USE OF ICT IN SCIENCE LEARNING

Dr. S. R. Waje,

Principle,

Adv. V.H. College of Education,

Nasik.

Abstract :

Kothari Education Commission (1964-66) rightly remarked that, "The destiny of India is being shaped in its classrooms". This statement shows the importance of education in modern India. Teachers of today should realize the significance and need for presenting different learning experiences so as to overcome the individual differences among pupils and make attempts to effectively use media and methods generated by Educational Technology. The advantages of technology should be exploited to the maximum to raise the quality of education and also to give meaning to teaching learning process. Information Communications Technology (ICT) has an important role to play in science teaching.

The use of ICT can make substantial changes in education and training mainly in two ways. Firstly, the rich representation of information changes learner's perception and understanding of the content. Secondly, the vast distribution and easy access to information can change relationship between teachers and students. ICT can also provide powerful support for educational innovations. By using ICT technologies such as Computer, Laptop, Digital camera, video, Internet, websites, CD-ROMs, DVDs, web camera, Radio, TV, application of software such as word-processing, spreadsheet, e-mail, digital libraries, computer mediating conferencing, video-conferencing, LCD and slide projectors, etc., we can overcome all barriers in communication and instruction in higher education institutes of learning. Therefore, the challenge for teachers has been to create a new generation of teachers capable of employing a variety of technology and tools in all phases of academic, administrative, research and extension functions.

Key Word : ICT.

Introduction :

Kothari Education Commission (1964-66) rightly remarked that, "The destiny of India is being shaped in its classrooms". This statement shows the importance of education in modern India. Teachers of today should realize the significance and need for presenting different learning experiences so as to overcome the individual differences among pupils and make attempts to effectively use media and methods generated by Educational Technology. The advantages of technology should be exploited to the maximum to raise the quality of education and also to give meaning to teaching learning process. The National Policy on Education (NPE1986) has emphasized upon the use of computers in higher education and for the first time in the history of Indian Education, NPE (1986) has observed that, "Educational Technology will be employed in the spread of useful information in the training and retraining of teachers to improve the quality of education".

Information Communications Technology (ICT) has an important role to play in science teaching. The developments in ICT over the past two decades possibly represent the greatest opportunities for and challenges to the formal educational process. The standards in the field of science teaching emphasize the need for science teachers to use strategies that develop deep scientific understanding while applying research skills and problem-solving abilities to complex questions. In recent years there has been a shift from the use of science as a vehicle through which students learn and use IT skills to the use of ICT skills as tools to assist learning in science. There has also been growing interest in the use of ICT to support whole class teaching and learning to complement ICT based activities for individual students.

Role of ICT in Education :

The Information and Communication Technology insurgency brings particular challenges to education system around the world. This mainly occurs in three broad areas. One occurs with participation in information society. The second is ICTs impact on access to do with the way ICT changes the education process. Here the formal learning of ICT is in school and higher educational institutions which make available better organized education. Thirdly, through ICT, non-formal education occurs with 'continuing education', 'adult education' through distance education and other organized programs. The acquisition of ICT skills in educational institutions of higher learning helps in knowledge sharing, thereby

multiplying manifold educational opportunities. Integrating ICT literacy will be crucial as it means harnessing technology to perform learning skills. It must encompass the use of ICT to manage complexity, solve problems and think critically, creatively and systematically towards the goal of acquiring thinking and problem solving skills, (Yves et al; 2006). For the students, this can be used for making assignment, collecting data, documentation and conducting research. It can be an effective medium for teaching and learning. This can act as the medium through which teachers and learners can learn. Here, in order to introduce and understand the need of ICT in educational institutions, teachers or students undergoing teacher education must first comprehend and be at ease with ICT. They must be given opportunities for acquisition of new knowledge. This can be made possible by promoting ICT based training programs introduced in their curriculum. ICT has influenced all aspects of the present teacher education system. It provides the capacity to store, to retrieve and to process e-content both fast as well as accurate.

The benefits of ICT in science :

There is considerable research evidence that learners are more highly motivated when their learning is supported by ICT. See Newton and Rogers, Teaching Science with ICT for a review of research evidence.

- Students are more engaged in activities; they show increased interest and demonstrate a longer attention span.
- ICT can provide access to a huge range of resources that are of high quality and relevant to scientific learning. In some cases the resources fill gaps where there are no good conventional alternatives; in other cases they complement existing resources. In some cases ICT resources are less good than conventional alternatives and do not add to learning.
- The multi-media resources available enable visualization and manipulation of complex models, three dimensional images and movement to enhance understanding of scientific ideas.
- ICT widens the range of material that can be used in teaching and learning to include text, still and moving images and sound, and increases the variety of ways that the material can be used for whole class and individual learning.

- ICT can improve the quality of data available to students. Information gleaned from the internet can be more up to date, and data obtained from loggers can include more frequent and more accurate experimental readings.

- Computers also allow repetitive tasks to be carried out quickly and accurately so that more student time can be spent on thinking about the scientific data that has been generated.

- Many ICT tasks do not require the use of a specific classroom or laboratory. They can, therefore, extend learning beyond the teaching space and class contact time, and place the use of ICT at the heart of the learning process rather than as an additional peripheral experience. An activity, started in one classroom, can be continued in a different room later in the day or at home in the evening.

- ICT provides opportunities for teachers to be creative in their teaching and in student learning.

Varieties of Technological Tools :

A. Hardware Resources :

1. Laptop computers :

    More recently, strategies to bring ICT support into the science teaching space have received much more attention. One approach is the use of a class set of laptop or notebook computers within a science area. These computers can be linked via a wireless connection to the school network to access the full facilities that this provides. Computers of this kind can be stored and recharged on a trolley so that they can be easily moved into different rooms on the same floor of a building. This is a flexible system that lends itself to individual or small group work in the science area and also provides ready access to data logging activities. The drawback is that class sets of laptop computers are expensive

2. **Data projectors :**

    The single biggest impact on the use of ICT in science areas is brought about by the installation of a Liquid Crystal Display (LCD) projector, permanently fixed to the ceiling and wired to appropriate sockets placed near some form of permanent screen. This arrangement significantly lowers the threshold of difficulty teachers face in using ICT in

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support of science and thereby significantly increases the likelihood of real progress in this area

3. Smart Board (Interactive White Board) :

There are several alternative ways of viewing the images from a LCD projector. The simplest method is to use an ordinary screen or whiteboard, which may often be already in place when the projector is installed. This low cost option is effective and trouble free. A white board has the advantage over a projector screen in that the image can be annotated using ordinary white board pens. Modern projectors are equipped with remote control devices that include a narrow infra-red beam, a zoom facility and the ability to act as a mouse for computer software. This means that the teacher and students can manipulate and place emphasis on images at some distance from the screen

B. Software Application :

1. Microsoft Word :

The advantages of using Microsoft Word to construct electronic worksheets are that most teachers will be very familiar with the software package and that it is commonly available on school network systems. Some ways in which Word can be used are as follows.

• Creation of text boxes linked to parts of drawn or scanned diagrams/photographs in which a student can write brief notes.

• Provision of randomly arranged parts of pictorial or flow diagrams that must be dragged and dropped into appropriate positions.

• Construction of sections of text which contain deliberate errors or misunderstandings that has to be identified and corrected. This allows the teacher to utilize their knowledge of common problems in a topic and to ensure that these points are confronted by students.

• Sections of text written with gaps in key places. Words or phrases are copied and pasted by the student from a list that includes distracters.

• Words that are jumbled up in sentences and sentences that are jumbled up in paragraphs have to be placed into an appropriate sequence. This approach allows for some

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differentiation between different ability levels through the extent to which the meaning of the text is disguised.

• A still or video image embedded within the document to provide stimulus material on which questions are based.

• Use of live links from a word document to other files on the network system or to websites.

2. Microsoft Excel :

The use of Excel as a spreadsheet in science is considered elsewhere in this report. To take account of the differing competences that students may have in the use of spreadsheets, they can be presented in ways that make increasing demands on such skills. For example; A substantially complete spreadsheet is provided that students add to, by inserting new columns that contain related data. A template is provided that may, for example, contain column headings to which student add data and insert additional columns. Students design and enter data into a blank spreadsheet.

A spread sheet containing the nutritional details of different foods can, for example, be used to :

• Sort the data to find out which foods have the highest proportion of protein, fat or carbohydrate, compare the nutritional make up of different menus, Work out a menu that will meet the nutritional requirement, for some given situations.

Spreadsheets can be used in a whole class activity, to provide a framework for the collection and averaging of class sets of data. Spreadsheets enable complex calculations to be carried out quickly and accurately. This means that a student can test a range of predictions based on the same data to explore possible relationships between variables, and derive other information related to the original data. For Example, In the study of domestic electrical appliances, the power and operating voltage of items such as a kettle, hair dryer and food mixer can be inserted into an appropriate spreadsheet and used to calculate the current that flows through them. Students can be asked to decide on the value of the fuse that they would need to use to protect each appliance. The task could be

extended by getting students to use the spreadsheet to calculate the energy consumption of each appliance, and to calculate the cost that this would incur.

- In a more demanding biological example, students can simply be given a formula that relates the number of fish that can survive in a pond with the number of fish at the beginning of a year, and a constant that is a measure of the ability of the fish to breed. The student task is to set up a Spreadsheet, and to change values of the constant and the starting number of fish, to work out what combination will ensure that changes in the fish population from year to year are as small as possible.

- Another spreadsheet application is to use experimental data to explore relationships between variables. A spreadsheet can, for example, be used to investigate the relationship between the equilibrium concentrations of reactants in a chemical reaction, and thereby to arrive at the concept of the equilibrium constant.

- Spreadsheets are particularly useful in AS/A level physics, and students' skills in use of them may be tested in examination questions. A spreadsheet may, for example, be used to model behavior such as the swing of a pendulum or the fall of a parachutist, using step by step calculations.

Drawing graphs from spreadsheet data :

Although spreadsheet data can be used directly, it is often easier to detect changes and to observe patterns from charts or graphs. This brings with it a new set of operational skills that students need to learn to produce their displayed data. Many students will need considerable help in producing good quality graphs using the full range of options within a package such as Excel. In addition, it high lights the thinking skills required to design graphs, whether they are drawn by computer or by hand, to ensure that they are of an appropriate type and include appropriate axes, scales and limits.

3. Microsoft PowerPoint :

The interest in presentation software has increased recently as projection systems in laboratories and classrooms have become more common. The most widespread package used by teachers is Power Point. This is a powerful yet easy to use package that is

capable of much more than a list of bulleted points. Slides can contain text, still and video images, animations and audio clips. Elements within a slide can be animated to attract attention and sequenced to closely follow the desired teaching pattern of ideas and information. Links can be created to allow easy movement between different slides. Once created, presentations can be shared between groups of teachers and updated easily. They provide a useful, shared focus for whole class teaching, and provide a clear framework for learning.

Helpful PowerPoint tips :

- Choose a dark background colour for slides.
- Use the same background, font style and font size for all slides in a presentation.
- Don't try too many fancy effects as they distract from the main message and quickly become very annoying.
- Don't put too much information into a single slide. It is better to use two simple, rather than one complicated slide.
- Use short phrases rather than long paragraphs.
- Use different text colour to create emphasis, but make sure that you can read it against the slide background.
- Use simple diagrams.
- Do include pictures.
- Do include short video clips.

C. Science CD Rooms :

A growing number of CDs have been produced commercially, with the specific aim of supporting science education.

1. Information and retrieval software :

Some of the CDs are designed to be enormous information storage and retrieval systems. Since each CD can store the equivalent of a quarter of a million A4 pages of text, they are clearly capable of storing a vast amount of information. They also have the advantage over books of being able to combine text, still and moving images, sound and

animation, to create attractive and dynamic learning packages which meet the needs of a variety of student learning styles.

Many CDs of this kind make use of embedded hyperlinks that facilitate movement and navigation within the resource, so that it does not have to be used in a linear manner. They may also make use of 'hotspots' that enable features such as text, images or sound to become active when the mouse is moved over them or clicked on them.

2. Simulation Software :

i.   CDs include Scientific concepts and industrial processes: simulations such as biological systems; industrial chemical plants such as the Haberprocess; and concepts such as radioactive decay and interactions within ecosystems, populations andfood chains. Some of these CDs are interactive, so that it is possible for the user to change the valueof variables and observe consequent effects on the simulated system.

ii. Virtual experiments :

A particular type of simulation is the virtual experiment. In some cases students can start at the beginning with a choice of apparatus, and move on to decide on amounts of materials or operating conditions. The software tabulates data arising from the experiment and often generates an appropriate graph from it. This kind of software can be used by teachers to complement student practical work. It can be used as part of a pre-lab discussion to set the scene for the experiment, or to stimulate post-lab evaluation of experimental process and results.

Effective Use of ICT :

The effective and efficient use of ICT depends on technically competent educators. They should be able to appreciate the potentiality of ICT and have positive attitude towards ICT. Four phases are conducted to implement ICT content in Teacher education programme so that the student teachers when they become teachers in school would able to utilize ICT tools in classroom instruction in promoting flexible learning environment to meet individual learning objectives of the subject matter content. The four phases are

a) ICT Literacy

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b) Effective and efficient use of ICT hardware and software for teaching learning activities.

c) ICT based pedagogy, online support, networking and management.

d) Adopting best innovative practices in the use of ICT.

Conclusion :

The use of ICT can make substantial changes in education and training mainly in two ways. Firstly, the rich representation of information changes learner's perception and understanding of the content. Secondly, the vast distribution and easy access to information can change relationship between teachers and students.

Conferencing, video-conferencing, LCD and slide projectors, etc., we can overcome all barriers in communication and instruction in higher education institutes of learning. Therefore, the challenge for teachers has been to create a new generation of teachers capable ofemploying a variety of technology and tools in all phases of academic, administrative, research and extension functions.

Example : 1.   Demonstration of human digestive system

            2.   Circulatory System Video

References :

1.   ICT in support Of science education A practical user's guide: the University of York Science Education Group, 2002

2.   Miri Barak: Aptness between Teaching Roles and Teaching Strategies in ICT-Integrated Science Lessons, Published in Interdisciplinary Journal of E-Learning and Learning Objects Volume 7, 2011

3.   Dr. Shazli Hasan Khan: Integration of ICT Component in Teacher Educational Institutions: An unavoidable Step towards Transforming the Quality of present Teacher Education System:*Vol.1,Issue.V/June; 12pp.1-4* Indian Streams Research Journal.

4.   K.Anandan, B.V.Gopal :Information and Communication Technology in classroom instruction; Article published in Edutracks,Vol.11. No.1.September.2011

5.   Retrieved from :

      • http://teachernet.gov.uk/supply teachers/detail.com

      • http://www.mscts.com.my/idb/2-3.htm