

CHAPTER - IV

**DEVELOPMENT OF
MULTIMEDIA INSTRUCTIONAL PACKAGE**

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IV.1. INTRODUCTION

Multimedia Instructional Package is composed of several media. The N.C.E.R.T. included media like television, and radio in a well-knit package for training of primary teachers in teaching science and extended to large number of teachers in 1975-1976. Video communication was found useful in explaining. One may say that the movement of Educational Technology is multimedia based today. We should know-what is media ?

IV.2. MEDIA - Meaning, characteristics and classifications.

IV.2.1. Meaning of Media

Instructional media are electrochemical devices which act as middle conditions between student and what he is to learn. An instructional medium is simply means of transmitting instruction. What passes through the channel is the substance of Instruction.

According to 'Wittich and Schuller' the term 'audio-visual material', 'instructional material' and 'educational media' are synonymous. The term media includes all the three terms. Media thus refers to filmstrips, slide, recordings, charts, pictures, printed material etc.

(Wittich and Schuller 1973)



IV.2.2. Classification of Media

According to the various characteristics media can be classified into the following main categories.

MEDIA CLASSIFIED ACCORDING TO THE RECEIVING CHANNEL.

(Kulkarni S.S. 1986)

A) AUDIO MEDIA

- i) Voice (of any human sender of the message).
- ii) Gramophone records.
- iii) Audio Tapes can be used in Tape-recorder.
- iv) Stereo records.
- v) Radio.
- vi) Telephonic conversations.

B) VISUAL (VERBAL PRINT) OR DUPLICATE MEDIA

- i) Textbooks, supplementary books.
- ii) Reference books, encyclopaedia.
- iii) Magazines, newspapers etc.
- iv) Documents, clipping from published material.
- v) Duplicated written material.

C) VISUAL (NON PROJECTED, TWO DIMENSIONAL) MEDIA

- 1) Messages/pictures on roll-up board and other boards.
 - (i) Flat pictures, cutouts, flannel board material.
 - (ii) Maps.
 - (iii) Posters, charts, graphs etc.
 - (iv) Cartoons, comics etc.

D) VISUAL (NON-PROJECTED; THREE DIMENSIONAL MEDIA)

- i) Model, mock-up, display materials.
- ii) Dioramas.
- iii) Globes and maps.
- iv) Specimens.
- v) Puppets.

E) VISUAL (PROJECTED STILL) MEDIA

- i) Slides.
- ii) Filmstrips.
- iii) Overhead Transparencies.
- iv) Micro image system - Micro film, Microcard, Micro-fiche.

F) AUDIOVISUAL (PROJECTED-MOTION) MEDIA

- i) Film.
- ii) Television.

- iii) Closed circuit television.
- iv) Video cassettes.

G) REAL OR SIMULATED ENVIRONMENT (BOTH TIME AND SPACE DIMENSION)

- i) Laboratory.
- ii) Workshop.
- iii) Demonstration plots, animal zoo, etc.

H) SMALL GROUP OF PERSONS

- i) Group Discussions, Seminar.
- ii) Role plays.
- iii) Dramas.
- iv) Games and Simulation Exercises.

I) NEW EMERGING MEDIA

- i) Tele-conferencing
(group discussion through telephones)
- ii) Cable television.
- iii) Satellite television.
- iv) Computer Networking.
- v) Mini computers, micro-computers, processors.

IV.2.3 Hardware and Software Media

Hardware is the equipment through which many software materials, messages, can be presented. A film projector is a

hardware, a film or message is software. The chalk-board is the hardware, the message written on it is the soft-ware. The media are listed in the chart IV.2 provides a list of equipment hardware media and the software.

Table IV.1
HARDWARE AND SOFTWARE MEDIA

MEDIA	HARDWARE (EQUIPMENT)	SOFTWARE
A) <u>Audio</u>	i) Throat of a person	Voice
	ii) Gramophone	Gramophone records
	iii) Taperecorder	Audio-tapes
	iv) Stereo system	Stereo-records/Tapes
	v) Radio set	Radio programme
	vi) Telephone system	Telephonic conversations
B) <u>Visual-print</u>	No special equipment except the eyes of the reader for printed materials but printing machinery and paper to produce the materials.	Printed matter.
C) <u>Visual</u> <u>(Non projected</u> <u>two dimension-</u> <u>nal)</u>	i) Chalk board roll up board	Message/pictures
	ii) Flannel board magnetic board plastigraph	Flat pictures cut-outs, flannel board materials and other adhesives.

MEDIA	HARDWARE (EQUIPMENT)	SOFTWARE
	iii) School-wall and other display places	map-message.
D) <u>Visual</u> <u>(Non-projected</u> <u>three dimen-</u> <u>sional)</u>	1) Display space (Tables, showcases etc.)	models, mock-up display materials
	ii) Glass cupboards or such storing space	globes, specimen puppets
E) <u>Visual</u> <u>(Projected still)</u>	i) Slide projector	Slides
	ii) Filmstrip projector	Filmstrips
	iii) Overhead projector	Overhead projector transparencies.
	iv) Micro-image system micro-reader etc.	Microfilms, microcards, etc.
	v) Epidiascope/ opaque projector	Printed material, slides, filmstrips.
F) <u>Visual</u> <u>(Projected</u> <u>motion)</u>	i) Film projector (8mm, 16mm)	Film
	ii) Television receiver	T.V. Programme
	iii) CCTV system	CCTV programme
	iv) Video player (Video recorder)	Video cassette
G) <u>Real or</u> <u>simulated</u> <u>environment</u>	Do not require any special equipment but laboratory needs equipments	Message

MEDIA	HARDWARE (EQUIPMENT)	SOFTWARE
H) <u>Small Group Persons</u>	Do not require any special equipment	Message
I) <u>Multimedia package</u>	Depends upon the media used	Depends upon the media used

IV.2.4 General advantages of using Media in Instruction

The following are the general advantages of using media in instruction.

- 1) The Audio-visual media help to extend human expense, they can help the imaginative teacher to solve instructional problems, inaccessible processes, materials, events, objects, changes in time, speed and space could easily be brought to the class by using audio-visual media.
- 2) Use of audio-visual media results in greater acquisition of knowledge of facts and ensures longer retention of the information gained. They provide first hand experiences in a variety of ways and sometimes make the pupils actively participate.



- 3) Use of audio-visual media in the class-room can provide effective substitute for direct contact of students, with environment social and physical, they enable us to cut through the physical limits of time and space.

- 4) By using suitable audio-visual media, any expected change in attitude and behaviour could be facilitated they add an interest and involvement to the lesson.

- 5) Proper audio-visual media can provide integrated experiences varying from abstract to concrete. Audio visual material supply a concrete basis for conceptual thinking, giving rise to meaningful concepts. Such media enhance clarity of instruction and increase speed of comprehension.

- 6) Using audio-visual media the approach is through more than one sense-multisensory approach and hence they will be able to secure and retain the attention of pupils as well as develop the communication skills of pupils.

- 7) Audio-visual media could be used to motivate and stimulate interest of pupils to gain further knowledge. Audio-visual media can develop an awareness of problems, open up possibilities for exploration, present preliminary information and thus open avenues to new activity.

8) Lastly, Audio-Visual media could be used to advantage for any age or ability groups. Audio-visual media may be used as 'supplements' to illustrate to clarity and to focus attention, when properly programmed, media alone can teach, students can learn using media at their own pace.

IV.4.3 Multimedia Instruction

Communication in the class-room is, to a considerable extent, carried on through language spoken or written, with the former playing a relatively greater role.

Good teaching is more than mere communication. True learning occurs only when the act of communication has succeeded in making permanent and meaningful addition to the students communication skills. Class room instruction which covers teaching and learning process is not merely one sided presentation of facts. It requires inter-communication between student and teacher or student and media. There must be reaction and interaction with constant reciprocal feedback.

Media are helpful in class-room communication and instruction. If the combination of media are used effectiveness of the instruction is increased.

IV.3.1. Multisensory approach

In a typical class-room, it is found that the teachers

taking to an ebullent group of children all the time. Although some teachers use pictures, models, charts and proportion is very small.

We learn through our senses, senses are gateways of knowledge. Audio-visual aids stimulate our senses and we receive message.

So in the area of instruction, the use of more than one medium is of course not new for generations, good teachers have been using variety of media in the class-room.

Media are best used in combination with variety of other instructional materials and techniques. It provides particular contribution it can make to the total learning expenses. The expenses may range from visual literacy activities to fairly complex individualised instruction sequences.

Although it has been long recognised that we learn through multisensory expenses we have neglected to organize these multisensory expenses to enable each learner to find his own way to knowing and understanding what we want him to learn.

A multisensory approach to instruction means the instruction which helps multisensory learning experiences. It is an approach which provides multimedia learning situations. Multimedia learning

refers to the basic strategy underlying the constructive use of a variety of interrelated learning experiences.

The strategy is also referred as

"Multimedia Instruction".

IV.3.2. Multimedia Instructional Kit

Multimedia Instructional Kits or multimedia packages usually contain a variety of systematically related materials which may include slides or filmstrips, cassettes, tapes, prints, charts, specimens and models, apparatus, guide sheets and booklet for teachers and students. They provide multisensory learning experiences in specific area of study or unit.

Good kits are really packaged sub-systems. A thoughtfully prepared kit, offered a variety of useful material to supplement a specific area of study. It offered a collection of readymade lessons for inexperienced teachers and flexible resource materials for experienced innovative teachers.

The use of instructional material included in the package is carefully planned to promote the desired learning outcomes and to realise the set objectives. The materials are evaluated and validated for their effectiveness in their specific use in the class-room. The use of different resources is made by the teachers in an integrated way so that each reinforces the other.

IV.3.3. Multimedia package and the teacher's role

There are many multimedia packages where a teacher's function as a presenter of information or giver of feedback is taken over by some inanimate medium e.g. - books, films etc. But there are certain functions of good teacher like initiating the learning process, motivating the learner, guiding him wherever necessary to change the package etc. which are difficult for the inanimate media to take over. Some sophisticated computer assisted instructional programmes go a long way in taking up these functions as well some of these functions are carried out by the learner himself independently or with the help of his peers.

Thus, teachers role will be more than one of a designer of multimedia package rather than that of delivery man, delivery function being taken over by inanimate media or peer groups.

IV.4. DEVELOPMENTAL PROCEDURE OF A MULTIMEDIA INSTRUCTIONAL PACKAGE

After having gone through the theoretical information, the investigator went about to develop multimedia instructional package for the present study.

The development of Multimedia Package is a subsystem in the development of Instructional System. A system of multimedia instructional materials begins with a specific set of objectives



and is designed to achieve these objectives most effectively. Each component of system is developed in order to accomplish a specific purpose through the best medium available.

The procedure used in the development of a multimedia package as a sub-system is as follows :

All media cannot be used. Only the media which will convey the concept clearly and effectively has to be selected and used. Not all schools have all the facilities, only those that are feasible and easily available, easily prepared have been used in the present study while developing Multimedia Instructional Package. The following steps have been used:

IV.4.1. Defining Stage

This was the first stage in which ^{the} investigator identified the problem, collected the information and knowledge about the problem, analysed present settings and organisation.

IV.4.1.a) Identification of the Problem

The investigator, after interviews with experienced science teachers and Technology Experts regarding the present system of instruction came to conclusion that all science teachers use lecture cum demonstration method and this instruction was not satisfactory. The instructional material to explain specific concept is not available in the market. Teaching strategies are not fair.

Evaluation procedure is not appropriate. The investigator discussed all these facts with experts and science teachers, and conceived the ideal situation regarding instruction. That is to be expected in a Multimedia Instructional Package.

Hence the identified problem was

"DEVELOPMENT OF MULTIMEDIA INSTRUCTIONAL
PACKAGES IN BOTANY
FOR STD. IX

IV.4.1.b) Analysis of the Present Setting

The analysis of the human and non-human factors involved in development of Multimedia Instructional Package was done after the interviews with 20 science teachers and 3 technology experts and the Head master. The interviews covered some questions related to human non-human factors involved in the present setting.

IV.4.1.c) Organising Management

Analysis of roles of human factors was done through the guidelines of Experts, Science teachers and Headmasters.

- 1) The role of material supplier - To supply instructional material available in the market.
- 2) Headmaster - To organise and administer the school activities.

- 3) Science Teachers - To observe the lessons.
- 4) Students - To learn, to interact, to answer the items in the tests.
- 5) Technician - To help the investigator by operating slide projector, taperecorder etc.
- 6) Recordist - To record the instruction on audio cassette.
- 7) Artist - To help in design and do the chart-work.
- 8) Photographer - To prepare slides.
- 9) Investigator - To act as co-ordinator and to teach 5 well-planned lessons to both groups.

IV.4.2. Developing Stage

This was the second stage of the development. In this stage investigator specified the method and constructed prototype or first working form of the Multimedia Instructional Package. The details are as follows :

IV.4.2.a) Identification of objectives

The identification of objectives of Multimedia Instructional Package was finalized with the help of subject experts.

IV.4.2.b) Specification of Methods

Two separate plans have been made for content analysis of Std. IX Botany.

Text book _ Biology standard IX.

UNITS - (i) Classification of plants.

(ii) Tissues in plants.

UNIT 1 : CLASSIFICATION OF PLANTS

OBJECTIVES (General)

- (i) To enable the students to understand the principle of classification of plants.
- (ii) To enable the students to identify variety of plants.
- (iii) To develop students' curiosity in observing plants.

Table IV.2

CLASSIFICATIONS OF PLANTS

UNIT	SUBUNIT	CONCEPTS/ Teaching points
1. Introduction	Variety in plants	Classification of plants
1.1. Cryptogams	a) Classification by vascular tissue	1) Vascular plants
	b) Classification by seeds	2) Nonvascular plants
1.2 Sub-division of cryptogams	1) Thallophyta	1) Characteristics of Thallophyta
	(a) Algae	2) Characteristics of group algae.
	(b) Fungi	3) Characteristics of group fungi.
	(c) Bacteria	4) Characteristics of Bacteria.

UNIT	SUBUNIT	CONCEPTS/ Teaching points
	(d) Bryophyta	(1) Characteristics of Bryophyta (a) Riccia (b) Moss
	(e) Pteridophyta	(1) Characteristics of Pteridophyta (a) Fern plant.
1.3 Subdivisions of Phanerogams	(1) Gymnosperms	(1) Characteristics of gymnosperm. (1) Cycas plant. (2) Thuja plant.
	(2) Angiosperms	(1) Characteristics of Angiosperms.
	(a) Dicotyledonous plants	(1) Characteristics of dicotyledonous plants
	(b) Monocotyledonous plants	(2) Characteristics of monocotyledonous plants (3) Vinca plant. (4) Ipomoea plant (5) Onion plant (6) Tuberose plant

UNIT 2 : TISSUES IN PLANTSObjectives

- 1) To enable the students to understand the term 'tissue'.
- 2) To enable the students to identify and classify the different types of tissues in the plants.
- 3) To enable the students to comprehend the functions of the tissues.

Table IV.3
CONCEPTS IN PLANT TISSUES

UNIT	SUBUNIT	CONCEPTS/
1) Simple Tissue	1) Parenchyma	1) Parenchyma structure and functions
	2) Collenchyma	2) Structure and functions of collenchyma
	3) Sclerenchyma	3) Structure and function of sclerenchyma
2) Complex Tissue	1) Xylem	a) Tracheids
		b) Vessels of tracheae
		c) Xylem fibres
		d) Xylem parenchyma
	2) Phloem	a) Sieve cells
		b) Sieve tubes
		c) Companion cell
		d) Phloem parenchyma

MEDIA FOR CONCEPT PRESENTATION

Concepts	Objectives	Material	Media
Classification	1) The student defines the term classification	1) Different types of plants	Visual
	2) The student identifies the variety in plants	2) Charts showing variety of plants.	Visual
Sub-division Cryptogams	1) The student defines the term 'Vascular plants'	Chart	Visual
	2) The student defines the term 'Non-Vascular plants'	Chart	Visual
	3) The student classifies the plants of 'Cryptogams'.	Chart	Visual
Thallophyta	1) The student tells the characteristics of Thallophyta	Chart	Visual
	2) The student classifies Thallophyta into different groups.	Chart	Visual

Concepts	Objectives	Material	Media
Algae	a) The student tells the characters of 'Algae'	1) Real material	Visual
		2) Microscopic slides	"-
		3) Charts	"-
		4) Slides	Visual
	b) The students explains 'Spirogyra' cell	1) Spirogyra fresh material	Visual
		2) Spirogyra chart	"-
		3) Spirogyra microscopic slides	"-
		4) Spirogyra Slide	"-
	c) The student prepares microscopic slide of spirogyra.	Microscopic slide	Visual
	d) The student draws the figure of spirogyra cell	Chart	Visual

Concepts	Objectives	Material	Media
Oedogonium	1) The student explains characters of 'oedogonium'	1) Fresh oedogonium material	Visual
		2) Microscopic slide of oedogonium	"-
		3) Chart	"-
		4) Slide	Visual
Fungi	1) The student tells the characteristics of fungi 2) The student identifies types of fungi.	1) Chart	Visual
		2) Chart	"-
		3) Microscopic slides	"-
		4) Slides	Visual
Mucor	1) The student explains the 'Mucor' plant 2) The student draws the diagram of 'Mucor'	1) Real specimen	Visual
		2) Chart	"-
		3) Microscopic slide	"-

Concepts	Objectives	Material	Media	
Bacillus	1) The student tells different types of Bacillus	1) Chart	Visual	
		2) Microscopic slide	"-	
		3) Slides	"-	
Algae and Fungi	1) The student compares Algae and Fungi	Chart	Visual	
	2) The student compares spirogyra and oedogonium	Chart	Visual	
Bryophyta	1) The student tells characteristics of Bryophyta	1) Specimen	Visual	
		2) Chart	"-	
		3) Slide	"-	
	2) The student draws the figure of moss plant.	Chart	"-	
		3) The student draws the figure of Riccia plant.	Chart	"-

Concepts	Objectives	Material	Media
Pteridophyta	1) The student tells the characteristics of Pteridophyta	1) Real specimen 2) Chart 3) Slide	Visual Visual Visual
	2) The student describes the fern plant	1) Real specimen 2) Chart 3) Microscopic slide of T.S. of Rachis of fern	Visual Visual Visual Visual
	3) The student compares Bryophyta and pteridophyta	Chart	Visual
Sub division Phanerogams	1) The student tells the characteristics of 'Phanerogams'.	Audio cassette	Audio
	2) The student tells characters of cycas plant	1) Audio cassette 2) Real specimen 3) Slide	Audio Visual Synchroniza- tion.

Concepts	Objectives	Material	Media
Gymnosperm	1) The student tells the characteristics of Gymnosperms	1) Audio cassette	Audio
		2) Real specimen	Visual
		3) Chart	Visual
		4) Slide	Visual
	2) The student tells the characters of cycas plant	1) Real specimen	Visual
		2) Slide	"
		3) Chart	"
	3) The student observes the Microsprophyll of cycas	1) Real specimen	Visual
		2) Chart	"
	4) The student observes the megasporophyll of the cycas	1) Real specimen	Visual
		2) Chart	Visual
	Angiosperm	1) The student tells the characters of the Angiosperms.	1) Audio cassette
2) Chart			Visual



Concepts	Objectives	Material	Media
Monocotyledons	1) The student identifies monocotyledonous plant	Audio cassette maize plant tuberose plant	Audio visual
Dicotyledons	1) The student identifies dicotyledonous plants	1) Dicotyledonous plants 2) Charts 3) Slides	Visual Visual Visual
	2) The student explains the characteristics of Vinca plant	1) Real specimen 2) Chart	Visual Visual
	3) The student compares monocotyledonous and dicotyledonous plant	1) Real specimens 2) Chart 3) Slides 4) Flashcards	Visual Visual Visual Visual

UNIT No.2 : TISSUES IN THE PLANTS**Table IV.5****MEDIA FOR CONCEPT PRESENTATION**

Concepts	Objectives	Material	Media
1. Tissues	1) The student defines 'tissues'	Introductory speech of teacher by cassette.	Audio
	2) The student classifies tissues	1) Chart 2) Slide	Visual Visual
2. Simple Tissue	1) The student defines 'simple tissue'	1) Chart	Visual
		2) Slide	Visual
2.1 Parenchyma	1) The student tells characteristics of parenchyma	1) Chart	Visual
		2) Slide	Visual
2.2 Collenchyma	1) The student draws the figure of collenchyma cells	1) Chart	Visual
		2) Slide	Visual
		3) Audio cassette	Audio
2.3 Sclerenchyma	1) The student tells characteristics of sclerenchyma cells	1) Chart	Visual
		2) Slide	Visual
		3) Audio cassette	Audio
	2) The student tells the functions of simple tissues	1) Audio Cassette	Audio

Concepts	Objectives	Material	Media
Complex Tissue	1) The student defines complex tissue	Audio cassette	Audio
	2) The student explains xylem vessels	Microscopic slides slide-projector slide	Visual --
	3) The student compares simple tissue with complex tissue.	Slides	Visual

IV.4.2.c) Decision about the Prototype of Multimedia Instructional Package

Following decisions about the development of prototype of Multimedia Instructional Package were taken by investigator after consultation with the experts.

1) It was decided to prepare charts on following content:

- 1) Classification of plants
- 2) Cryptogams
- 3) Algae
- 4) Spirogura
- 5) Oedogonium
- 6) Fungi Mucor
- 7) Bacilli
- 8) Bryophyta-Moss
- 9) Riccia
- 10) Pteridophyta-Fern
- 11) Phanerogams
- 12) Angiosperms-Ipomoea
- 13) Vinca
- 14) Tuberose
- 15) Onion
- 16) Gymnosperm-Cycas
- 17) Thuja
- 18) Algae and fungi

- 19) Bryophyta and Pteridophyta
- 20) Gymnosperm and Angiosperm
- 21) Tissues in the plants
- 22) Parenchyma cells
- 23) Collenchyma cells
- 24) Sclerenchyma cells
- 25) Xylem vessels

These were photographed and slides were prepared on the above content.

3) Verbal narration / explanation of each chart was recorded on audio cassettes.

4) Microscopic slides on the following content were prepared.

- 1) Spirogyra filament
- 2) Oedogonium filament
- 3) Mucor
- 4) Bacilli
- 5) Moss
- 6) T.S. of fern Rachis
- 7) T.S. of cucurbita stem
- 8) T.S. of sunflower stem
- 9) Parenchyma cell
- 10) Collenchyma cell

5) Real specimens of the following were collected.

- 1) Spirogyra material
- 2) Oedogonium material
- 3) Mucor
- 4) Riccia
- 5) Moss
- 6) Fern plant
- 7) Cycas leaf
- 8) Thuja plant
- 9) Vinca plant
- 10) Tuberose plant

6) Flash-cards on the above content were also prepared.

7) Assignment book on all the content areas was prepared and used after the instructions were delivered.

IV.4.3. Evaluation stage

The prototype of the Multimedia Instructional Package was ready for tryout.

The evaluation stage includes three functions.

- 1) Test Prototype.
- 2) Implementation or Experimentation.
- 3) Analysis or Evaluation.

IV.4.3.a) Test Prototype

A prototype is administered to a representative of small group of students. This is small scale tryout. Data is collected & evaluated.

IV.4.3.b) Implementation / Experimentation

Implementation in case of the present study is full scale tryout of the new package.

Testing of the prototype of Multimedia Instructional Package was done in the following order:

Content achievement test in Botany on unit classification of plants was administered on Std. IX students.

The test was for a total of 50 marks. 60 students were selected randomly and divided into two groups by random selection. Content achievement test (Pre-test) was administered on both the groups, data was collected and analysed and interpreted in the tables.

IV.4.3.c) Treatment

Multimedia instruction was imparted with the help of a Multimedia Instructional Package to experimental group of

30 students. Investigator conducted 5 well-planned lessons on two units (1) classification of plants (2) tissues in plants to the experimental group. Equipment and facilities were made available.

For the 'control group' the investigator herself conducted 5 well-planned lessons, without using Multimedia Instructional Package and with traditional method. The science teachers observed lessons for both the groups.

IV.4.3.d) Post Testing

After completing the treatment, the investigator administered a 'Post-test' on both groups, the data was collected, and interpreted in Tables (Table V 17-24).

The data on pre-test, and post-test were analysed, and interpreted to collect information about the effectiveness of using Multimedia Instructional Package.

IV.5) CONCLUDING REMARKS

In the foregone pages the investigator has explained the procedure of development of Multimedia Instructional Package which she has constructed.

With the help of the reliable tools, data was collected through experimentation, analysed and interpreted in the following chapter viz. chapter V 'Analysis and Interpretation of the Data'.

