selected function (e.g. input summation, activation function, filter properties etc.). For each functional domain a parameter window can be opened, providing parameters for the selected function as well as alternative functions to select. It allows students to completely reconfigure a given neuroid. Each change in the model functionality will be visualized in runtime by the connected visualization tools, i.e. the oscilloscope and the neuron representation (color coded). Additionally, relational plots can be integrated by authors to visualize specific parameter combinations (as shown in fig. 5 by plotting stimulus intensity I and corresponding neural activity F(I)). The simulation can be started, stopped, reset etc. via a simulation control panel (below the oscilloscope)

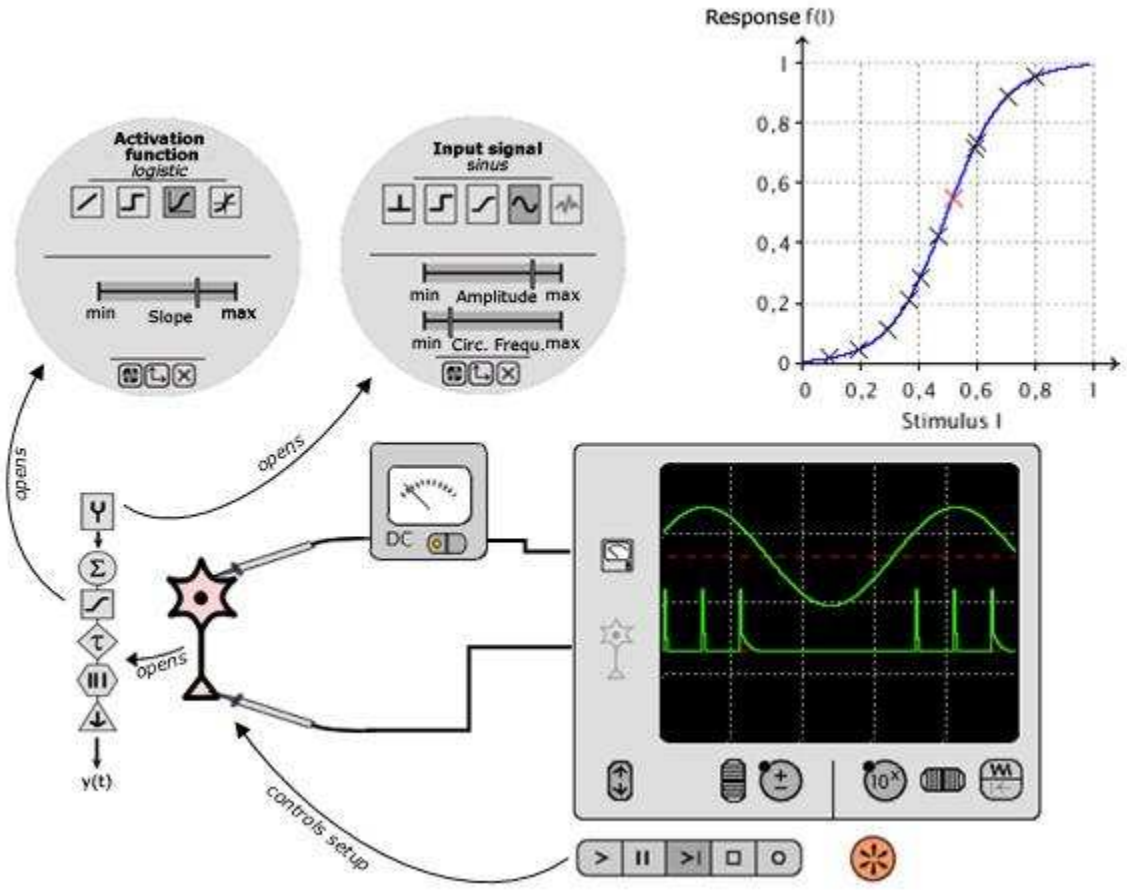

Figure 6: Simulation composition and interaction model (for details, see text).

This simulation setup is the basic template of a simulation-KIT for authors to rapidly create educational simulations of this type. In principle, each part of the simulation can be represented

by author-specific visualizations. Authors can setup simulations due to the described educational simulation framework by configuration scripts. They can lock and unlock parameters from page to page to provide only those functions and parameters that are needed in a given step within the learning unit and by this way guide students in exploring the parameter space.

3.3 Curricular Integration - Instructional and Technical Perspective

Curricular integration of interactive educational media affects not only instructional settings but also the technical basis by means of learning repositories .(see also Model DB, Morse 2008, this volume) and learning management systems (LMS). In an LMS, complete course materials can be collected and/or authored, stored (equipped with metadata) and retrieved by students as learning resource as well as by other teachers as reusable teaching resource. Additionally, LMS offer course communication tools ranging from messaging, forum, and chat to wikis and blogs, to support group learning. Based on modern educational technologies LMS allow for the integration of e-learning components into the traditional face-to-face learning at a modern university. Recently, LMS are established technical infrastructure in universities world-wide.

Natural sciences can benefit from learning tools by integration in practical courses. These tools provide practical course scripts, interactive experimental setup descriptions (labeled images, videos) and additional media for a better understanding of how practical sciences works, e.g. by combining wet experiments with simulations. Students can upload their homework and protocols and perform some electronically provided assignments.

Using standard learning environments as technical basis for integration of complex interactive media in neural and cognitive science education bears two principle problems: Firstly, special didactical approaches, like the above-mentioned educational simulation approach, can not be integrated as such, but have to be re-organized (e.g. parallel sub-pages have to be serialized), which is merely a soft problem. Secondly, and hardly solvable, learning environments are operating on standard formats and, hence, only support integration of media that are delivered in such a standard. This contradicts the overall approach to integrate and re-use scientific tools and media, since these are mostly delivered in a non-standard, i.e. non-web-standard, implementation. Especially simulations, where no standard exists (Cannon et al. 2007; Crook, Beeman, Gleeson & Howell 2005; Horstmann 2002), are hard to integrate without re-implementation, i.e. as Java applet. The next section describes a way to overcome these problems.

3.4 Example LMS for Simulations – the Monist Project.

An extension of the educational simulation approach is to provide an integrative instructional framework (or learning management system, LMS) for using all educational approaches and reusing all kinds of scientific simulations and simulation tools. This extension has been introduced by the Monist project (Lorenz et al. 2004). Monist (fig. 7) is an LMS with two unique features: Firstly, it delivers learning units based on the educational approach (see above). Secondly, it allows for the integration not only of precompiled simulations and of any sort of other media, but represents an instructional environment for working with scientific software tools, i.e. simulation tools. Monist allows the teacher to build learning repositories that include

not only learning units with descriptive text and standard media but also a mechanism to automatically install, run and learn with any other program. Monist, thus, provides an environment for sharing and re-using scientific and educational resources (for details see Lorenz, Oesker & Horstmann 2005). Monist learning objects as well as learning units can be equipped with metadata and stored in the Monist database. All objects and units can be shared, reused, and recombined by authors.

Monist gives teachers the opportunity to

a. synchronize with each other much easier according to the learning objectives and materials, since teachers have access to all materials of the course.

b. integrate additional media, like experimental setup descriptions, data analysis software, simulations, animations, and games within one course material and one technical environment

c. evaluate and further develop course materials in cooperation.

Students benefit from the use of Monist in

a. having one central learning environment providing all required learning resources, even though some programs are run in parallel (extra window)

b. getting the opportunity to easily explore different types of scientific and educational resources to support their understanding of scientific workflows on different levels.

c. being able to upload own materials, like protocols etc. and to send assignment results to tutors

Despite dealing with several resources differing in their appearance as well as in functionality, students are almost fully served by using Monist.

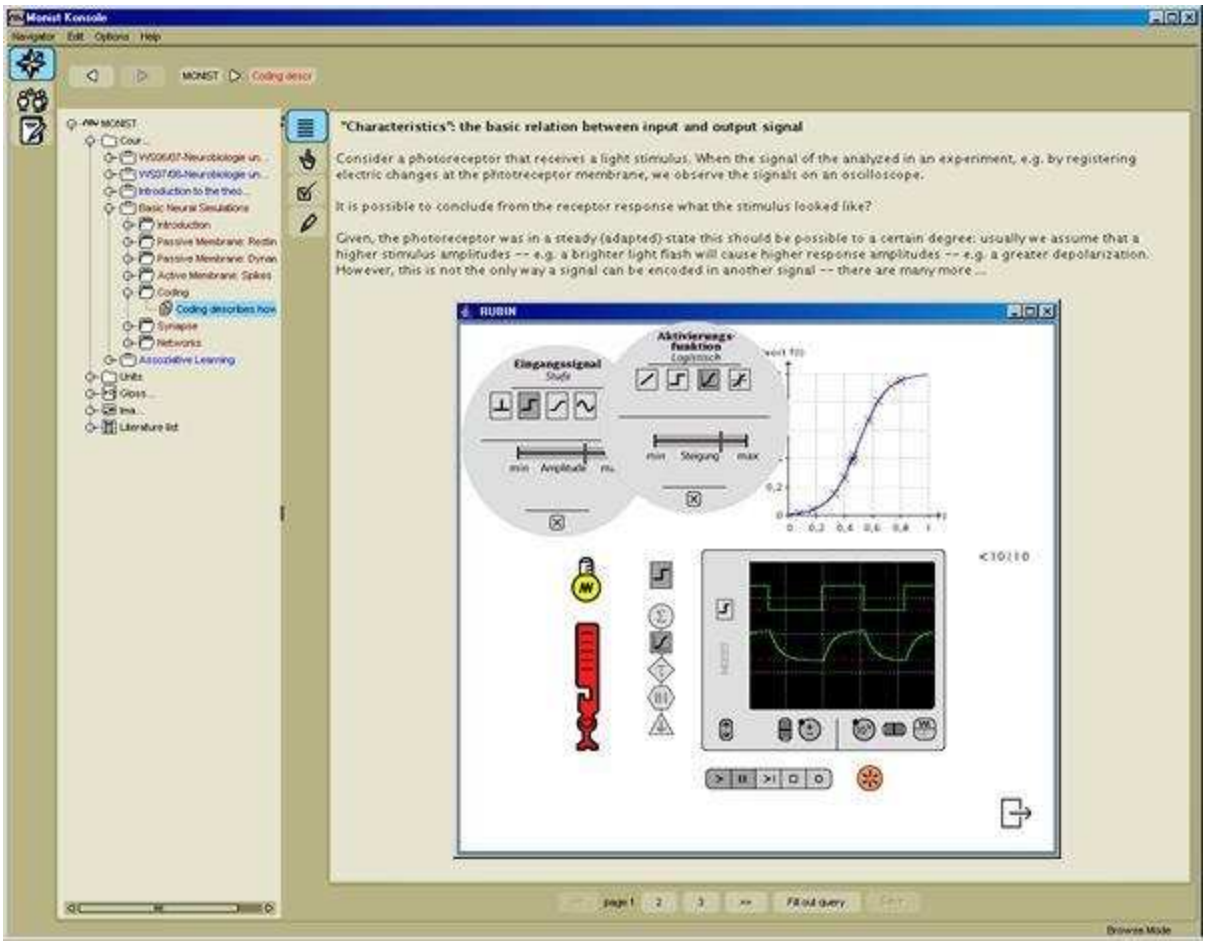

Figure 7: Screenshot of the Monist learning environment. Arbitrary simulation types can be linked within the learning unit, including installation instructions, if needed. Shown is a learning unit including a Rubin simulation on characteristics (window with white background), which can be initialized in the instructions sub-page. In principle, any type of simulation and any simulation tool can be integrated in the Monist learning environment, including those described in this volume. For a list of already used external tools in Monist visit http://www.monist.de/(see also Lorenz, Oesker and Horstmann 2005).

3.5 Example of Interactive Media Integration in Undergraduate Degree Practical Courses

In 2004, the 3rd semester undergraduate course "Neurobiology and Behavior" (currently in German only), has been integrated into the Monist learning environment and since then subsequently been updated. In 2006, the first complete practical course has been held with the help of Monist. Each year, 70 students participate in two parallel groups á 35 students. Organized in three main parts (from neuron to networks – senso-motor systems – behavior) this course is carried out by six academic teachers and several tutors. Students work in small groups (2-3 students per group) and conduct together wet and computer based experiments. Tutors are always present for questions and discussions.

Whereas most of the wet experiments are established experiments for students, the added simulations and other media as well as the contextualization (in the sense of the introduced educational simulations) have been newly designed. Within the complete undergraduate course, the integrative possibilities of Monist have been used extensively. The course includes more than ten different external resources, ranging form external web pages, providing third party educational contents, over the Java applets and the previously introduced educational simulations provided by Rubin to several simulation software packages, like SNNAP (see Av-Ron et al. 2008, this volume) and NeuralSim (including APSim and PSPSim) and environments for virtual behavioral experiments, i.e. Sniffy – the virtual rat.

The course structure is exemplified by the part "From Neuron to Networks", which has been designed by one of the authors. It consists of five learning units with a duration of six hours each. Every single unit combines neurophysiological or psychophysical experiment (including scientific data analysis and spread sheet) and simulations. Each unit is equipped with context information about the neurobiological background as well as the experimental and simulations setups. All texts include glossary entries and literature references. Instructions for all procedural parts of the practical course are provided. Students can perform assignments and tasks and write and send answers directly within the learning unit, including parameter constellations of simulations. Tutors can directly explore the students' results by initializing simulations with the students' parameter set.

Scenario 1 – Analyzing action potentials

This course combines electrophysiological experiments with leeches and model simulations on action potentials with the software package APSim. In the first part, the background of the experiments is explained by detailed contextual information structured as educational unit (see above) and gives

- detailed information on action potentials,
- background information of leech biology and video based information on leech behavior,
- labeled images on leech dissection,
- labeled images of the experimental setup and each experimental step to be conducted by the students,
- information about the type of action potentials to be expected while running experiments.

In the second part, the simulations with APSim follow and provide

- a link to install and start the software package from within the Monist learning environment,
- a detailed general instruction on how to use APSim,
- detailed instructions for three simulations

Solutions found by the students are written down in the assignments box (see fig. 6 and 7), saved as html and send to the tutor. The combination of both, wet experiment and simulation within one learning environment is a typical example of how interactive media can be integrated into the traditional curriculum.

Scenario 2 – Directional Hearing

The second example for integrating interactive media combines a computer based psychophysical experiment (fig. 8) and a simulation (fig. 9) on directional hearing. Both learning units are designed in Monist. Experiments are carried out in groups of two students, firstly making the self-experiment and secondly learning via simulation about general neural network mechanisms that might lead to localization of a sound source. The first part, the self-experiment includes a spread sheet and data analysis whereas the second part is merely for getting an impression of how the system might work.

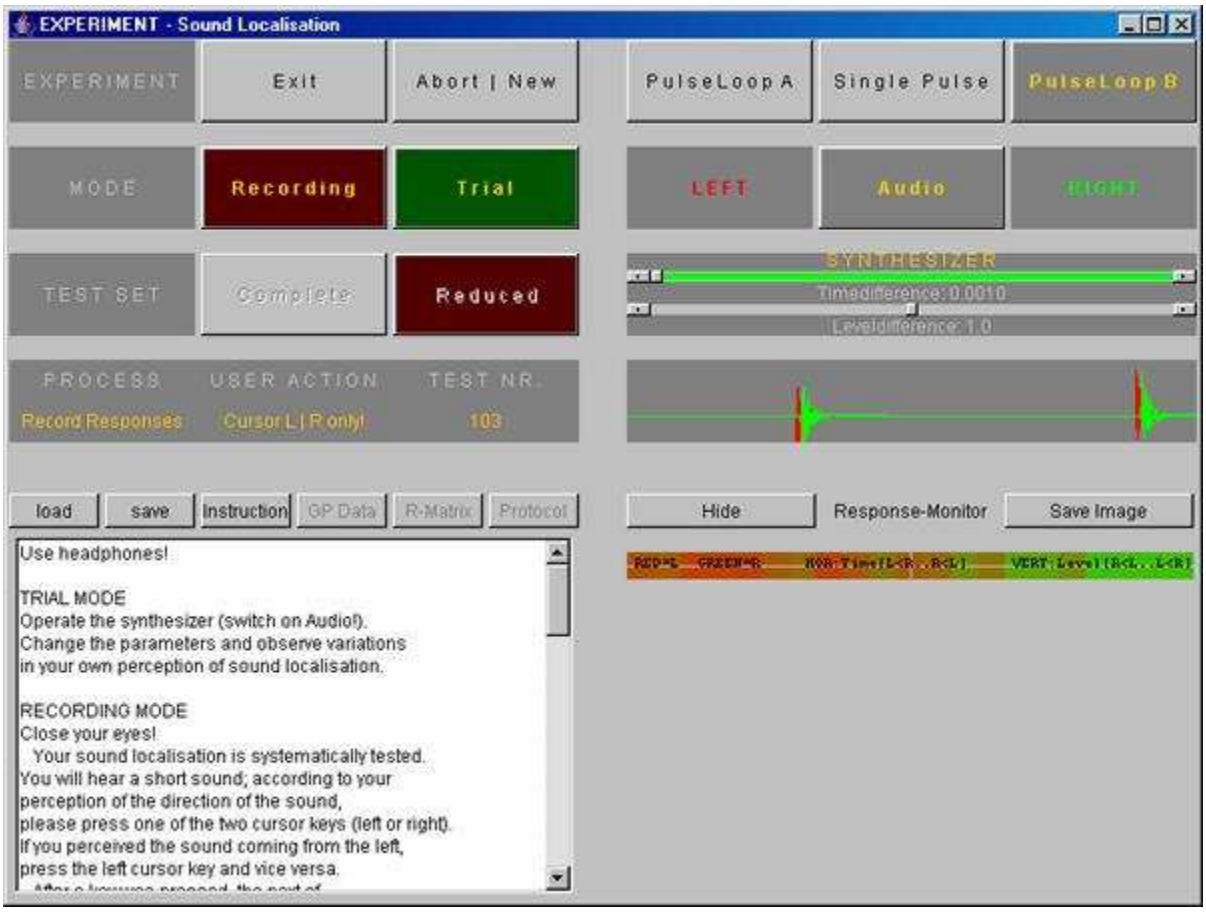

Figure 8: Psychophysical experiment ―directional hearing‖. Students hear single pulses via headphone and have to decide in a "two-alternative-forced-choice", from which direction the sound came. The result (here after 103 single pulses) is shown in colored bar in the right bottom quarter of the screenshot. The upper right quarter shown a trial using PulseLoop B and a strong time difference to the left to demonstrate the construction of sounds by the system (see green and red plots in the time line).

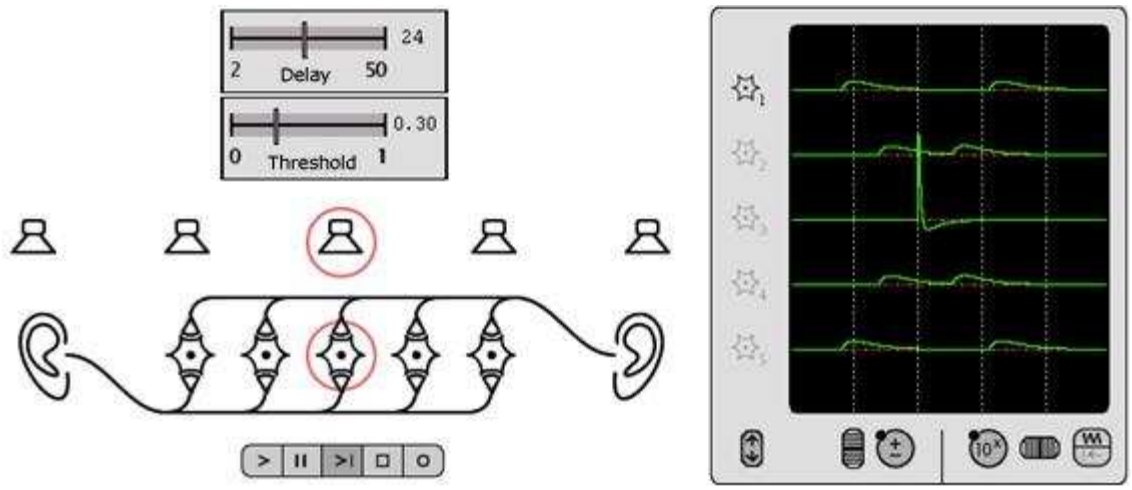

Figure 9 a: Rubin simulation "Directional hearing" – setup with sound sources (activated by mouse click) and a simplified network for sound direction localization. The oscilloscope shows the response line for each of the five neurons. Neuron no.3 has generated an action potential, because both synapses are excited simultaneously if the middle loudspeaker is activated. The simulation can be explored by varying the delay of signal transduction along the 'axon' and by varying the threshold of the neurons (one value for all neurons in this case). Both parameter variations can have the effect of a network dysfunction.

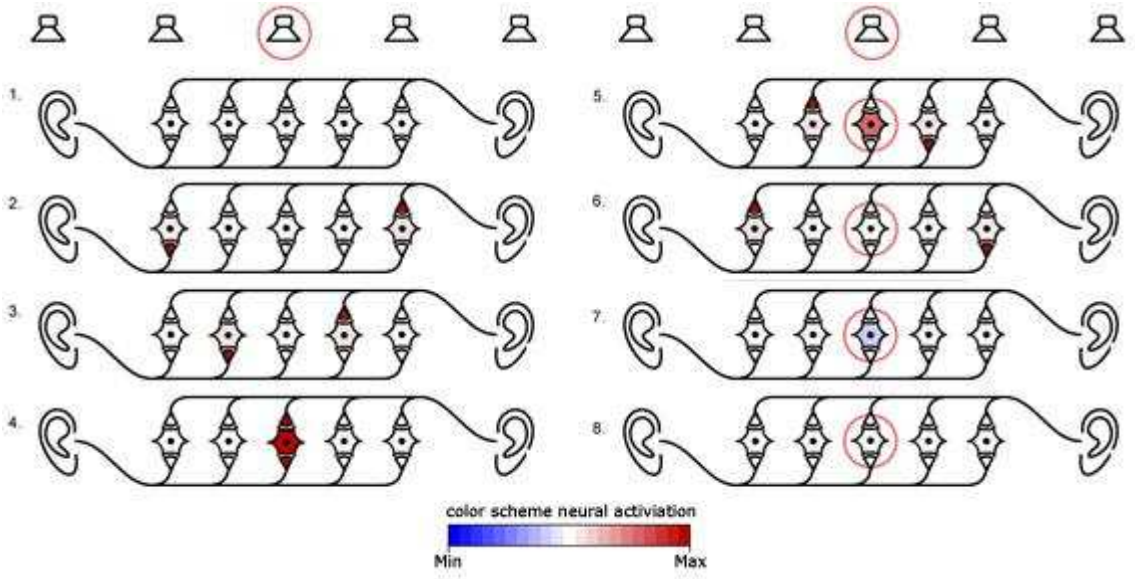

Figure 9 b: Simulation "Directional hearing" - flow of animated model representation (8 time steps). The red circles indicate the stimulus source and the responding neuron, respectively. In contrary to the oscilloscope in figure 9 a), this kind of visualization shows the overall activity distribution of the network (neurons and synapses) in eight time steps. Activity runs from right to left in the upper connection and from left to right in the lower connection, after a sound source has been activated (symbolized by the row of five loud speakers). Step 4-7 additionally illustrate

the action potential progress of the most activated neuron, which network location corresponds to the location of the sound source.

3.6 Example of a Postgraduate Course (Masters Level) Based on Interactive Media

The postgraduate course "Introduction to the theory of neural networks" has a long tradition at Bielefeld University. Organized by Holk Cruse and based on his book Neural Networks as Cybernetic Systems (Cruse 2006), it is targeted to both, students of biology and students of computer science. Originally based on computer simulations from Rumelhart & McClelland (1986), all simulations have been redesigned, mainly based on Rubin simulations and implemented as Java applets. In the first years held with the help of the Rubin system, this course has been integrated into the Monist environment in 2004 and been held since every year. The history of this course is a good practice example for the subsequent transformation of simulations into educational simulations, and the subsequent integration of existing educational simulations into an instructional environment like Monist, providing a broader contextualized course structure.

Until 2000: The first version of the course provided simulations written in C, running on MS-DOS level. They were very easy in appearance, providing a keyboard-based shell interface which forces to subsequently configure the simulation by keyboard (yes/no or number and enter). The data visualization was mainly based on columns of numbers and in some cases on simple plots.

Since 2001: The second version includes the transformation of the simple simulations into the educational simulation framework of Rubin (as described above) and was a major step in re-designing the simulations. As a result, this course is established as the second chapter of the Rubin. On this level, students had access to several new features not available in the first course version:

- A newly established interaction model – user can operate with an easy to use GUI.
- Several different dynamic visualizations of model and simulation data.
- Dynamic visualization and interactive parameter variations in runtime – any change in the configuration of the model is made directly visible without restarting the simulation.
- Guided exploration by model progression – model parameters and functions can be restricted in several steps to guide a systematic exploration of the simulation.
- Contextualization of simulations – each simulation is embedded in theoretical background information (including glossary entries), instructions for simulation exploration and concrete tasks to solve.

Since 2004: The complete course structure has been imported into the Monist environment and context information has been updated. Rubin simulations are embedded as single page simulations that will directly be initialized by an external link. Hence, the educational simulation

structure of the previous version remains, but simulations are embedded as external media. Additionally, this integration has opened the course material for some new Java applets, which had not been part of the course so far. In a further step, the complete course materials have been updated. The integration into the Monist environment was a major step in the curricular integration of the interactive media not only into the structure of this specific course but also as part of the Master program in general. In sum, the new course representation introduces several new features and advantages for learners as well as for authors and teachers:

- Students have integrated access over one login to several courses.
- The Monist communication system can be used for course communication and cooperative learning in addition to face-to-face sessions.
- Updating context information for authors is much easier now than in the previous stand-alone version.
- As an additional special feature of this course, the theoretical foundations of each of 18 educational simulations (taught in an accompanying lecture) are provided by linking into the corresponding sections of Holk Cruse's e-book (2006).
- The course is now part of the Monist repository and not only a stand-alone application.
- Course materials including the simulations have been equipped with appropriate metadata and can easily be shared and re-used by other authors and teachers.
- User access can be regulated by the Monist user rights management.

This course version is the last in a long development from single simulations to the curricular integration of a complete computer based representation of the course, including all course materials. With support of the Monist communication system, this new course design even does allow for blended learning scenarios.

4.0 CONCLUSION

Simulations are one of the most complex interactive media for learning. A consequent integration into the curriculum touches many instructional and technical levels to be taken into account, beginning with the simulation interface and interaction model and ending with the combination of simulations with other traditional learning types for neurosciences, like laboratory experiments. The several presented educational arrangements for integrating simulations in academic teaching of neurosciences revealed new opportunities for learning and teaching. They led to a technical learning environment, which allows for a flexible combination of these variations. Especially the instructional constraints associated with each variation can be implemented and combined with the help of a technical learning environment.

In this context, simulations have been introduced as a method to acquire intuitive knowledge about complex and dynamic systems even for novice students. It has been demonstrated, that

especially novices gain additional impulses for understanding neural systems by using educational simulations. For teachers, educational simulations are a flexible and multi-functional instructional tool. Within the continuum of the scientific simulation approach to the educational simulation approach, an appropriate integration of interactive educational media into a neuroscientific curriculum heavily depends on learning objectives and background knowledge of the target group. Since the scientific simulation approach is relatively easy to implement, further educational enhancements involve much additional effort. Hence, cost-benefit considerations have to be taken into account. To integrate new media into the curriculum always means to invest a lot of additional time, since the production and sustainable integration of electronic educational media is time-consuming. Once established, interactive media may decrease the effort over the years due to more comfortable content updating. It is not suggested that the use of modern educational technology is able to reduce general effort of teachers – but it allows an easier teaching of complex processes, encourages learner-centered educational scenarios and allows for the acquisition of intuitive knowledge. And the use of a learning environment can help to reduce the overall effort and to combine not only several approaches to learning with simulations but also to combine simulation and other interactive media with traditional learning scenarios in neuroscience teaching.

Having gained experience with all educational approaches to simulation, we suggest the 'precompiled simulation approach' in combination with an appropriate learning environment to be the most effective and flexible approach, since it allows both an effective re-use of scientific resources as well as an educational (or instructional) embedding of these resources. A reimplementation of simulations, as done in the Rubin example, can be dropped. Whereas the Monist software has the advantage of consequently supporting the educational simulation framework as well as the integration and re-use of scientific media and tools, it still lacks some basic features of modern learning environments [11]. For all those, who are interested in the combination of complex interactive media, scientific tools, and learning environments, we recommend to evaluate both, the Monist system as well as the standard learning environment provided by your own institution.

5.0 SUMMARY

Exemplified by educational simulations for the neurosciences it has been shown, that the curricular integration of interactive media and tools affects several levels of learning and teaching, ranging from the instructional design and representation of the simulation itself over its embedding in a learning unit to the integration into an e-learning environment and eventually into the structure of an entirely computer based course. Several examples have illustrated possible solutions for each step of the integration process, including the combination of wet experiments and computer based experiments.

The choice of an appropriate simulation approach is critical for a given learning objective. The selected approaches gradually shift the learning objective from doing science with the help of simulations to using simulations as an explanatory learning tool to understand complex and dynamic processes. Employing such a learning tool has strong implications for the required domain knowledge of students and, hence, for their motivation to get in contact with simulations. Especially the educational simulation approach is suitable for the use already in the first

undergraduate semesters, since it aims at students' intuition rather than their interest in modeling. It is an appropriate start into the world of scientific simulation to awaken interest in simulation as a scientific tool, and allows a much broader group of students to get in contact with simulations as easy-to-use learning media.

On the level of integrating course materials into one portal, the use of e-learning environments has proven to be a useful tool not only for learning, but also for integrating different course materials and external resources to a series of learning units. This integration works for all approaches to simulation described and helps to build up a learning repository that allows for re-using, combining and organizing course materials including the re-use of scientific media. The last step of curricular integration is reached by either combining interactive media with traditional experimental setups. This has been demonstrated for action potentials and directional hearing as well as by creating new courses based completely on educational simulations in the context of neural networks.

In sum, it is suggested to use the features of e-learning environments in general to embed existing interactive media, being it simulations or others, into contextualized learning units, including content-related information as well as instructional help and specific tasks. New educational technology provides manifold opportunities not only to create new educational scenarios but to renew traditional settings into the modern technology-driven world of university education.

6.0 TUTOR –MARKED ASSIGNMENT

1(a) Explain the term simulation in your own words.

(b) What are the derivable values of integrating simulations into the teaching of scientific concepts?

2. Write short notes on the following;

- Interactive media
- Simulation Interface and Interaction Model
- The MONIST project
- Educational Simulation Approach

3. What would you regard as challenges for a teacher willing to integrate simulation into his teaching and learning process?

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UNIT I4

OF SOME KEY SCHOOL SUBJECTS

CONTENTS

1.0 INTRODUCTION

It is considered necessary to provide you a good number of case studies of how technology has been integrated into the curricular of some school subjects. With this hand on exposure you would be able to realize the various ways by which media could be properly be integrated into the teaching and learning process.

Again you would note that integration of media into curriculum is not limited by such factors like the discipline, topics and ages of the learners. You are to note from your readings, the factors that determine media inclusiveness/integration into the curriculum.

2.0 OBJECTIVE

After reading this unit, you should be able to:

- Adduce reasons for the integration of technology into the curriculum;
- Compare the similarities and differences in the ways technology is integrated in the curricular of the sciences and the social sciences;
- Discuss the ingredients of media integration into the curriculum

3.0 MAIN CONTENT

3.1 Integrating Technology in specific Program Areas – Science

As teachers plan instruction related to their science program, technology should be incorporated into their lessons. These lessons, ranging from Kindergarten through grade 12, are based on the 5 E model: engagement, exploration, explanation, extension and evaluation. Technology resources can be incorporated as another tool of the student scientist during any portion of a lesson where it may be logically applied and developmentally appropriate. The science classroom experience provides an opportunity for students to use the technology skills they have developed in other classrooms. In Maryland K-8 Outcomes for Science, the skills and processes are identified. A student should use these skills and processes within the context of a science lesson to develop an understanding of the various science concepts. Technology can support a variety of learning experiences in all of these Outcomes, while laying the foundation for knowledge and skills to be developed in the high school science program.

In the High School Core Learning Goals for science, each of the concept areas – Earth/Space Science, Biology, Chemistry and Physics – is connected to Goal 1 ―Skills and Processes‖ and contains specific references to the technology associated with that area. The technology-related Expectations and Indicators in Goal 1 include the following: The student will:

- select appropriate instruments and materials to conduct an investigation.
- develop skills in using laboratory and field equipment to perform investigative techniques.
- learn the use of new instruments and equipment by following instructions in a manual or from oral direction.
- analyze outputs generated by technology such as spreadsheet, graphing and database programs, probe ware on computers and/or graphing calculators.
- use models and/or computer simulations to extend his/her understandings of scientific concepts.
- use computers and/or graphing calculators to perform calculations for tables, graphs and spreadsheets.
- use computers and/or graphing calculators to produce the visuals that will be used for communicating results.

Instructional Examples:

The study of local streams is conducted across all grades and instructional settings. Students in classrooms and Outdoor Education Centers combine the excitement of outdoor exploration, authentic data collection, and scientific inquiry with the use of sophisticated technologies. Using

laptop computers students make onsite observations at the stream and record them for comparison over time. Digital images of the site record changes in biodiversity and erosion. These images also support student writing to inform or persuade. Using probe ware, data is collected on temperature, stream chemistry, and the weather conditions. This data is added to past stream data in spreadsheets to analyze the stream's condition through graphing tools. This data is then compared with the online stream data collected by the National Oceanic and Atmospheric Administration (NOAA). The students record the macro-invertebrates that are found in their stream and take digital images of them for later identification confirmation. If they have difficulty identifying of the macro-invertebrates the scientists at the Department of Natural Resources are available for consultation. The stream observations and data is then shared with other classrooms to obtain a better understanding of our local, state, and national streams. These studies are valuable when considering the impact of impervious surfaces, sediment and chemical runoff, heat island effect, and chemical dumping in local streams.

The virtual frog web site and other virtual dissection sites allow students to manipulate a model and collect data about a particular subject without ever actually touching a real frog. See website: http://www-itg.lbl.gov/ITG.hm.pg.docs/Whole.Frog/Whole.Frog.html

In the physics classroom students often incorporate simulations into their learning experience. As students explore the concepts of physics in amusement parks and then assume different roles in researching and developing a proposal for a new amusement park. When investigating the first law of thermodynamics and conservation of energy, students use simulation software to evaluate the efficiency of heat engines they have constructed and attempt modifications to improve the efficiency. Students then compare their models with each other, analyzing different factors to determine which is the most economical design.

Students in elementary, middle and high school Earth Science classes are working on the Chesapeake Bay from Space program in partnership with the Maryland Space Grant Consortium, NASA, and Towson University. They conduct studies on the impact of impervious surfaces in the Chesapeake Bay region. This study includes the use of Global Positioning Satellite (GPS) units to ground truth impervious surfaces and to learn map reading skills. Students then infuse the study of Land Sat images using NIH Image a free software developed through the National Institutes of Health. They compare change over time in both current images and images from 1973. Geographic Information Systems (GIS) software, an industry standard, is then used to facilitate to analyze the data collected. Information is then shared in a collaboratively across the state. Chesapeake Bay from Space http://chesapeake.towson.edu ESRI in K-12 http://www.esri.com/industries/k-12/index.html

3.2 English Language Arts

English Language Arts (ELA) education has traditionally helped students master the listening, speaking, reading and writing skills requisite for success and active participation in community life. The 1986 English Language Arts Curricular Framework notes that ELA education provides ―the means for universal basic literacy.‖ In today's information-rich society, however, ―universal basic literacy‖ needs redefinition in light of the rapid development of new information and communication technologies. From the use of conventional printed texts to electronic hypertext

on the World Wide Web, from the simple graphics of posters and charts to the dynamic visual language of film, learners engage as creators and receivers of messages. Knowledgeable, reflective, critical and creative participants in contemporary life need to gain access to, respond to, and make strategic use of a whole spectrum of technology and media. Each classroom should have sufficient technologies available for students to routinely use them for one of the following learning activities related to the English Language Arts Core Learning Goals and indicators:

- Composing and editing original texts (word processing).

- Researching (on-line services and CD ROM catalogues).

- Prewriting, drafting, revising, editing and publishing original texts (word processing with appropriate tools, such as spell checkers, dictionary/thesaurus and grammar check).

- Preparing and presenting multimedia presentations and oral texts.

- Locating, retrieving, evaluating and using information from various sources.

- Responding to print and non-print texts.

Second-language programs have many of the same goals. English as a Second Language (ESL) programs provide support and transitional services to linguistically-diverse students who need to improve listening, speaking, reading and writing in their new language, English, in order to succeed in the culture of American schools. ESL programs translate to the above-listed English Language Arts Core Learning Goals. Similarly, foreign language programs for English-speaking students provide the means to develop insight into the nature of language and culture, to connect with other disciplines and to communicate in languages other than English. An important goal of all second-language education is to enable students to participate in multilingual communities at home and around the world. Communication technologies provide such access to the world and its languages.

Instructional Examples:

Students use electronic journals to support the writing process. Students become engaged in collecting, saving and displaying samples of their work using a word processor, camera, scanner and software programs. They plan, organize, and save their work using a storyboard approach. With these tools, students are able to computerize work samples and record personal reflections upon those samples each grading period. The writing skills of students may increase when they have a meaningful audience for their work, which can be found by using e-mail and the Internet. E-mail can be accessed to send letters to businesses and politicians. The Ask an Expert web site can open doors for students to consult with real experts in numerous disciplines on real-life problems and issues. E-mail can also be utilized for peer review and sharing. It is very motivating for students to share their work with other teachers, students, and members of the learning community. The Internet also hosts multiple resources for publishing student work. Students can easily contribute poetry, fiction and non-fiction for publication to a potential worldwide audience.

Acquiring research skills is an essential habit of mind for student success and the Internet and electronic encyclopedias are valuable resources in conducting research. The user can access a wealth of information about nearly any topic imaginable. Much of the information comes from primary sources, a store of knowledge nearly impossible to tap effectively until the advent of the Internet. Students take notes using a word processor as they read the actual diaries of Howard Carter or Elie Wiesel, or as they study ancient cultures and compare them to modern civilization. They utilize valuable Internet resources about life in Egypt, examining hieroglyphics, and reading first-hand accounts by Howard Carter, the archaeologist who discovered the tomb of King Tut. They can compare ancient maps with modern maps. They find and prepare authentic recipes. Throughout this process, students create a multimedia presentation (using Kid Pix, Hyperstudio or PowerPoint) to describe what they have found. Reading across disciplines and providing differentiated reading material is critical.

The Internet provides reading matter such as diaries and other first-hand accounts of important events, discussions of scientific findings and even full copies of important literary works. Students access full text versions of thousands of books on the Project Gutenberg site. It's purpose is to provide full access to the great literary works, including works by Shakespeare, Poe, and Melville, as well as lighter classics like Alice in Wonderland. Additionally, full text versions of important reference books are also provided. http://promo.net/pg/

In reading for literary experience, students in high school study Amy Tan's Joy Luck Club. One group of students uses the Internet to conduct a virtual tour of locations that form the setting of the novel. Students access several Internet sites containing information related to the geography of San Francisco, exploring not only historical and current maps but also real-time and archival photographs. To record and communicate their experiences while ―on tour‖ to fellow class members, students employ presentation software. An extension to this lesson might include employing desktop publishing software to publish a newspaper, travelogue, or brochure or incorporating the presentations into a class website that can be viewed by other teachers and students, as well as parents.

3.3 Mathematics

In the report, Keys to Math Success, released by the Maryland Mathematics Commission in June 2001, there are two recommendations that specifically address technology. They are:

- Ensure that all mathematics students have the appropriate access to calculators, computers, and Internet connections for class work and homework. Teachers shall incorporate the use of such technology into the delivery of mathematics instruction.

- Require that candidates for initial and permanent certification as school administrators and (K-16) mathematics teachers demonstrate computer, calculator, and Internet skills and have the ability and willingness to incorporate technology/multimedia into mathematics instruction.

The vision of the commission is to provide all students and teachers with the opportunity to use technology to support and extend student learning. Students must learn the power of technology

in order to deal with real-life situations. They need to know when and how technology will improve their ability to solve problems. What we teach, how we teach, and the means by which we evaluate the relative success of that teaching and learning are inextricably influenced by technology. Skills and strategies previously not emphasized now need to be stressed (e.g., the increased need to recognize when computation and estimation are most appropriately done using mental, paper and pencil, and/or technology-supported methods, as well as the ability to judge the feasibility of solutions to problems). Instructional use of technology allows teachers to capitalize on the power of visualization and the connections between and among graphic, numeric and symbolic representations (such as when applying the properties of one-,two-, and three-dimensional geometric figures to represent, investigate, model, analyze, solve and evaluate solutions to problems).

Teaching mathematics as an investigative, exploratory subject requires the use of technology. Projects and group explorations that use technology may be added to instructional lessons to help students make connections among the different areas of mathematics as well as content from other disciplines. Technological research tools such as the Internet enable students to collect real-world, up-to-the-minute data, analyze the data, and then to share their findings and conclusions with others. Specifically, students are expected to:

- analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology (such as graphing calculators, spreadsheets and computer software).

- model and interpret real-world situations, using the language of mathematics and appropriate technology (such as graphing calculators, CBLs, spreadsheets and computer software).

- represent and analyze two- and three-dimensional figures using tools and technology (such as interactive software and graphing calculators).

- apply geometric properties and relationships to solve problems using tools and technology (such as interactive software and graphing calculators).

- apply concepts of measurement using tools and technology (such as interactive software and graphing calculators).

- demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communication results, using technology when needed (using graphing calculators, spreadsheets and computer software).

- use transformations to move figures, create designs and/or demonstrate geometric properties.

Instructional Examples:

The Maryland Virtual High School in Science and Mathematics (MVHS), funded under a National Science Foundation Research in Educational Policy and Practice grant, creates and uses dynamic computer modeling to help students reach the expectations of national and state standards in science and mathematics. Student in MVHS schools have collaborated to pinpoint the epicenter of a fictitious earthquake, used the Internet to share data comparing local water quality, and chatted online with Governor Glendening about educational uses of technology. The Internet-based virtual school uses the CoreModels curriculum of graphic modeling and simulation to encourage student investigations, predictions and hypothesis-testing. It also enables teachers to continually improve math and science instruction through peer collaboration In high school, students apply probability and statistical methods for representing and interpreting data and communicating results. They examine the power of natural selection and the relationships between animals and their environment. Teachers participating in the Maryland Technology Consortium (MTC) Fall Institute designed activities for students to look for reasons for bird migration. They complete a simulation about predatory effects on the goose population and collect data supporting their findings. They use this data to create a ―Null Hypothesis‖ chart in a spreadsheet to see if their findings are either correct or unrelated to the actual causes of migration.

See http://www.mcps.k12.md.us/mtlt/institute99/index.html for more information and for access to more than 20 complete science and mathematics lessons using technology. Teachers use a variety of affordable software packages to present mathematics problems in graphic form in which students can actually see the ideas at work. Students in elementary and middle school use Data Explorer to set up and conduct surveys, collect data from the Internet, graph and analyze data, and decide which graph best represents their data. In high school, rather than simply telling a class that the limit of the sine (1/x) as x approaches 0 does not exist since the function oscillates as x approaches zero, a calculus teacher instead enters the function on a Graphing Calculator program. A vivid onscreen image displays the behavior of this function, using what seems like animation. Immediately, the students understand why the sine limit fails to exist. In middle school, students work in cooperative groups to investigate the relationship between degrees Fahrenheit and degrees Celsius. They use the Calculator-based laboratory (CBL), temperature probes, and a graphing calculator. They measure ten different temperatures reading in both degrees Celsius and Fahrenheit for a cup of water and a cup of ice. Students then graph the results on the graphing calculator. Students use the graphs and the room temperature in degrees Fahrenheit to determine the temperature of the room in degrees Celsius.

3.4 Social Studies

Access to computers with Internet and multimedia capability in the classroom, as well as the library media center, provides students with appropriate current materials, including economic and geographic data, necessary to reach the critical thinking levels called for in the Expectations and Indicators of the Social Studies Core Learning Goals. Students can learn to research historical and current situations and events, as well as answers to questions or background on issues. They can also become aware of research methodologies that will assist them in study, work and other informational needs after graduation. These capabilities would also enhance

students' participation in interactive on-line field trips and experiences, such as the Pride of Baltimore program, the Whitbred Race and MayaQuest. Multimedia capability is important not only because it allows teachers to address a variety of learning styles, but also because it provides a vehicle for students, through development of projects and presentation, to demonstrate proficiency in Core Learning Goals and Skills for Success.

The student will:

- construct a historical argument based on research and interpretation.
- create and use visual and mathematical data presented in graphic organizers to gain comprehension in a field of social studies.
- draw upon visual, literary and musical sources to gain historical comprehension.
- use library media resources to access, organize and evaluate information and data from multiple perspectives and from multiple print and non-print sources, both primary and secondary.
- demonstrate ability to use Geographic Information Systems (GIS).
- analyze the influences of technology in the social studies.
- demonstrate the ability to create a multimedia presentation.
- use technology to create graphic representation of data.
- compose and edit original text (word processing).
- understand how to use technology for such civic activities as campaigning and lobbying.

Instructional Examples

Simulation software can be used for problem-solving, analyzing issues and decision making. Software exists that allows students to take the role of foreign policy advisors who must solve a fictional policy issue. They can ―ask‖ experts about the issues consult with the President of the United States and formulate decisions based on these consultations. Students must justify their conclusions in writing, which will increase their ability to write to persuade an audience. Students learn about the rights and responsibilities of American citizenship by accessing the Maryland General Assembly Site. They can see what bills are on the docket and find the e-mail addresses of the legislators in their area. They can have class debates and write letters to the legislators about what they think should be done. This activity could count as part of the community service credit that students must earn to graduate. http://mlis.state.md.us/

Educators attending the Maryland Technology Academy (MTA) as Fellows design activities that integrate technology into their curriculum. In one seventh grade activity synthesized information

from primary source documents found via the Internet from museums and the National Archives and illustrated a Turning Point in History. The topics range from The Voyage of the Mayflower to the invention of the microchip. Students analyze both primary and secondary source. Students then present their video and computer documentaries, display boards, research papers, and dramatic presentations to judges from the community. To view this and additional MTA activities visit: http://www.mdtechacademy.org

Students can take on the role of planners for a town or city. They can access data from the Census Bureau (http://www.census.gov/) such as population statistics by state and county and make predictions about where growth is occurring. Then they can then make an informed decision on how resources should be allocated.

3.5 Physical Education

Physical education is an applied science that requires students to use the processes and principles of science to conduct an ongoing experiment in which they are the subject. Technology devices such as heart rate monitors, body composition machines, blood pressure monitors, and spirometers which interface with computers provide objective biofeedback which allows students to evaluate the effects of physical activity on their own bodies. Computerized exercise equipment allows students to control the variables of time, distance and intensity to determine the effectiveness of their activity programs.

Camcorders combined with appropriate software allow students to apply biomechanical principles to their own movement in analyzing and improving physical skills. Technology allows teachers to vary instruction to meet the different skill and fitness levels of students. A computer with Internet access serves as a daily station in the gymnasium to allow students to:

- obtain and evaluate current physical activity, scientific and consumer information.
- utilize software to determine energy needs and design personal fitness plans.
- download personal biofeedback and biomechanical information into electronic portfolios.
- record, evaluate, monitor and plan improvements in personal goals, personal program plans and data displays of personal progress.
- use biofeedback data to analyze the effects of a variety of physical activities and exercise plans on the systems of the body.
- apply the principles of exercise physiology to the development and continual revision of a personal fitness plan.
- use biomechanical and motor learning principles to analyze and refine personal performance of motor patterns and skills.

- interpret personal biofeedback and biomechanical data and use this information to solve problems and design activity programs to achieve personal goals.

- understand the concepts of aerobic and anaerobic activity.

- obtain, analyze and evaluate physical information, products and services.

- use technology to control the intensity and duration of physical activity to design tests to evaluate their current physiological status and progress.

- describe ways in which technology and medical advances can influence personal health.

- maintain an electronic journal/portfolio of motor learning progress, interpersonal and interpersonal responses to physical activity and physiological changes resulting from physical activity.

- determine the caloric expenditure of various physical activity plans.

- use biofeedback data to critically evaluate motor/fitness status and progress.

Instructional Examples

Students obtain up to date and historical information via the Internet, television, and print media to study, follow, and research the various Winter Olympic events. The students can virtually follow the athlete through their training program as they learn about the exercise physiology and exercise programs. The students then share with the class what they learned about the sport they are following and how it evolved at those particular Olympic Games.

Using a digital cameras or video cameras, students take still pictures of class activities to study body mechanics and the basic rules of sports, games, and activities. These images are imported into a computer, analyzed for correct mechanics, and used to create an informational digital movie on their individual activity. Students can then use information to understand and support their individual fitness program.

3.6 Health Education

Health literacy is the capacity to obtain, interpret and understand health information and services and the capacity to use that information in health-enhancing ways. A health educated person is a critical thinker and problem solver, a self-directed learner and an effective communicator. Computers with Internet access should be incorporated into all health education lessons to provide students with access to current and ever-changing medical information and to allow students to ask specific questions of medical experts and utilize relevant software to analyze and evaluate personal health behaviors. Students are continually asked to set personal goals and apply decision-making processes to real-life situations. Word processing programs, database and publishing programs allow students to maintain electronic journals, monitor progress toward personal goals, convey health information to others and gather and interpret health behavior data.

Camcorders provide self analysis and immediate feedback opportunities as students practice life skills such as communications, refusal skills, decision making and conflict resolution.

As part of the Maryland Learning Outcomes for Health Education the student will:

- demonstrate the ability to evaluate resources from home, school and community and technological sources that provide valid information concerning health issues, services and careers.

- evaluate the validity of health information.
- demonstrate the ability to access school and community health services for self and others.

- evaluate the impact of technology, research and medical advances on personal, family and community health.

- evaluate the effectiveness of communication methods for expressing accurate health information.

- demonstrate the ability to analyze and adapt health messages and communication techniques to the characteristics of a particular audience.

Instructional Examples

Students study their favorite menu items from a fast food restaurant on the Internet to obtain the fat grams and calories and compare this to their daily-recommended allowance. They subtract their fast food calories and fat grams from the recommended calories and fat grams to find out how many calories and fat grams they have left to eat after eating just ONE fast food meal. Fast Food Quest: http://www.cyberdiet.com/ffg/index.html

This site provides the number of calories and fat grams for each food item from the various fast food restaurants. Nutrition Profile: http://www.cyberdiet.com/profile/profile.html

Students enter their basic body information including weight, height, and age to receive their daily-recommended number of calories and fat grams. Students working in small groups use the Internet to research communicable or non-communicable diseases. The students can locate historical information, current patterns, and future predictions for each disease. For example the students would use the following website to gather information:
Center for Disease Control and Prevention: http://www.cdc.gov/

The media influences people‘s opinions and how society views some drugs. The students learn about media literacy, research a particular drug, and the influence the media has on public opinion. The students examine their findings as a critical thinker and consumer of information. The student‘s share their information with the class about a particular drug, and include a movie or play a song that involves that drug.

3.7 Library Media

School library media programs are recognized as integral to student achievement because they provide all students and staff members with equal and timely access to ideas and information. Through an integrated instructional program, school library media specialists ensure that their students are effective users of ideas and information. The library media specialist also provides guidance to teachers in the application of technology and in the implementation of information literacy skills, using state and national standards as a basis. The national standards published jointly by The American Association of School Librarians and the Association for Educational Communications and Technology, Information Power, Building Partnerships for Learning and Information Literacy Standards for Student Learning, are nationally recognized as an excellent foundation for student learning in all curricular areas. Through the Maryland Information Literacy Standards, the library media program helps students to make real world connections in the application of information technologies to become information literate, independent learners and socially responsible citizens.

With the Information Literacy Standards, students will demonstrate the ability to:

- locate and use information resources, equipment, and other technologies.
- review, evaluate and select materials for an identified information need.
- learn and apply reading, research and critical thinking skills to organize information.
- comprehend content in various types of media.
- retrieve and manage information.
- demonstrate an appreciation for all types of literature and other creative expressions as sources of information and recreation.
- create materials in various formats.
- apply ethical behavior to the use of information.

Instructional Examples

The study of Maryland is conducted in all fourth grade Social Studies classes throughout the state. The purpose of this unit is to introduce students to the state in which they live and to provide them with an understanding of Maryland yesterday and today. One of the objectives is for students to be able to identify the regions of Maryland and their vast economic and geographic characteristics. To further their understanding, students will work with the library media specialist in conducting research (using print, non-print, online resources and a word processing program) to create a travel brochure persuading visitors to visit the unique regions of Maryland. All students will demonstrate the ability to locate and use information resources, equipment, and other technologies, e.g. SAILOR, the Internet, and on-line information databases, by using the on-line public access catalog (electronic card catalog) to locate resources needed for a class assignment. After locating these resources, the student will then review and evaluate them to determine if they are the best resource to use for the assignment.

Students learn the stock market by participating in a nationwide stock market game. They realize in order to participate, they have to have knowledge of the ―ends and outs‖ of the market. This includes the change in value and keeping track of the its increases as well as decreases. They

decide in order to be successful at this game, they will first have to research the company they plan to purchase stock from, and then to read stock reports on a daily basis. After completing this research, they will track their findings in a spreadsheet program.

A 9th grade health class is researching the various diseases that have plagued the world. In conducting their research, they learn that print resources and the Internet are not ―created equal.‖ Information contained in books and on the Internet must be evaluated for its accuracy and authenticity by checking the credentials of the authors and their sources of information. In completing an assignment about immigration, third students research information about the countries of their ancestors. They find information in a variety of resources, e.g. books, on-line and/or CD-ROM encyclopedias, and the Internet, and struggle to put the information in their own words. They have learned, however, that copying word for word from a source or printing it out to submit as their own work is wrong.

3.8 Fine Arts

Each of the fine arts disciplines (dance, music, theater and visual arts) is fundamental to human existence and pervades all aspects of life. The Essential Learner Outcomes for the Fine Arts, approved by the State Board of Education in October 1997, encompass several theoretical stances that contribute to the learner's understanding of arts content, processes and skills. The outcomes include a wealth of possibilities for making connections among the disciplines and the development of fine arts skills, creativity and aesthetic judgment within disciplines. These areas of focus are addressed within the context of a rich historical and cultural heritage. The outcomes encourage the exploration of contemporary technologies that significantly affect how the arts and humanities are produced and received and how they influence teaching, learning, perception and communication processes.

Fine arts classrooms should have sufficient technologies available for students and teachers to use them routinely for the following learning and assessment activities related to the Essential Learner Outcomes for the Fine Arts:

- gaining access to computer catalogs to find plays and other dramatic texts.
- using the Internet to study current reviews of artistic performances, playwrights, composers and artists.
- studying the images, artifacts and sounds included in major collections of world art.
- creating works of art.
- establishing process portfolios.
- documenting personal creative efforts over time.

Technologically-rich fine arts education environments enable instructors to make frequent use of the Internet and other current technologies. They provide exciting laboratory experiences for students, enabling them to:

- create, edit and preserve original works of art.

- experience world collections of artistic images, sounds and texts.

- explore an enormous range of career opportunities made possible through enlightened encounters that include creating, performing and responding to the arts.

Instructional Examples

In the arts, students use technology tools to compose and arrange music. Students working individually or as a group identify and experiment with non-traditional sources of musical sound utilizing sound generating and sequencing software. Students studying theatre use technology to create visual images, design scenery, control lighting in theatrical productions, and design dance sequences. Students also use the Internet to explore styles of architecture from various periods and cultures and compare those styles to theatrical stage design, script writing style, and acting methods of past eras. The students then compare contemporary dramatic literature and performance styles with new theatre facilities.

In art class students visit a museum on the Internet for a virtual tour of the exhibits. Students have access to museums around the world to view single artists or groups of artwork selected to express a theme. Students then determine and discuss the criteria used in selecting and arranging the exhibition
.

3.9 Early Learning

Every pre-kindergarten to third-grade student has daily access in classroom and lab settings to state-of-the-art technology, including software, hardware, multimedia and communication tools. Young learners will be able to use technology to develop necessary social, cognitive and physical skills and construct meaning through the exploration and application of a variety of interactive materials. Through telecommunications, including e-mail and Internet, student learning extends to the world beyond the classroom. Young learners begin to make decisions about the quality and appropriateness of information provided through technology and how it may be used. The technology addresses multiple learning styles, accommodations and adaptations, and it supports a variety of learning strategies such as cooperative learning and student-directed learning. Students will demonstrate abilities:

- in the basic operation and concepts for effectively using technology.

- to use technology tools such as word processing, database, spreadsheet, content specific software, telecommunications and multimedia.

- to search for information and communicate long-distance.

- to read, write, edit text, solve math problems, apply scientific methods, learn about their environment and other cultures, and pursue the fine arts.

- to obtain and use information from a variety of teacher-guided and rapidly changing sources (e.g., e-mail, website).
- to work cooperatively with peers when using technology.

- to take care of technology and use it in a responsible way.

Instructional Examples

In an elementary classroom a teacher demonstrates and models a group writing activity using a computer and a projection device. Then working individually or in a shared writing experience young learners write about an assigned topic. They compose at the keyboard for easy revision and editing as they work. Graphics and digital images are easily incorporated into the writing piece for support. Students use the text to speech feature in word processing programs to hear what they have written. Peer editing further enhances the students writing skills in a cooperative learning environment.

An early childhood literacy project uses technology to increase reading and writing achievement. The writing process is introduced as early as kindergarten and students can use word processors to draft stories and reports. The use of ―Key-Pals,‖ pen pals who communicate via computer, is an essential part of the writing process. Students communicate with peers in another school, sharing and editing writing. The project involves teachers, library media specialists, reading specialists, and instructional assistants in the development, planning and delivery of technology supported reading and writing. Their web site provides valuable resources for the primary teacher. http://www.mcps.k12.md.us/curriculum/littlekids/

Career and Technology Education

Career and technology education (CTE) prepares students for further education, careers and lifelong learning through academic instruction, career development, technical skills development and work-based learning. Career and technology education instructional programs incorporate different forms of technology currently utilized in business and industry to ensure that students understand and evaluate the uses of current technologies for a variety of purposes and situations. These skills are designed to add value to the students overall education program. The student will:

- identify and use resources and strategies for keeping abreast of advances in technologies.

- identify and describe current technologies used to meet a variety of needs, including obtaining and managing information, communicating, performing work and solving problems in a variety of situations.

- evaluate the uses of current technologies in specific situations.

- identify needs not being met by current technologies and emerging technological solutions that may meet those needs.

- use technologies safely, effectively, legally and ethically.

- use appropriate technologies to obtain, store, manage analyze and convey information.
- use appropriate technologies for research, creatively and problem solving.

- monitor, evaluate and plan to improve personal uses of technologies.

- analyze and evaluate the effects of technologies on individuals, society and the environment.

3.10 Technology Education

Technology education is an integrated, experienced-based instructional program designed for citizens who are knowledgeable about technology—its evolution systems, techniques, uses and social and cultural significance. It allows the application of mathematics and science concepts in technology systems. Students discover, create, and solve problems by using a variety of tools, machines, materials, processes and computer systems. The Maryland curricular framework for technology education identifies the technology-based outcomes for students enrolled in technology education to ensure that students will:

- demonstrate knowledge and skills regarding diverse technology systems, including their functioning and applications.

- demonstrate knowledge of the nature of technology, and the relationships and impacts among technological achievement, the environment, the advancement of science, the individual, and society. The contexts for this knowledge shall be historical, current and futuristic.

- demonstrate the ability to solve problems with technology using a systems approach, higher-order thinking skills, individual and collaborative ingenuity, and a variety of resources including information, tools and materials.

- make ethical decisions about technological issues, including the development and use of technology and technology resources.

- demonstrate in an experiential setting the safe, effective and creative use of technology resources – including tools, machines and materials – in carrying out technological processes.

- apply science and mathematics, language arts, social studies and technological concepts to solve practical problems and extend human capabilities.

- apply knowledge of – and perform tasks representative of – technology-based careers, including engineers, technologists, technicians and crafts-persons.

- recognize the multicultural and gender diversity included in past, present and future uses of technology.

3.11 Implications for Nigeria

The implications of the above case studies should be considered. In the first instance as County, there is a need for us to put in place a policy of technology integration at the school level. In addition we also need to insecure proper monitoring of the quality of teaching in our various schools. Education supervisors need be told of the value to be attached to media integration. School administrators must insure that needed and required technologies are available. Government on its part must ensure that teachers are encouraged to integrate media into their teaching activities. On the job workshops and seminars at regular intervals should be organized for the teachers and the school managers to improve their knowledge of media and their usage.

4.0 CONCLUSION

It has been clearly demonstrated that the need to integrate media into the curriculum is one that is not negotiable. Media integration can be done in a variety of ways to appeal to the various academic disciplines. As much as possible teachers should consider such issues like age, topic, environment, media availability, methods, flexibility, cost, and technical know how in their efforts at integrating media for effective results.

5.0 SUMMARY

In this Unit, we have read about how media have been successfully integrated in the teaching of some key school subjects in some developed countries. Attempts have been made to showcase examples in such disciplines like the sciences, health education, mathematics, social studies, early childhood education among others. The implications of the foreign experience to the integration of media/technology in Nigeria were explored.

6.0 TUTOR –MARKED ASSIGNMENT.

1. Media integration is no respecter of any academic discipline. Do you agree?

2. What roles would you ascribe to the teacher, students and technicians in media integration and utilization?

3. How prepared is Nigerian teachers in media integration of classroom teaching?

7.0 REFERENCES/FURTHER READINGS

http://www-itg.lbl.gov/ITG.hm.pg.docs/Whole.Frog/Whole.Frog.html
http://www.mcps.k12.md.us/curriculum/littlekids/

http://www.cdc.gov/
http://www.cyberdiet.com/profile/profile.html
http://www.cyberdiet.com/ffg/index.htmls
http://www.census.gov/
http://www.mdtechacademy.org
http://mlis.state.md.us/
http://www.mcps.k12.md.us/mtlt/institute99/index.html
http://promo.net/pg/
http://www-itg.lbl.gov/ITG.hm.pg.docs/Whole.Frog/Whole.Frog.html

UNIT I5 CASE STUDIES OF MEDIA INTEGRATION INTO THE TEACHING OF SOME KEY SCHOOL SUBJECTS - NOUN's EXPERIENCE

CONTENTS

1.0 INTRODUCTION

In this unit, we will discuss the integration of media into instructional delivery to the learners using the National Open University of Nigeria (NOUN) as a case study.

2.0 OBJECTIVES

At the end of this unit, you should be able to discuss the integration of media into the instructional delivery to learners in the National Open University of Nigeria.

3.0 MAIN CONTENT

3.1 Technical Requirements

Production of course materials, learning aids and other student support materials acquired or developed in-house will be centrally undertaken at the REPRODAhq centre and delivered in various formats and through various channels to the study centres for onward distribution to the students. The choice of format and/or delivery channel will be based on student's preferred learning styles and the facilities, which they can access in their various locations. The different delivery formats shall include:

- Printed materials
- Audiotapes
- Videotapes
- CD ROMs
- Online multimedia interactive and non-interactive presentations
- Direct TV and radio broadcasts

The different delivery channels shall include:

- Physical transportation of hard copy materials (printed materials, audio and videotapes, CD ROMs) by courier companies, NIPOST and/or in-house transport division.
- Electronic transmission of materials in multimedia (voice, data, graphics, video) over fixed line (telephone or leased lines), terrestrial and VSAT wireless communication systems.
- Television and radio broadcast of educational programmes.

The delivery infrastructure will have a star topology with the REPRODAhq as the central hub and the study centres acting as nodes. The link between the hub and the nodes could either be the Intranet/WAN, Television and Radio broadcast or physical transportation of hardcopy materials. This is further explained below.

3.1.1 The REPRODAQhq

The REPRODAhq, which shall be located in Lagos, will be the central hub/gateway for the production, storage and distribution of learning materials in multiple media formats. It will be an aggregation of educational resources for sharing and distribution purposes. The key functions of REPRODAhq and the services it will offer include (as shown in figure 2):

- Academic services
- Content authoring
- Central multimedia content repository/database
- e-Learning/web-based learning solutions
- Learning management system
- User interface
- Communication tools (mail, chat, forums, instant messaging)
- Secure internet access
- Access to the National Virtual Library
- Data collection, display and analysis
- Directory services
- Testing and certification
- Network management

Also, production and editing facilities will be installed at the REPRODAhq to produce, convert and edit multimedia content for multi-channel delivery. Delivery platforms will include:

- Live audio and video unicast, multicast and broadcast
- Video and audio on-demand
- Text and graphics
- CD-ROMs
- Audio and video tapes
- Printed materials

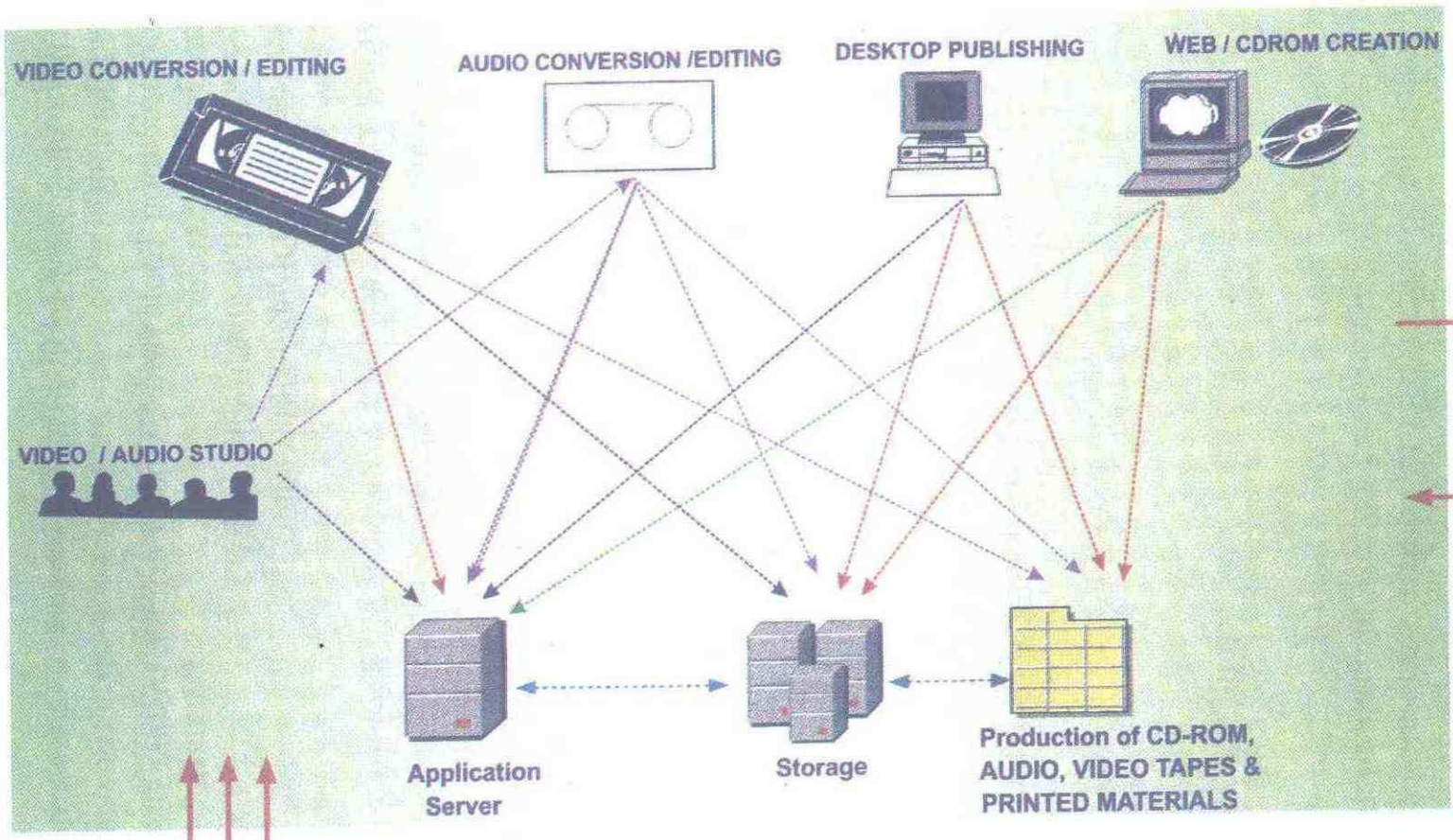
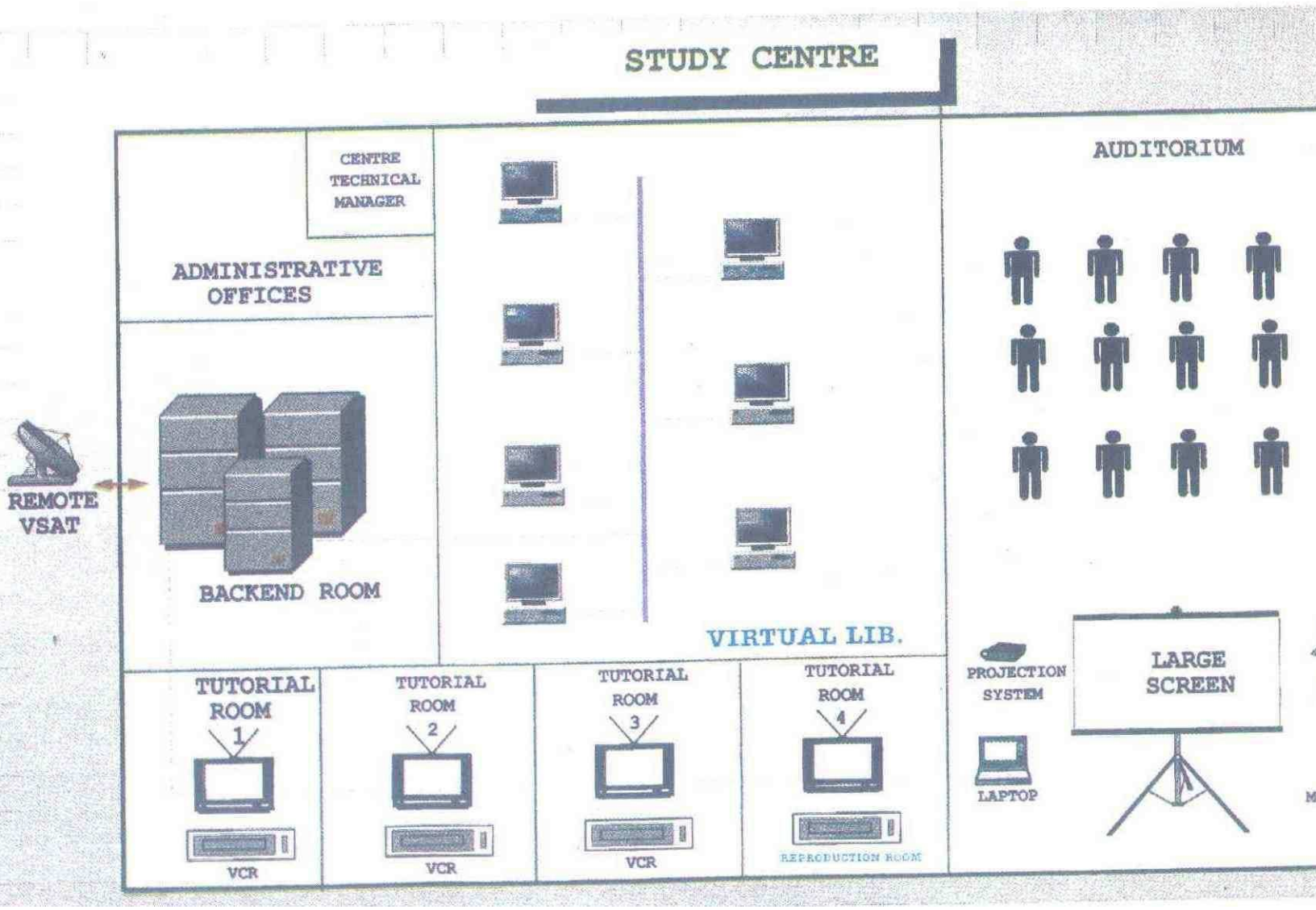
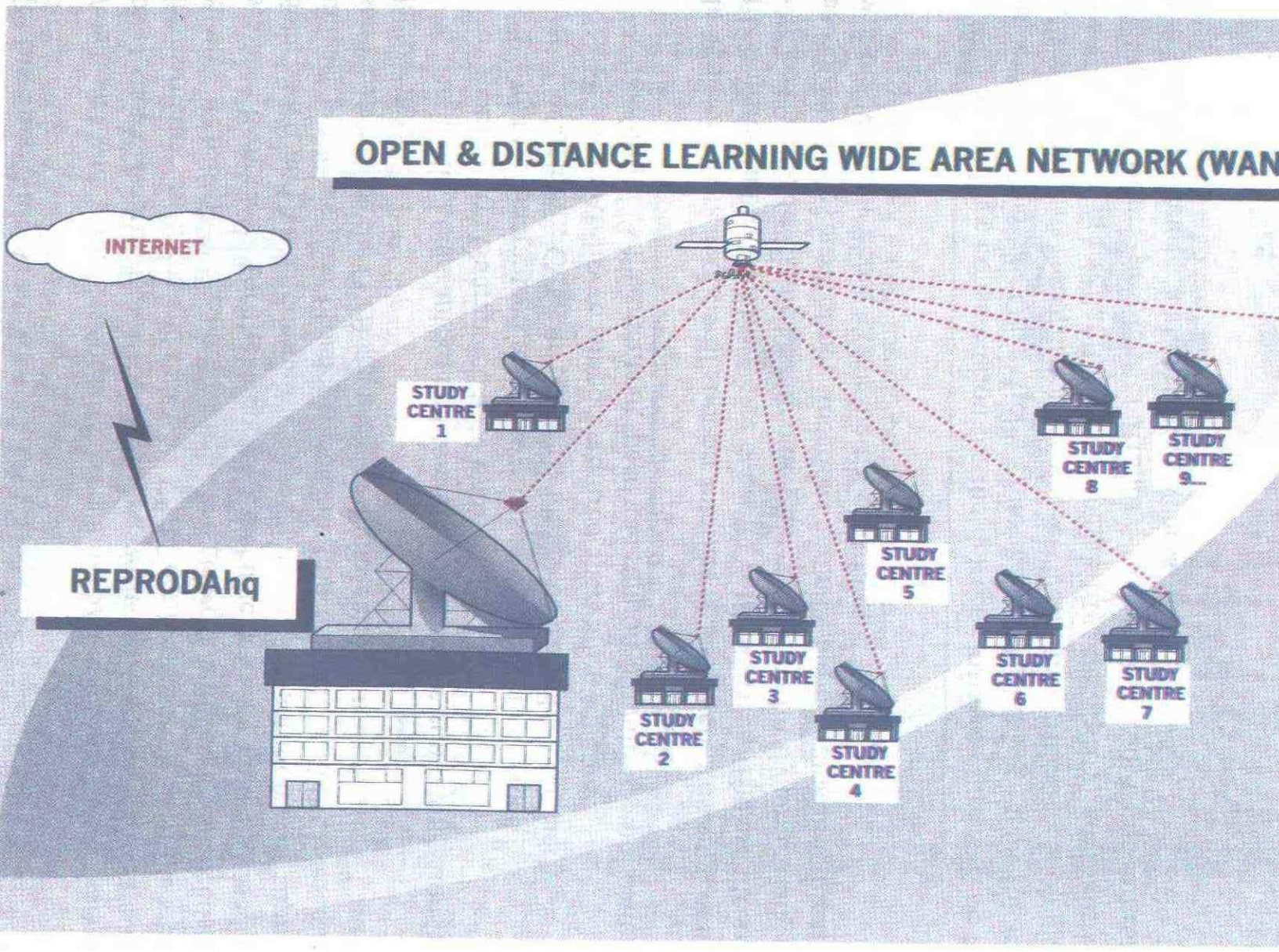

REPROSITORY, PRODUCTION, DISTRIBUTION &
ADMINISTRATION HEADQUARTERS (REPRODAhq)
VIDEO CONVERSION / EDITING
AUDIO CONVERSION /EDITING
DESKTOP PUBLISHING
WEB / CDROM CREATION
VIDEO / AUDIO STUDIO
Application
Server
Storage
Production of CD-ROM,
AUDIO, VIDEO TAPES &
PRINTED MATERIALS
Instructional Material
Course Contentts
Syllabus / Curriculum

Figure 2


STUDY CENTRE
CENTRE TECHNICAL MANAGER
ADMINISTRATIVE OFFICES
AUDITORIUM
REMOTE VSAT
BACKEND ROOM
VIRTUAL LIB.
TUTORIAL ROOM 1
TUTORIAL ROOM 2
TUTORIAL ROOM 3
TUTORIAL ROOM 4
VCR
VCR
VCR
REPRODUCTION ROOM
PROJECTION SYSTEM
LAPTOP
LARGE SCREEN


OPEN & DISTANCE LEARNING WIDE AREA NETWORK (WAN
INTERNET
REPRODAhq
STUDY CENTRE 1
STUDY CENTRE 2
STUDY CENTRE 3
STUDY CENTRE 4
STUDY CENTRE 5
STUDY CENTRE 6
STUDY CENTRE 7
STUDY CENTRE 8
STUDY CENTRE 9...

Learning materials can thus be delivered over the IP-based network, broadcasted on television or radio or physically transported to the study centres by courier services. The REPRODAhq is illustrated in figure 2 above.

3.1.2 Study Centres

The study centres, which will be located as shown in Table 1, will have Local Area Networks (LAN) with a minimum of 20 computers. The LANs will be connected to the REPRODAhq through the Wide Area Network (WAN) and will allow for the following activities:

- Training and learning
- Assessment and testing
- Interactive sessions
- Communications (email, chat, forums, instant messaging, file transfer)
- Internet access
- Access to the National Virtual Library
- Other computer applications (word processing, spreadsheets, database, etc.)

In addition, each study centre will be equipped with equipment for the viewing, playback, audio and video conferencing and other systems required to create virtual classrooms, rich and compelling multimedia presentations and memorable learning experiences. These will be installed in a large auditorium capable of sitting up to 300 students and other adjoining rooms used for smaller classes and tutorials. The equipments will also be interfaced with the LAN and the WAN. Figure 3 above further illustrates the study centre concept.

3.1.3 Intranet/Wide Area Network (WAN)

A national Wide Area Network (WAN) using VSAT solution for the delivery of Distance Learning will be deployed with the Central Hub/Gateway infrastructure in Lagos and two-way VSAT equipment in each of the study centres. This is illustrated in figure 4 above. The network will be a high speed and scalable IP network for the support of distance learning content based on data, video and voice communication delivery. The solution will support unicast, multicast and broadcast transmission as well as fully interactive services based on the DVB standard for digital satellite transmission. Critical factors are:

- Reliability: Guaranteed end-to-end uptime on the communication link
- Availability: Guaranteed 95% uptime
- Quality: Guaranteed response times and BER performance
- Throughput: Guaranteed bandwidth to be available constantly
- Security: Ability to support required encryption schemes
- Flexibility: Adjustments in speed and support of multiple application.

In addition, the network will support Internet access, web browsing, email, file transfer and toll quality Voice over IP (VoIP) services. The architecture will be open and flexible among other things to allow for dynamic ramp up and quick deployment of new locations and new applications/functionality without worrying about technological constraints.

A key technology consideration for the delivery infrastructure will be the use of Open Standards, Open Architecture and standardization on the Internet (IP) platform for its video, data and voice services. Other critical technological considerations are reliability, interoperability, flexibility, adaptability, scalability, future-proof, user-friendly, ruggedness requiring minimal maintenance, security and cost effectiveness.

3.2 Integration of other Support Services

Some existing government-owned infrastructural facilities have been identified which are strategic and will be of immense benefit to the National Open University of Nigeria and the Open and Distance Learning programme in general. These include the NTA Educational Unit in Tejuosho, Lagos, which has highly sophisticated, state-of-the-art facilities for the mass production of educational audio and videotapes as well as production of educational programmes for broadcast purposes. There is the National Educational Technology Centre (NETC) in Kaduna which harbours some not too up to date equipment but is staff by well trained personnel that can be deployed to the Disance Learning Programme.

It is therefore proposed that these two national assets, with their human and material resources, which are currently underutilized, should be ceded to the NOUN for maximum utilisation.

In addition to the many advantages of this arrangement, the REPRODAhq centre which is central to the production, distribution and delivery of instructional materials in the various formats described above will be located at the NTA Educational Unit, which is ideal and in a near-ready state to accommodate this arrangement.

Furthermore, the NTA Educational Unit will be used to support the production and nationwide transmission of educational radio and television programmes in conjunction with the NTA, FRCN, State and Private broadcasting stations. This will be particularly useful for the students that live a considerable distance from the study centres who may not always have the opportunity to visit the study centres.

4.0 CONCLUSION

We have discussed the integration of media into instructional delivery to the learners using the National Open University of Nigeria (NOUN) as a case study. We have specifically mentioned the various strategies through which instructional delivery made available to learners.

5.0 SUMMARY

In this unit, we have discussed the technical requirements of integrating media into instructional delivery to the learners in the National Open University of Nigeria (NOUN).

We mentioned REPRODAhq, study centres and intranet/Wide Area Networks as some of the media through instructional delivery are made to the learners.

6.0 TUTOR-MARKED ASSIGNMENT

1. Do a critique of the National Open University of Nigeria media/technology mix plan.

2. Write short notes on the following:

   (a) Wide Area Network (WAN)
   (b) Intranet instructional delivery
   (c) Mix-mode delivery strategies

3. Why has NOUN adopted the three items in question 2 above.

7.0 REFERENCES/FURTHER READINGS

NOUN (2002). Blueprint for Open and Distance Learning Programme in Nigeria and the establishment of the National Open University of Nigeria.