CHAPTER - II

CONCEPTUAL FRAME WORK
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2.1 Introduction

Education is the process of bringing about a desirable change in the behaviour of human beings through teaching and learning. So it is mainly concerned with the ways and means of teaching and learning. Human beings receive most of the sensory stimuli that enter into our perception through the eyes and ears. Thus the stimuli that impinge our perception and form a concrete base for learning are mainly audio-visual. When proper media are utilized for providing sensory experiences it sharpens teaching and learning. Application of different media has psychological bearing that learning becomes more efficient. Hence multisensory approach has the potential to maximize learning in an individual.

2.2 Media in education

In the today's world of 'information explosion' and 'information exploration' it is necessary for an educator to find efficient and effective ways of imparting knowledge to the student. Thus, in order to explore better ways for improving teaching and learning, the concept of Educational Technology emerged.

2.2.1 Evolution of Instructional Media

Good teachers have been using instructional media for centuries. Commenius wrote 'Orbus Pictus' (the world in Pictures)-the most popular illustrated textbook written for children in 1658. Pestolozzi held that sense impression is the only true foundation of human
knowledge. As new inventions brought new technologies in the field of education, it is being used to make education more productive, powerful and immediate to make instruction more scientific, accessible equal and finally more individualized.

### Evolution of Instructional Media

<table>
<thead>
<tr>
<th>Year</th>
<th>Media Type</th>
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<tr>
<td>5000 B.C.</td>
<td>Written symbols</td>
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<tr>
<td>1440s</td>
<td>Printing press</td>
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<tr>
<td>1826</td>
<td>Still photography</td>
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<tr>
<td>1870s</td>
<td>Cylindrical sound recordings</td>
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<tr>
<td>1889</td>
<td>Flexible film</td>
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<tr>
<td>1890s</td>
<td>Movies</td>
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<tr>
<td>1890s</td>
<td>Disc sound recordings</td>
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<tr>
<td>1920s</td>
<td>Radio</td>
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<tr>
<td>1930s</td>
<td>Audio wire recorder</td>
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<td>1940s</td>
<td>Audio tape recorder</td>
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<td>1970s</td>
<td>Microcomputer</td>
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<tr>
<td>1980s</td>
<td>Compact disc</td>
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<tr>
<td>1990s</td>
<td>Networked system</td>
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### 2.3 Learning Theories and Media

Learning is always an interest for the psychologists and the theories developed by them help us to understand the intricacies related to the process and guide us to enhance the process. Most of the theories have influenced the designing of instruction and
consequently the media to enhance instruction. Therefore it is important for a teacher who attempts to design and develop media to enhance instruction to keep in mind the key concepts propagated in these theories. Some theories that have close relationship with media are:

i. Operant conditioning theory
ii. Component display theory
iii. Elaboration theory
iv. Information processing theory
v. Social learning theory
vi. Attribute learning theory
vii. Concrete - Abstract continuum theory
viii. Intellectual development theory

i. Operant Conditioning Theory

The Theory proposed by B.F. Skinner views learning as modification of behaviour. When a person acquires new knowledge, new skills or experiences an event, the individual's behaviour is modified. When the stimuli and response pattern are repeated it leads to the conditioning to the response and learning is resulted.

ii. Component Display Theory

The Proponent of Component Display Theory, Merrill, classifies outcomes of learning into two dimensions- content and performance. According to this theory each learning segment must have clear objectives and the selected content should be delivered in a planned manner using statement of rules, recalls, attention focusing devices, mnemonics and feedback.
iii. Elaboration Theory

Reigeluth in his Elaboration Theory emphasizes the organization of content in terms of increasing complexity. Elaborations that relate to more than one single idea or concept are more effective in promoting learning and that at each step, the student should be informed about the procedure as a whole.

iv. Information Processing Theory

In Information Processing Theory Norman claims that the way an individual learns depends on his ability to select, encode and store information. The theory advocates the use of advance organizers, instructional aids and cues to enhance learning.

v. Social Learning Theory

According to Bandura, the proponent of the Social Learning Theory, learning takes place through an individual's ability to observe and imitate behaviour. It proposes that learning takes place through the interaction amongst the model, the student and the environment. The theory indirectly recognizes the forceful role that media can play in enhancing learning.

vi. Attribution Learning Theory

In the theory Weiner focuses on the different ways in which individuals understand events and messages. The theory lays great emphasis on motivation because the search for understanding and feedbacks from past achievements becomes the motivating factors.
vii. **Concrete - Abstract Continuum Theory**

In developing a theory of instruction, Bruner proposes that the instruction provided to a student should proceed from direct experience (enactive) through iconic representations of experience (as in picture, films etc), through symbolic or digital representations (as in words). He states, "The sequence in which a student encounters materials has direct effect on achievement". Learning is facilitated when instruction follows a sequence from actual experience through iconic to symbolic representation.

viii. **Intellectual Development Theory**

In order to explain how mental development occurs, three concepts are outlined by Piaget - Schema, Assimilation and Accommodation.

Schemata are mental structures used to identify, process and store incoming information and experiences. They are structures of cognitive development that change by the process of Assimilation and Accommodation.

2.4 **Meaningful learning in an information age**

The use of technology in the classroom is determined by the goals set for the students, the understanding of how students learn and the methods schools use to support student learning. Use of technology can facilitate desirable learning outcomes. Theoretical models based within the cognitive tradition suggest that educators can
establish learning environments that help students learn more effectively, apply what they have learnt and become more excited about learning. In the conventional school setting students learn facts and skills by internalizing the content presented by the teachers and media resources.

The role of the teacher is to manage the class and to facilitate information. In such a setting technology is used as a source of information for absorption (Brown, 1992, Knapp & Glenn, 1996; Means, 1993). In such a situation, a deliberate attempt should be how best to help students learn in a meaningful way.

Paivio's (1986) Dual Coding Theory is cited as a support for exposing students to both pictures and verbal information. Dual Coding Theory argues that information is stored in different ways. Experiencing something verbally and through imagery offers advantages because experience may result in two memory codes instead of one. Students exposed to pictures or video and verbal input may store and retrieve information fare effectively than students who do not have retrieval options because of connection with other memory units. Studies of Mayer and Anderson, 1991; Moreno and Mayer 1999 about conditions under which multiple formats are advantageous, it is found that when you are explaining relatively complex phenomena, dual codes are more beneficial when students are able to interrelate the codes. A computer animation with narration was found to lead to better understanding than allowing students first to hear the narration and then to watch the animation.
Classroom experiences influence mental behaviours and an understanding of how this is decisive in using technology in the classroom. Most academic and life tasks require the use of several categories of memory contents. We have the capacity to store smells, sounds, and visual representations. Researchers working mostly with the visual images have demonstrated just how remarkable our long-term storage is (Read & Barnsley, 1977). Effective educational experience must result in both the accumulation and organization of memory components like imagery, episodic memory and declarative and procedural knowledge. A major goal of education is to construct and modify the elements of memory - ideas, events, images or procedures.

Empirical studies of computer-based instruction frequently demonstrate an advantage for computer control over student control (Milheim and Martin, 1991, Steinberg, 1989). Allowing the student a great deal of control does not seem to work in practice.

In Studies evaluating the effectiveness of computer advisement have demonstrated the student control with advisement is superior to unaided student control (Tennyson 1980; Tennyson & Bretty, 1980). Without advisement students tend to terminate study of lessons more quickly, possibly indicating that they had overestimated their level of mastery.

2.5 Learning Experience

As suggested by Alessi & Tollip (1991) a complete instructional experience takes the student through four stages
a. Presentation of information or learning experiences
b. Initial guidance as the student struggles to understand the information or execute the skill to be learned.
c. Extended practice to provide retention
d. Assessment of student learning

Instructional software does not eliminate the need for teaching, nor does it eliminate the need for teacher supervision.

Student will have questions in response to a learning activity presented. The teacher needs to take an active role in structuring the learning environment and this includes the use of instructional application.

- How can student be most effectively oriented to important lesson content?
- What are the most effective ways to use multimedia sources to encourage learning and understanding?
- How can student be assisted in detecting and responding to errors in their understanding?
- How can the sequences of content be best adapted to individual student needs?
- How can students develop the ability to apply what they know?
- What factors motivate the student?

2.6 Learning environment and learning experience

The learning environment provided by the teacher is a manageable and responsive multimedia PC world, monitored and assisted by the teacher. The intentional learning environment offers elements or information base or a rule system to the students to work with and a setting in which the manipulation of these elements all students to explore a cohesive body of information (Hsu, 1993).

Major characteristic of the environment is that there is a high degree of student control over their experiences and a great deal of flexibility in what might be done like revisiting the same concepts. The environment designed by the teacher is anchored in realistic situations, experiences, goals, nature of the student and process of learning. The multimedia PC allows the student to exercise control. The PC can control the video presentation. The student can also control allowing the creation of a more student-controlled environment. A purposeful exploration of information sources can provide learning experience (Scardamalia, 1989).

2.7 Media based instruction

The technological sophistication we now posses has not affected our life profoundly but also is a tantalizing promise for increasing our efficiency in the field of education. The technology has bestowed education with equipments and materials that can enrich educational experiences.

Verbalism and written communication still reigns over education. Although these channels of communication plays a
dominant role in teaching learning process, a variety of media are available today to make education more meaningful. They involve non-projected, projected and electronic media. They provide sound psychological and technological advantage to the student as well as the teacher. According to the Council for Educational Technology, instructional technology helps to meet the challenges of new learning environment. Media resources play active role in integrating technology for meaningful learning. Instructional efficiency is enhanced by the use of appropriate media.

Illustrated Oxford Dictionary (1988) interprets a 'medium' as 'the intervening substance through which impressions are conveyed to the senses'. A medium, broadly conceived, is any person, material or event that establishes conditions, which enables the student to acquire knowledge, skills and attitudes. The media is defined as "the graphic, photographic, electronic or mechanical means for arresting, processing and reconstituting visual or verbal information" (Eding, 1972). Media can be combined according to the needs of the target groups, philosophies, resources and course content. Integrated, complementary, supplementary and independent approaches can be used for media - mix (Selvaraj, 1995).

All technological innovations have the potential to touch every teacher and student in a classroom to a certain extent. A medium of instruction must be selected on the basis of its potential for implementing stated objectives.
2.8 Pedagogic importance of media

It has long been recognized that the various senses condition the reception of messages, its storage and retrieval. The more concrete and realistic the vicarious experience, the more is its learning effectiveness. So, in addition to reading, vicarious experience can be gained from still pictures, films, filmstrips, televisions, videos and multimedia material and the like. Technological media help the teacher to clarify, establish, correlate and co-ordinate accurate concepts, interpretations and appreciations and enable the teacher to make learning more concrete, effective, interesting, motivating and meaningful.

In the words of Dale (1969) "because audio visual materials supply concrete basis for conceptual thinking, they give rise to meaningful concepts enriched by meaningful association, hence they offer best antidote for the disease of verbalism". The 'hard to understand principles' or 'hard spots' are usually made clear by the intelligent use of skillfully and creatively designed learning materials. So technology can be integrated for meaningful learning.

2.9 Advantages of media assisted instruction

Carefully designed media - based materials are used for instruction. Some of the important advantages are the following.

- Media focuses on better organization of contextual input.
- Media helps to make the delivery process more standardized.
• Media helps to enhance the quality of education.
• Media helps to overcome constraints of time and space.
• Media helps to reduce teaching time and learning time.
• Media can enhance student motivation.
• Media makes teaching pleasurable and rewarding for the teacher as well as the student.

2.10 Instructional Design

Instructional design is the application of well-defined procedural steps for designing instructional resource materials.

2.10.1 Designing an instructional media

The choice of educational media has the following uses in the learning process.

• Effective learning begins with first hand or the concrete experience and proceeds towards more abstract experiences. Thus students who have the advantage of reaching to well selected and wisely prepared audiovisual media learn more effectively than those who are provided with mostly verbal material.

• The student profits from instruction when he became involved though his own interest and device. A well chosen educational medium present concepts in an interesting manner and motivates the student.
- Students who are knowledgeable and whose interest is whetted are better able to perform as creative inventive human beings.

The National Conference on Distance Education Ahmedabad (1986) made recommendations on the role of media in education.

It has been stated that media cannot eliminate or replace the teacher. It has been accepted that media should not be considered as a solution to all educational problems. The use of the media has its own limitation depending upon the use in different situations: the teacher, the student, and their social background.

2.10.2 Selection of the Media

"A medium of instruction must be selected on the basis of its potential for implementing a stated objective" Vernon and Ely.

A four-step process is recommended to carry out the selection of the media.

i. Write the objectives.

ii. Determine the domain—cognitive, affective, psychomotor, in which objectives can be classified.

iii. Select an appropriate strategy within the domain.

iv. Select the appropriate media.

Step i Write the objectives

Characteristics of good objectives are:
a) it describes something that the student does or produces at the end of the process.

b) it states an observable behaviour as a product of the student.

c) it states the condition under which the behaviour is to occur.

d) it states the standard that defines whether or not the objective has been achieved.

**Step ii**  Determine the domain in which the objectives can be classified.

According to Benjamin S Bloom and his associates all educational objectives are classified as cognitive, affective and psychomotor. Cognitive pertains to recall or recognition of knowledge and development of intellectual skills and abilities. Affective objectives pertain to interests, attitudes and values and the development of appreciation. Psychomotor objectives are of manipulative or motor skills area.

**Step iii**  Select the appropriate strategy within the domain determined in the step two.

**Step iv**  Select appropriate media

We have thus specified the objectives, classified it according to the best domain to which it is related and further specified the category to which the objective is fitted best. The media has to be
selected based on the abilities, intelligence, experience, and motivation, personal and social skills of the student.

2.10.2.8 Criteria for selection of the media

One of the basic assumptions in teaching is that different ways of teaching will influence the learning process. The media selected may have a potential to improve the teaching and learning. Literature in instructional design and educational technology usually deals with the problem of how to make the best use of teaching aids; learning materials or the use of the term 'media' to use the media systematically a systematic plan is also required. A rational decision on pedagogical grounds regarding the selection and the use of a particular media on a given situation is perhaps the most difficult area. This is because not all media seem to be well suited to a given lesson context. One should match media choice to the particular lesson context or subject of the lesson.

The set criteria for selection of a medium vary according to the technologists. But there are certain underlying common factors that can be grouped as:

i. task factors
ii. student factors
iii. physical attributes
iv. instructional factors
v. economic factors.

i. Task factors
The task factors are:
a) Objectives of the content

We may at this level be led to decide between media that are capable of presenting information in such a way that it is easy for teachers and students to modify the context and sequence of the message.

b) Content variable

One of the decisions that can be made in disseminating information is whether we require instructional media, informational media or unidirectional media.

c) Learning outcome

It refers to the behavioral modification that occurs in the student at the end of the programme or course. In order to attain the set objectives detailed planning of instructional events, its transaction and assessment is required. This again point to identifying the right type of stimuli necessary to present those events and identifying media capable of presenting the stimuli.

d) Student capability

This refers the level of maturation and innate potential of the student to complete the task.

ii. Student factors
a) Size of the group

Select the media that are well suited to the size of the group or if required modify the size of the group or its structure to suit the media.
b) Interest of the student
The student motivation and attitude towards the type of learning task determine the duration of the attention of the student.

c) Age
Young students seldom attend to one type of presentation for a few minutes, as their span of attention is very small when compared to adult students who can attend for a considerable long period.

d) Physical disabilities of the student
Disabilities like poor auditory or visual impairment, dyslexia, colour blindness etc. If any of the student too may be considered.

iii. Physical Attributes
   a) Realia suitable for small groups.
   b) Audio media - for teaching affective objective and to present appropriate stimulus
   c) Visual media helps the student to acquire concrete concepts
   d) Motion Picture helps to classify the concepts otherwise almost impossible

iv. Instructional Factors
   a) Instructional strategies:
The appropriate media mix will be determined through instructional design strategy.
b) **Degree of teacher control**

The instructional media is under teacher's control. The extent of control may vary from almost absolute as in the case of visuals on the chalkboard to educational broadcast.

c) **Teaching learning Style**

An important consideration whether the medium is new and strange to those who are at delivery point. Following questions are very important regarding teaching learning style:

- Are the teachers familiar with the medium selected?
- Are they capable of administering the system effectively in transaction?

d) **Use of media taxonomies**

The use of flow charts given by Romis Zowasier (1974) helps for the analysis of the tasks that have a visual stimulating content and the verbal information that should be presented live or packaged.

e) **Instructional events**

Before selecting the media to be used during the lesson, the events of instruction of the lesson should be planned. Informing the student about the objectives intended to be realized or what will be expected to be learnt at the end of the event will help them to maintain their orientation to the learning tasks and outcomes.
v. Economic Factors

a) Cost effectiveness and availability

Once we specify the media objective by objective or lesson-by-lesson we can get an accurate estimate of the cost that the medium will present. This will help to have a more precise data to make cost estimates based on the standard cost for the media production with a fair degree of accuracy. One should ask if a particular presentation should indeed be developed for the purpose.

If suitable materials are available in the market which could bring down a reduction in the cost of production such materials could be incorporated into the media.

b) Time

Now one can estimate the production time for each lesson. Priorities can be made if there is time constraint. This will help to produce an effective media for the course.

c) Resources

Based on the available of resources it is possible to establish priorities opting for the most easily produced media for the less essential objectives. This will also help to have a control of media production.

d) Practicability

See whether the media selected in well adopted to the use in the environment and will operate in the conditions like temperature, humidity etc. of that environment; student proof, withstands careless
handling, maintained easily at low cost and have a reasonable durability.

2.10.2.b Exploiting the potential of each medium

In order exploit the medium to its optimum service of expert producers with sufficient time and resources has to be harnessed. Multiple media presentation can accommodate individual differences in learning style, enable the student to learn from the media as well as some of the classmates do.

2.11. VIDEO MEDIA IN EDUCATION

The terms ‘video’ is derived from the Latin word ‘videre’ meaning ‘to see’ It can present real life situations effectively just like a television.

The word ‘video’ is often used to an image on a screen. It is a term applied to all visual aspects of TV signals equipments etc.

There are definitions that explain the word ‘video’ as the picture itself; the process by which the image and sound have been recorded and reproduced by means of videotape or videodisc. The image is presented to the viewers either on a TV receiver or a monitor or video screen. Video communication has become one of the most pervasive forms of communication in education, entertainment and business.

‘Video’ or an electronic form of message transfer may not require a broadcast mode. Video systems are often called a closed
circuit system that does not need Technology for transmission unless there is an intention for transmission. Even though the video and video related technologies are there only for a few decades, it has gained an unbeatable position in visual communication. It provides us information that is unbounded by space or time.

2.11.1 Role of Video media in education

It is sometimes stated that television is the greatest educative force known to man. But everything depends upon the style, content and quality of the programme. A television set, Videocassette player (VCP), or a Videocassette Recorder cum player (VCR) and power supply and some space are just enough to use the medium again and again to achieve a variety of ends in a variety of ways. The beauty of video lies in the simplicity in handling it.

2.11.2. Video tapes, video discs, CD Rom & DVD

Due to rapid technological advancement different storage systems are now available. Videotapes, Video discs, CD Rom and DVD are available storage systems. These storage systems offer the capacity to hold a lot of information. The equipments required for the retrieval of information from the storage system also differ. A video cassette player (VCP), or a Videocassette Recorder cum player (VCR) and a Television monitor is enough for information from VHS videotape. But for videodiscs, CD-ROM, DVD etc. a VCD / DVD player and a television monitor or a multimedia computer will serve the purpose.
(a) **Videotape** stores images in series while a videodisc stores the images in concentric circles on the disc. The individual frame in a videodisc can be accessed very quickly. In contrast, videotape is unable to provide practical access to individual images within a reasonable time. Moreover, images can be displayed as individual frames. Video segments can be played both forward or backward to display specific video segments or frames. The video products can be stored conveniently in disc for longer and repeated use.

(b) **Compact Disc - Read Only Memory (CD-ROM)** is popular now a day. While the method used to store data on a CD uses analog format (variations in signal represented as continuous). The data stored on a CD-ROM are in digital form (Recording format in which information is stored as a series of numbers, allowing exact duplication of their original information) and can be brought into a computer. The data can be read but cannot be altered. The large amount of space available on a CD makes it ideal for storing video images and sound.

(c) **Digital Video Disc (DVD)** - Another storage method capable of putting very large amount of information on a disc of the size of CD Rom is digital videodisc (DVD). DVD is referred to as digital versatile disc in some sources to indicate the capacity to store any type of digital information. A DVD allows two layers of information to be stored on both sides of the disc. Application of DVD technology in education is yet to
be popular. But CD Rom is more popular in the field of education and concentrates on a form in which a computer is involved. The computer presents the information or can be accessed easily with the help of it. Some would prefer the term ‘multimedia’ to the entire system of communication including hardware, software and document (files storing the text, graphics and sounds) (Marchionini, 1988) In short multimedia is a communication format integrating several media (text, audio, video) most commonly implemented with a computer.

2.11.3 Video Tape or Video Disc

The option is based on a number of factors. One important consideration should be the trend in technology. Which technology is going to be obsolete and which is becoming popular? Its cost, effectiveness and suitability should be the main focus in opting a technology. The accession to different parts of videotape is time consuming and contrary to the objective of allowing the user to proceed through the programme at his pace. But disc system allows very fast access to any part of the disc and the search time is reduced to a couple of seconds. So any part of the programme in the disc can be accessed or skipped or reviewed easily and can avoid boredom. Discs are more durable and will stand up better for repeated use. A multimedia PC alone is needed which has become popular and the students are being familiar with it as information technology is one of their school subjects.
2.11.4 Multimedia

"If a product use more than one modality (Say, visual and auditory) at least two symbol systems within a modality (words and pictures) or at least two genres with a symbol system (prose and poetry, a still image and video), the product includes multiple media—that is, multimedia." (Mark, Cindy, (2001). So due to the technological advancement video format has been giving way to multimedia format where the data can be stored in a CD Rom. The CD Rom supplies video and audio information. The computer presents the text, graphics and audio, accepts the responses from the keyboard or mouse and makes decisions. The advantage is that the media offers large storage space, easy to handle; its portability, durability, accessibility and is becoming more economic and universal.

2.12 Strength and Weakness of multimedia

The media considered has a lot of educational value.

- The variety of visuals sound and graphics help the student to pay undivided attention and to form and retain concepts.

- Observation of video segments offers student a riches context for conceptual understanding.

- Video segments depicting outside classroom situations allows students to connect with experiences not otherwise available in the classroom.
• A combine of tutorial and simulation assist student in achieving understanding, provides extended practice and evaluate the understanding

• The tutorial user text, a few simple diagrams or video clippings and audio to get the concept.

• Allows the student to control information they experience.

• The programme can be viewed repeated with many pauses or partial replays till it is understood.

• Once the teacher has mediated the instruction, the student gets more opportunities the interact with the teacher or peers for clarification having at his disposal the unaltered form of the lesson experienced earlier.

• Physical absence of a student in a class will not adversely affect the student much as he has the access to the lesson at any time.

• The teacher using the same basic material can ensure redemption to the students

• A minimum standard and quality in teaching can be maintained in all classes in transacting a given content area.

• Media can play a catalytic role in the interaction in the class between student, material and teacher.
2.13 Conclusion

Technological advancements have enabled in integrating technology for meaningful learning. It has widened the scope of its application in providing more meaningful experiences to the students. Production of video programmes became easier with the advent and progress of computer technology as it is now possible to produce multimedia programmes using computers. At the same time it can be used in the classroom for teaching and learning because it integrates video and audio information at the fingertip of the teacher or student.