UNIT 8 EDUCATIONAL SOFTWARE APPLICATION

Structure

8.1 INTRODUCTION

When you look around, you will find world full of electronic gadgets. These have slowly pervaded each and every aspect of our life. All systems and their operations have slowly switched from manual to digital. You are aware of Digital India movement. When you see electronic gadgets, for example, a television or a computer, you assume that it is the hardware which is important. But actually these hardwares are being operated with the help of software. It is pertinent to know here that the hardware is not complete in it and needs software to function. Software are used in all ICT based systems or gadgets,

Software are also used in teaching and learning and other areas of education and are known as educational software. In this unit, we will discuss educational software.

8.2 OBJECTIVES

After studying this unit, you will be able to:

- explain educational software;
- discuss the importance of educational software;
- explain the role of multimedia in teaching-learning process;
- describe the free and open source software;
- explain various technologies used for learners' with special needs; and
- describe various uses of ICT for assessment.

8.3 EDUCATIONAL SOFTWARE

Software are used for a variety of purposes. The software which are used in teaching-learning process by teachers and students are called educational software. Wikipedia defines educational software as computer software, the primary purpose of which is teaching or self-learning. Educational software help teachers improve their teaching skills and students their learning skills.

Educational software are available in plenty, though many of them may not suit everyone's requirements. . Thus, you have to select a software as per your requirement and context. You can choose appropriate software from a huge range of educational software. You have to be very careful in selection of the software for their use for educational purposes..

Educational software can be divided into two categories. As already mentioned, the teacher can select as per the context, need and the level of the learners.

1) **Content-free Software:** They help or facilitate the learners/users to create their own contents. Learners can create their own contents as these are more open-ended like word processing suite, and graphic programs. It can be used across disciplines/subjects. For example, if you want to develop a material for its use in teaching history or geography, it can be easily done by word processing software. These software not only facilitate creation of text files but also multimedia files. If you want to add an audio file, it can be done through audio recording and editing software like Audacity. Similarly, planning an essay or a brainstorming session in any subject area can be done through any concept mapping software like c-map, or freemind. The graphics can be used and modified using Paint, etc. If a teacher intends to use technology for teaching-learning purpose, these Content-free Software facilitates him/her for a wide range of cross-curricular teaching and learning activities. Content-free software also offers better opportunities for sharing and collaboration of reusable resources.

2) **Content-rich Software:** As the name indicates, they focus on content. These are discipline/subject specific software which are used for teaching-learning purpose in particular subject. They typically comprise multimedia content (e.g., graphics, video, sound, animation, etc.), which are presented in a very structured way for concept building as well as concept clarification. Teachers use these software for teaching new topics for concept attainment and clarification among learners. They are often used as supplementary to classroom teaching in schools and provide an alternative way to teaching-learning. In using the content -rich software, the learner has the advantage of re-running the software till the mastery of the concept. These are used in schools, sometimes, as part of SMART classroom project and are useful in teaching-learning activities in schools. Most of these software are copyrighted and proprietary.

8.3.1 Principles of Educational Software

Principles are the guiding rules which help in smooth functioning of any area of knowledge. Though there are many principles of educational software, but there are three main principles which need to be considered while using educational software.

1) **Usability:** This is most important principle as it helps us to select whether the educational software, under consideration, is suitable for the intended task. This principle also takes care of the effectiveness and efficiency of the educational software in achieving its intended outcome.

2) **Usefulness:** The software should be able to make positive changes or help in improving teaching -learning process in the classroom. If it is not able to bring any improvement in teaching-learning process, its use becomes redundant. Thus, usefulness is another principle in selection of educational software.

3) **Desirability:** The quality which makes the software popular and desirable is its quality to motivate learners to learn new learning tasks. It should be effective in helping learners attain new concepts and clarify doubts.

Any good software, especially educational software, must have all the three characteristics. All of these are interlinked to each other like desirability depends on usability.

Most of the software development are governed by two general guidelines to accommodate these three principles -

- **Know the user:** This means the human aspect like the age , cognitive level and reasoning, leaning styles, social and psychological aspects; and
- **Know the system:** It is concerned with the delivery aspect i.e. the platform has the maximum reach, interoperable, etc.

Check Your Progress

Notes: a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

1) **State whether true or False:**

a) Educational software are used for teaching the slow learners. ( )

b) MS Word is content rich software. ( )

c) Desirability of a software is one of the important principles of software selection. ( )

d) A good software can run on any system. We should only bother about the software features for the users. ( )

8.3.2 Free Open Source Software (FOSS)

Software are the computer programmes, which are written in programming language (codes) by developers. This is called 'coding'. The coding is done as per the requirements, as discussed in previous section. To use a everyday analogy, coding is like recipe of a new dish. A cook keeps on modifying the recipe till the perfect desired taste is achieved. Similarly, coding is developed, modified, tested and revised till the desired output as software is reached. It is quite a comprehensive process. Now it depends on the developer or the organization he/she is working for to decide whether the code (source) should be shared with others or not. It is this decision which makes the software proprietary or free and open source.

Proprietary Software: Most people want to retain the rights of their creations and this is the concept of copyright or the intellectual property right. In case of software it is called proprietary software where code or the recipe is not disclosed by the developer to the users. One has to pay a license amount to use the proprietary software. In case of freeware, the code is not shared but the use of software is allowed for free.

Free and Open Source: The application of democratic values in education gave rise to free and open philosophy and the copy left movement. The basic premise of the copy left movement is sharing the code and the software with the user/ learner who in turn has the freedom to access, use, modify and, if need be, redistribute the software back to the community.

Free and Open-Source Software (FOSS) is computer software that can be classified as both free software and open-source software. Anyone is free to use, copy, study and change the software in any way as per his/her need and context. As already discussed, the source code is shared with all and others are encouraged to make changes for the betterment of the design. This is in contrast to proprietary software, in which the software is under restrictive copyright and the source code is usually hidden from the users.

Free in FOSS does not mean free in price but the liberty given to the user to run, copy, distribute study, change and improve the software. To understand the concept, you should think of "free" as in "free speech". It is also sometimes called "libre software". **Software Libre** (or **libre software**, or **Free software**)[1] is software released in a way which grants users the freedom to run, copy, study, change, improve and share the software. (http://wikieducator.org/Software_libre) (https://www.gnu.org/philosophy/free-sw.html). It further states that free software grants its users four essential freedoms:

- To run the program as you wish for any purpose.
- To study how the program works and change it so that it does your computing as you wishes. Access to the source code is a precondition for this.
- To redistribute copies so you can help your neighbour.
- To distribute copies of your modified versions to others.

This can be done through the sharing of source code so that the whole community gets a chance to benefit from your changes.

The GNU General Public License (GNU GPL or GPL) is a widely used free software license, which guarantees end users (individuals, organizations, companies) the freedoms to run, study, share (copy), and modify the software. The license was originally written by Richard Stallman of the Free Software Foundation (FSF) for the GNU Project.

Limitations:

Though it seems very attractive, the use of open software also has its limitations:

i) **User Interface -** Sometimes the user interface is not as user friendly as in case of proprietary software. This is because in case of Open and free software, commercial angle is not involved, and therefore, it is more in terms of developer's perception of the need of the users than the researched need of the user.

ii) **Service support -** As the software is free and open, there is absence of any dedicated support service as in case of proprietary software. There is community of users who respond and fix problems for the user but that is not as prompt as in case of proprietary software.

iii) **Compatibility issues -** In case of some proprietary hardware, there is requirement of specialized drivers to run open source programs. These have to be procured from the equipment manufacturer. This can potentially add to the cost of your project. Even if an open source driver exists, it may not work with your software as well as the proprietary driver.

iv) **Hidden costs -** Software that is free up-front but later costs money to run can be a major burden, especially if you haven't considered these hidden costs from the outset.

Check Your Progress

Notes: a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

5) What are the differences between proprietary and open source software?

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6) List few Free and Open Source Software.

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7) What are the four freedoms of the FOSS?

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8.4 SOFTWARE FOR CLASSROOM LEARNING

When many media or multiple media are integrated in a comprehensive and cohesive manner in a single software for concept clarification, it is called multimedia (the combination of different media i.e. audio, video, graphics, animations and text in a software). We have to keep this in mind that though multimedia is a combination of two or more media, it is not merely mixing of the media but an integrated and well weaved programme designed to be used for teaching and learning.

The quality and effectiveness of a multimedia package depends both on the types and kind of media used and also how the parts are integrated together to create a whole. Multimedia, initially were linear and had very little interactivity other than pressing of arrow key or mouse press for moving forward. This gave learner very little option to be active and interactive. It was realized that interactivity is as important an aspect of multimedia as the types of media integrated. Let us understand more about Multimedia.

8.4.1 Multimedia

Of late, we come across many modern electronic devices in classroom, like computer. Communication through these devices is done using images, animations, videos and graphics. Many media are used for concept formation, attainment as well as clarification. Multimedia are used on the premise that students learn better from well-designed multi-media materials in comparison to traditional modes of communication. The basic premise is that more the number of senses involved, the more efficacious is student learning.

Multimedia uses text, graphic, animation, video and sound in a unified and integrated manner so that the content is presented to students comprehensively. This comprehensibility would have been less if only one medium was used. Thus, we may say that Multimedia uses text, graphic art, sound, animation, and video in different combinations but in an integrated and holistic manner.

Elements of Multimedia

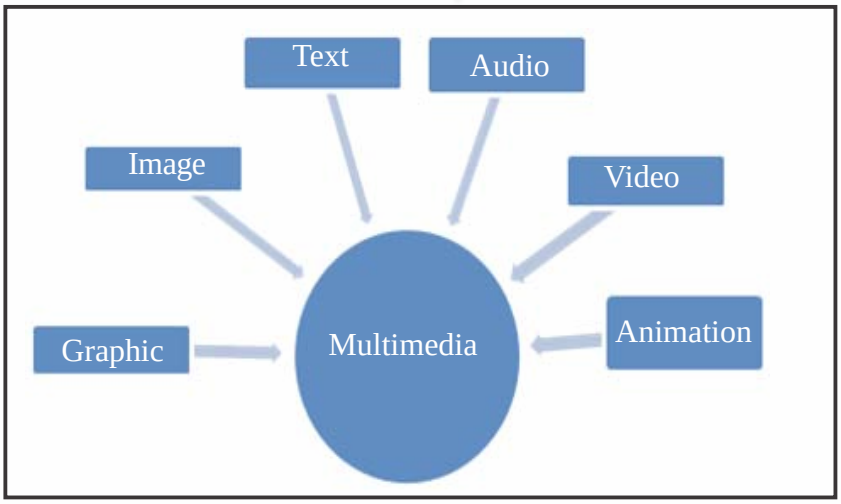

Fig. 8.1: Elements of Multimedia

Multimedia has six basic elements: Text, Images, Graphics, Audio, Video, and Animation. These are also referred to as building blocks of multimedia. Therefore, any multimedia consists of any or all of these elements.

i) **Text:** It is the simplest of the six elements both in creation and communication. It needs less space, and bandwidth. HTML, and Postscript, PDF are the types of text used in multimedia.

ii) **Images**: A picture says louder than thousand words. It can be digital picture, scanned image, slide, or painting. All of these are mostly used in multimedia. It can be easily used for clarification of concepts and also generation of student interest.

iii) **Graphics:** Graphics are visual representations to enhance or enable the representation of an idea or feeling to the user. Graphics may entertain, educate, or emotionally impact the user. They are crucial for strengthening clarity of illustration.

iv) **Audio:** It uses the strength of sound to facilitate learning of concepts. It is also used to reinforce ideas presented as text or graphics on the screen. Audio becomes very important in language education. Audio is used as voice over (narration), background sound or to create effects.

v) **Video**: It is very important element of multimedia with respect to clarification of concepts, generation of interest and motivation among students. It demonstrates different processes, equipment and the context among other things. The lengthy processes involved in a learning task can be demonstrated in less time. Minute details of the processes can be highlighted. It has a wide scope and should be judiciously used as downloading a video requires large bandwidth though it is very useful for transacting certain learning tasks.

vi) **Animation:** It is an interesting way of illustrating concepts with movements. This has the strength of video and at places is better than a video as one can focus only on important things. It involves graphics with movement. Flash is mostly used for creating animations. Simple 2D animations can be created using open source tools like pencil or tupi and more advance tools like blender.

Types of Multimedia:

Multimedia are broadly of two types: **Linear and Non-linear.**

- **Linear Multimedia:** In linear multimedia, the content is presented in linear way i.e. without any navigational control for the viewer. Here the sequence of content is pre-determined and learner is passive receiver and interacts with the multimedia application in which the content is sequentially presented. The viewer does not control the progress of the content. For example, in a video there is a combination of audio, graphics and animations, but the viewer has no control over the sequence of events presented in the video.

- **Non-linear Multimedia:** It uses learner interactivity to determine the progress in the content. The example is self-paced computer based programme, or a video game. The learner is able to progress as per his/her ability. Thus learner is not passive but is active in a two way communication. This communication can be controlled by using buttons, links and hypertext. Hypermedia is an example of non-linear content.

The multimedia, having so much potential for teaching and learning, will not be meaningful if the learner is not able to learn as per his/her ability and remains as a passive learner. Thus there is an important component of interactivity added to multimedia. Such multimedia is termed as **Interactive Multimedia.**

Interactive Multimedia:

According to Reimann (as stated in Andresen, 2013), interactivity influences the process of learning and the content through a broad range of possibilities. It could vary from simply manipulating objects on the screen by mouse activities to immersed contextual interactivity wherein within virtual reality the user ventures into a simulated three-dimensional world.

- **Linear navigation:** It means only moving forward/backward on the screen is allowed.
- **Hierarchic navigation:** It allows the learner to select content/links by using special menus.
- **Interactive help:** This kind of help, which is available through special menu buttons, is most effective when adapted to the topical presentation of information;
- **Feedback:** The programme answers by giving an assessment on the quality of user activities. These answers are visible on the screen. The further programme may be dependent on this assessment, i.e. adaptability is established.
- **Communicative interaction:** There is possibility of interaction with other persons, i.e. other users or 'friends' in social networks. Since, social networks consist of people who are connected by a shared object, networks can foster learning about these objects (Zengestrom, 2005).
- **Constructive interaction:** The programme provides an opportunity for constructing or configuring objects on the screen. For example, users have a possibility to actively create their own nodes and link models, i.e. they can add new nodes and new links between already existing nodes and in this way develop their own hypertext structure.
- **Reflective interactions:** The programme stores the learner's individual activities for further analysis (e.g. a navigation path within a hypermedia lesson). Furthermore, the programme can provide the learner with an 'expert path' or a 'guided tour';
- **Simulative interactivity***:* Objects on the screen are linked together and exchange information in such a way that a particular configuration of objects produces 'behavior' of these objects (simulations of machines, simulations of social interactions, etc.);
- **Non-immersed contextual interactivity:** The learner is involved in an activity that implies a pedagogical purpose. Many edutainment applications (software which combines education and entertainment) and adventure games use this kind of interactivity .
- **Immersed contextual interactivity:** This is virtual reality. Within virtual reality the user dives into a simulated three-dimensional world.

8.4.2 CD and DVD

With the rise of demand for educational software and the personal computers having very limited storing space approximately 10 MB of data (in initial years of personal computers), compact disc (CD) became a very appealing option for storing and retrieving data as well as playing the educational software. CD is an optical media storage device which has enhanced storage capacity than the earlier used magnetic media storage device like Floppy disc. One CD could contain data equivalent data capacity of 500 floppies and is almost seven times more durable than the floppy.

A compact disc (CD) is a round, thin portable storage medium that can be used to record, store and play back audio, video and other data in digital form. A standard compact disc measures 4.7 inches, or 120 millimeters (mm), and is 1.2 mm thick. You can store up to 700 MB data in any form, though initially CD was used for storing audios.

CD has many formats like:

- CD-Read-Only Memory or the CD-ROM could only be read by CD-ROM drive on any computer. It was available in 1985.
- CD-interactive was released in 1993 wherein more interactivity was introduced. It started with educational music and self improvement titles but later on games were added.
- CD-Rewritable (CD-RW) was available for rewriting data as the CD used earlier when burnt could not be used again. The problem in using CD-RW was that it was unreadable to many early CD players as CD-RW used a metallic alloy that reflected differently than regular compact discs.
- CD-Recordable **(**CD-R) is a compact disc that can be written once and read many times, but unlike the CD-RW, the CD-R can be read on CD players released prior to its own introduction.
- CD-ROM extended Architecture**:** The CD-ROM XA is an extension of the standard CD-ROM that allows audio, video and computer data to be accessed simultaneously.

CD was widely used for multimedia and educational software. As its cost became more affordable, its popularity gained tremendously. But now-a-days, its use is on decline with the availability of cloud services and other digital data managing and storing options.

A more advanced and somewhat digital version of CD is DVD. DVD is Digital Versatile Disc or Digital Video Disc. A DVD or DVD-ROM is a disc capable of storing large amounts of data on one disc though it is of the size of a standard CD. Like a CD, any kind of media data may be stored on DVD and retrieved whenever needed. DVD can be played on a computer through a part or unit called DVD drive and its associated software. One of the free and open source media player which works across many operating systems like Windows, Mac, and Linux is VLC. The Windows Media Player on Windows operating system also supports most DVDs and CDs as well as all DVD drives are capable of reading both CDs and DVDs. DVDs are especially used for large sized multimedia programs and video programmes. Also educational games with high level of interactivity are available on DVDs.

Although with advent of cloud, streaming and pen drives, DVD usage has declined, but it is still quite popular and widely used. In spite of more cloud, streaming and other storage options, CD and DVD are available for games and other uses.

Besides the use of CD and DVD, other computer based teaching learning programmes are Computer Assisted Instruction (CAI), Computer Based Instruction (CBI), etc.

8.4.3 Computer Assisted Instruction (CAI)

As the name suggests, CAI is an interactive and self-learning technique. The content is presented on computer screen and the learner interacts with the computer for learning. It could be offline/online, involving interaction of the student with the contents presented on the computer screen in the form of programmed instruction.

CAI uses a multimedia i.e. combination of text, graphics, sound and video in enhancing the learning process. It is delivered through the use of the computer to facilitate and improve instruction. Important modes of delivery or instructional strategies used in CAI are tutorials, drill and practice, simulation, games, etc.. These are used for presentation of content and assessment of learner's understanding. Therefore, a typical CAI will have multimedia content, mostly text, multiple choice questions, problems for application , immediate feedback, notes on incorrect response, exercises for practice, and result of learner performance.

Advantages of CAI

The advantages of CAI are:

- Individualized instruction i.e. Learners learn according to their own pace.
- Learning is self-directed as learners decide when, where, and what to learn.
- It motivates learners as they learn at their own way and pace.
- There is freedom to experiment with different options as learner learns individually.
- Immediate feedback to the answers is provided to enhance student learning.
- It provides teacher more time to devote for individual student.
- It helps shy and slow learners to learn as they do not feel awkward and humiliated in front of class.
- Use of multimedia in CAI helps learners to understand difficult concepts through multi sensory approach.

Disadvantages (Limitations) of CAI

In spite of many advantages, CAI has some limitations.

- Lack of adequate infrastructure.
- Non-availability of good CAI packages.
- If not used judiciously, a learner may feel overwhelmed by the information and resources available.
- Tendency of overuse of multimedia which may divert the attention of learner from the content

- Learning becomes too mechanical.

Computer based learning is not only meant for the normal children but has the capacity to cater to learners with special needs.

Check Your Progress

Notes: a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

8) Fill in the blanks with suitable words

a) The different building blocks of Multimedia are Text, Images and graphics, Audio, ... and .....

b) Multimedia may be broadly divided into ..... and .....

c) The storage capacity of CD is .....

d) Passive learning through multimedia can be made active through the uses of .....

8.5 SOFTWARE FOR SPECIAL LEARNERS

In earlier sections, we have discussed how technology helps in individualizing learning experiences**.** Learners with special needs also require individualized learning experiences. Learners with special needs have a range of provisions of education from regular schools to specialized residential schools. Learners with special needs receive their education in the least restrictive environment (LRE). In recent times, inclusive education is being implemented in school system. In

Fig. 8.2: Assistive Technologies

Source: Unit 10 : ICT for Educational management in Critical Understandings of ICT, www.riemysoure.ac.in/ict/index.html

inclusive schools all students with special needs are taught in regular classroom and extra provisions are provided to cater to their special needs, over and above the needs of the regular classrooms.

There are many technological innovations which can help learners with special needs to learn in the regular classroom. There are many assistive technologies and many software which can help learners with special needs (Fig. 8.2).

The technology which helps students with special needs are commonly called assistive technology (AT) which simply means technology that helps a learner with special needs to enhance or maintain his/her level of functioning. AT includes technologies like laptops with specialized programs, like speech to text, text to speech, graphic organizers and word prediction software which increase, maintain, or improve the functional capabilities of a child with a disability. It is enabling and empowering for all individuals with special needs, various range of cognitive/ learning, and physical disabilities, to be more independent, self-confident, productive and better included in everyday life, education, employment and living.

Nature of Assistive Technology

Assistive Technology refers to any technological tool that allows learners with special needs to be more independent, self-confident, productive and better included in everyday life. It helps in compensating for the deficit in the learners' abilities and skills. It increases their learning and functioning by lessening and removing any barriers in learning and functioning. This forms the basis of inclusive education, wherein special learners are taught in the regular classrooms. Assistive Technologies support their participation and learning in classroom. It further motivates them to learn like normal children in the classroom and also strive to do best of their abilities.

As with normal children learners with special needs have their own unique set of strengths, weaknesses, interests, experiences and special abilities. Therefore, technology needs to be individualized and chosen with reference to the special abilities of learners and the context of learning. The technology varies from low grade technology to medium to high, sophisticated technology. Some commonly used technological devices are:

- Digital recorders, and books which are reading systems that utilize a computer, scanner, and software to "read" scanned book pages out loud, e.g. Kurzweil
- Speech recognition software that allows a computer to operate by speaking to it, e.g. Siri, Watson
- Speech recognition system that turn oral language into written text, e.g. Dragon. Google also provides this facility.
- Software that predicts and edits words for students who struggle with spelling, e.g. WordQ.
- Mind mapping/outlining software.
- Global Positioning System (GPS)

Besides these, there are some specialized software which help learners with special needs in their learning. These are screen reading software or the screen readers. **Screen Reader** is a screen reading software especially designed for visually

impaired learner to learn the displayed matter on the computer screen. It is especially designed to recognize and detect text as input and give speech or the voice as output. Thus, it acts by recognizing the text being displayed on computer screen, which is spoken aloud by speech synthesizer as speech which is enabling and empowering for a visually impaired learner to be independent in use of computer. If a print is required in form of tactile dots, the system may be connected to Braille display wherein the Braille printed matter will be provided as output.

With the use of screen readers, a visually impaired learner can communicate through computer like a sighted person. There are many screen readers available compatible with different operating systems of the computer. They may be chosen according to the context and need of the user.

JAWS10.00

JAWS for Windows is one of the most popular screen reader which reads aloud what's on the computer screen and helps the visually impaired person to be an independent individual as a learner as well as a worker. It was developed by Freedom Scientific Company. JAWS are compatible with most of the commonly used applications. It has an array of versatile features wherein it provides for Braille output in addition to speech output.

Non Visual Desk Top Access (NVDA) is a free and open source solution to visually impaired person supported by NV Access Organization. NVDA is bundled with eSpeak which is also a free and open source multi-lingual speech synthesizer which helps learners to use many languages. NVDA has been translated in twenty languages of the world. It allows visually impaired learner to get feedback as synthetic speech and Braille. It has ability to run entirely from an USB stick without installation, thus supporting mobility. It has basic support of Microsoft and thus empowers the special learners to access and interact with Windows Operating System and many third party applications.

Super Nova: It is developed by Dolphin , one of the reputed players in the field. Super Nova is a full screen offering magnification, speech and Braille support, offering visually impaired learners the freedom to access Windows as per their desires and needs. It supports the whole range of visual impairments. It is suited for individual learners as well as group settings like classrooms, or work place.

SAFA: Screen Access For All (SAFA) is an improved version of READER. It supports Hindi text and helps in detecting a language. SAFA automatically speaks the language of the input or text in windows. It currently works with Microsoft word, notepad.

All the above software are on Windows Operating System.

A Linux supporting software is:

ORCA: ORCA is a free and open source scriptable screen reader using various combinations of speech, Braille and magnification.

As mobiles have become omnipresent, so there is presence of Mobile Screen Reading Software.

TALKS: It is developed by Nuance, a leading service provider. It supports over twenty languages . The screen reader can be adjusted with respect to volume and speaking rate. It has automatic caller ID announcement network, battery and other status indicators. No additional hardware is required for the software to run.

Mobile Speak: It is developed by Code factory. It also supports speech and Braille like other software. It can speak in Hindi besides ten other languages like Hungarian. It has 'voice on call'. It has integration of full screen magnifier with unique features such as font smoothing, cursor customization, status shortcuts and more. It has built-in dictionary to customize pronunciation.

Technology devices have helped to decrease isolation of learners with special needs to some extent. They empower learners with special needs to learn in regular classrooms in an inclusive environment.

One needs to do regular practice to use these devices effectively. The assistive technologies should be selected on the criteria of:

- **Effectiveness:** how well the technology enhances the learners' learning abilities.
- **Affordability**: how much it costs to purchase, maintain, and repair the technology.
- **Operability**: how easy the technology is to use.
- **Dependability**: how long the technology operates without reduced performance or breakdown.

Therefore, all the teacher education preparation programs should ensure that prospective teachers have knowledge and basic exposure to the technologies for learners with special needs. The learning environment needs to be designed or adapted for all students to have the opportunity for learning.

Check Your Progress

Notes: a) Write your answers in the space provided.
b) Compare your answers with the one given at the end of the unit.

9) Fill in the blanks by choosing the suitable words

a) The technology to help learners' with special needs is called ..... (assistant /assistive).

b) ORCA is ..... Software (Proprietary/free and Open source).

c) TALKS is screen reader for ..... (laptop/mobile).

d) Inclusive education is possible because of .....

8.6 SOFTWARE FOR ASSESSMENT

Learning is validated only through assessment. Assessment has significant role in teaching -learning process. Thus, we may say that assessment is the process of identifying, gathering and interpreting information about learner's learning. It involves a wide variety of methods and tools to evaluate, measure, and document both the process and the product of learning. There are two major types of assessment: formative and summative. It basically helps teachers and the system to improve student learning and also sets direction for ongoing teaching and learning process.

Formative assessment is usually considered "for learning" whereas Summative assessment is "of learning". Formative assessment helps to improve the process of learning whereas Summative assessment helps us to know whether we have been successful in achieving learning outcomes..

ICT has also opened numerous possibilities for assessment. Software for assessment are readily available like other fields of education for assessing student learning and providing feedback. Digital devices and software are available for construction, delivery, storage or reporting of student assessment tasks, responses, grades or feedback.

Various terms are used to describe the use of a computer for assessment purposes. These include:

- Computer-Assisted Assessment or Computer-Aided Assessment (CAA);
- Computer-Based Assessment (CBA);
- Online Assessment.

Although these terms are commonly used interchangeably, they have distinct meanings. Computer Assisted/Mediated Assessment refers to any application of computers in the assessment process. The role of the computer may be extrinsic or intrinsic in the assessment process. Computer Assisted Assessment is also known as *e*-assessment, which describes a wide range of computer-assisted assessment. In computer-assisted assessment, the computer often plays no part in the actual assessment of responses but merely facilitates the recording and transfer of responses between candidate and human assessor.

Computer-Based Assessment refers to assessment which is built around the use of a computer; the use of a computer is always intrinsic to this type of assessment. This can relate to assessment of IT practical skills or more commonly the on screen presentation of knowledge tests. The defining factor is that the computer marks or assesses the responses provided by Iearners. Online assessment refers to assessment activity which requires the use of the internet. In reality, few high stake assessment sessions are actually conducted online in real time but the transfer of data is conducted through the internet prior to and after the assessment session. There are many examples of practice and diagnostic tests being run on real time over the internet.

Christine, R. (2013) provided an overview of developments and trends in technology-enhanced assessment by elaborating the work of Bunderson (1989), Martin (2008) and Bennett (2010)) in the following figure:

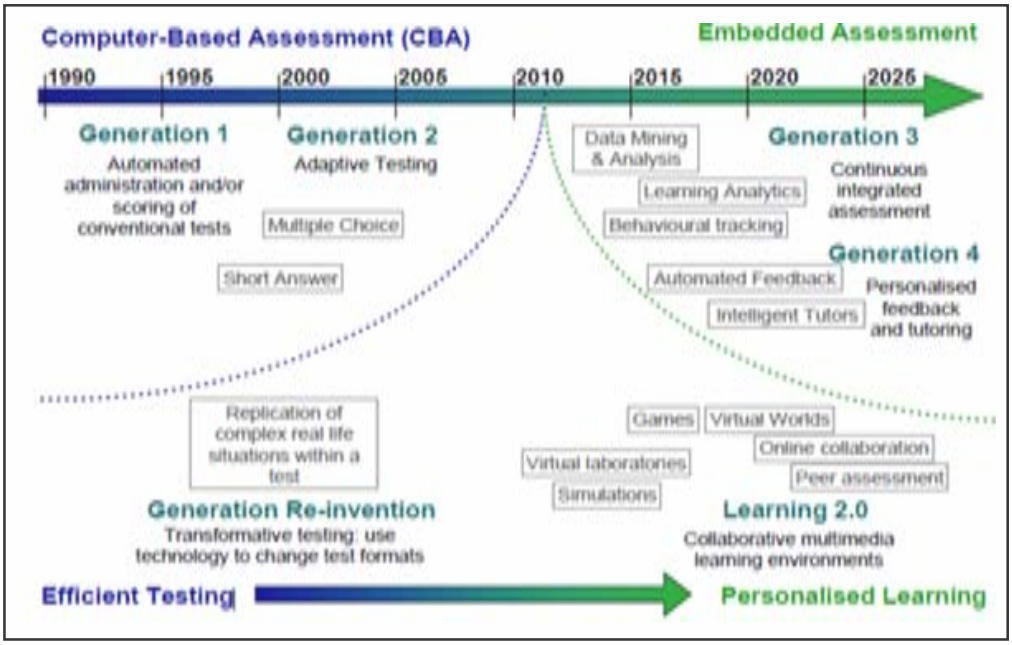

Figure 8.3: overview of developments and trends in technology-enhanced assessment

Source: Elaborated by the autor on the basis of Bunderson (1989), Martin (2008) and bennett (2010)

Christine, R. (2013) tried to consolidate the use of e-assessment and identified two conceptually different approaches:

Computer-Based Assessment (CBA): In this form of assessment computer acts as a platform to run the assessment. It involves assessment questions like multiple choice questions. Assessment is not only summative or "of learning" but formative or "for learning". It is not done at the end of teaching consisting of recall or recognition type questions but is now being designed as part of teaching-learning process integrated with contextual problems or case study based questions. Thus, mere memorization does not help but the use of Key Competencies is required to answer these questions.

Now, there are software available for student assessment. These are also customized according to the need of the learner, curriculum and the organization. **Technology-enhanced learning (TEL)** environment is another software based application of assessment wherein focus is on learning analytics besides there are provisions of embedded assessment of higher cognitive abilities like critical thinking, and problem-solving.

Computer Assisted Assessment (CAA): In **c**omputer-assisted assessment, as the name suggests, computer is used to assess students' learning and performance. It is used in both formative and summative assessment. The computer assisted assessment could be online or offline. Offline assessment is done with the help of Optical Mark Reader (OMR). Computer Assisted Assessment is primarily formative in nature and provides teachers timely feedback on how best to teach a subject. It can also be summative, with limited feedback being given at the end of a course and serves to grade and categorize student's work. It can also be diagnostic to find out learning difficulties of learners.

Advantages

- Computer assisted assessment is generally objective testing; testing that can be marked objectively and thus offers high reliability.

- The tests can be marked quickly and easily, and adapted to meet a wide range of learning outcomes.

Disadvantages

- Construction of good objective tests requires skill and practice and so it is time consuming;
- Hardware and software must be carefully monitored to avoid failure during examinations;
- Security issues can be a problem in Web based CAA;
- Students require adequate IT skills and experience to answer assessment questions.

Online Assessment: Online assessment is the process used to assess student learning wherein the assessment is carried out via a computer connected to a network. It is a CBA but through connected network. Network connectivity is important for this as assessment is carried out online. The test is not located in the stand alone computer but is administered through the networked computer. Online assessment provides flexibility and scale to conduct examinations of various candidates at a given point of time. Processing of result is quick. It can also provide useful analytics for the academic and administrative decision-making. Very often, online assessment is carried out for recruitment, employee training, entrance examinations, etc. With the emergence of read write web and the development of software as a service (SaaS), it is possible to design and conduct online assessment with ease.

Online assessment can be used to assess cognitive and psycho-motor abilities. The cognitive abilities are assessed using online-testing software, whereas psycho-motor abilities can be assessed using e-portfolios, virtual labs, or simulation software. Online assessment has the following advantages:

- **Flexibility:** There is flexibility in conducting online assessment in terms of time and place like the open education system.
- **Lowers the overall cost**: It can be used again and again.
- **Feedback is instant:** Students get instant feedback in most cases and thus acts as a motivator to learners (immediacy of reinforcement is very important)
- **Reduces the subjectivity:** It reduces subjective biasness of the assessor as it happens in paper and pencil test.
- **Helps in analytics of both system and learner:** Data is stored for a longer time and can be retrieved as per the need for analysis.
- **Incorporation of multimedia and interactivity:** Multimedia and interactivity can be incorporated in the assessment process.

The major disadvantages of e-assessment are its higher cost of development in the beginning, in establishing assessment system and creation of question bank. Any e-assessment has to consider three major components. To effectively conduct e-assesment, three major components have to be catered for efficiently. They are:

1) **Creation of assessment questions –** Online assessment involves mainly two components: one is the platform which is software to create and deliver

the assessment questions and the second is the creation of question bank. The question bank is created by subject matter experts. Subject matter experts can also create assessment questions online. The questions have to be kept securely until the examination starts. The online assessment questions can be of different difficulty level and interactivity can also be incorporated in them.

2) **Supervision of assessment -** Students have to be properly identified, and screened to ensure that they do not compromise the standards of the exams.

3) **Marking of the student performance-** Marking is the ultimate stage in any assessment as it determines the success or failure of students. It is the stage that dictates the next level of success.

A major highlight of using a web based exam software or an online examination system is that it gives a high level of transparency as opposed to the traditional method of assessment. It is almost impossible to influence the process of framing questions and carrying out evaluation of student performance. Most online assessment generate their results instantly and it is often possible for the learner to get his/her results almost immediately.

There are many online service providers, both free and paid, for designing and developing online tests and quizzes.

One of the e-assessment is hand-held response system, which is used to carry out polls and surveys. It is popularly called **voting device or clicker**. In many school classrooms, it is used in combination with an interactive board.

Some of the online service providers are:

Eklavvya:

Eklavvya is an online assessment and knowledge management solution used by many Corporates, Professional Training Institutes, and Universities involved in skill based training. It is designed for regular Assessment for University Courses, Entrance Tests for Academic Courses, Various Test Preparations. It supports to assess according to difficulty level and curriculum. Question bank is created and questions randomization is possible. (reference: https://www.eklavvya.in/)

Rogo:

Rogô is the University of Nottingham e-Assessment management system used to create and deliver online assessments. This online system supports the full process from question and paper creation (including peer and external examiner reviews) to the analysis of exam results and creation of reports. (refernce: http://www.nottingham.ac.uk/rogo/)

Hot Potatoes:

The Hot Potatoes software is a freeware since October 2009which is widely used to design e-assessment. It includes five applications that can create assessment exercises for the World Wide

Web. The applications are JCloze, JCross, JMatch, JMix and JQuiz. There is also a sixth application called The Masher that will compile all the Hot Potatoes exercises into one unit. Hot Potatoes was created by the Research and Development team at the University of Victoria Humanities Computing and Media Centre. Commercial aspects of the software are handled by Half-Baked Software Inc. (reference: https://hotpot.uvic.ca/)

E-Box

E-Box is a Technology Enabled Active Learning and Assessment platform. Apart from the basic LMS components like quizzes, assignments, lesson components, resource components etc. It has numerous activity components pertaining to technology and engineering concepts that could be used for design of analysis oriented learning. These components are also used for assessing the design and analysis of skills of candidates, apart from testing their regular knowledge. (reference: http://e-box.co.in/#page-top)

myexambox

myexambox is platform to create your own online examinations and share them privately free. You may also create and share your quality online examinations with others and publicly. The platform also allows you to modify and update your online exams on the basis of learners' performance, feedback and ratings. The platform also provides publicly available quality online exams which may be used anytime. (reference: https://www.myexambox.com/)

Activity

- Explore the websites of any three assessment tools
- Compare the features of these tools
- Find any two assessment tools you think good.

8.7 LET US SUM UP

Software, used in teaching-learning process and other functional areas of education, are known as educational software. The vast collection of educational software can be divided into two categories: content-free software and content-rich software. There are three main parameters to assess educational software :Usability, Usefulness; and Desirability. Any good software, especially an educational software, must have all the three characteristics. Free and Open-Source Software (FOSS) is computer software that can be classified as both free software and open-source software. Anyone is free to use, copy, study and change the software in any way as per his/her need and context. Multimedia uses text, graphic art, sound, animation, and video in different combinations but in an integrated and holistic manner. Mostly, multimedia are broadly of two types: Linear and Non-linear. Interactivity influences the process of learning and the contents in different ways. It could be simply manipulating objects on the screen by mouse activities or immersed contextual interactivity wherein the user ventures into a simulated three-dimensional world within virtual reality. CD and DVD are widely used for multimedia and educational software. Technologies which

are used for empowering the learners with special needs are called Assistive technologies (ATs). They include technologies such as laptops with specialized programs, like speech to text, text to speech, graphic organizers and word prediction software which increase, maintain, or improve the functional capabilities of a child with disability. Learning is validated through assessment. Assessment has significant role in teaching –earning process. Thus, we may say that assessment is the process of identifying, gathering and interpreting information about student's learning. Various terms are used to describe the use of a computer for assessment purposes. These include:

- Computer-Assisted Assessment or Computer-Aided Assessment (CAA);
- Computer-Based Assessment (CBA);
- Online Assessment.

8.8 SUGGESTED READINGS AND REFERENCES

- Anderson, B.B.& Brick, K.V.D. (2013). *Multimedia in Education Curriculum.Russia Federation*: UNESCO Institute for Information Technologies in Education. retrieved from http://unesdoc.unesco.org/images/0022/002241/224187e.pdf on 19.05.17
- Computer Software (n.d.) RIE, Mysore. retrieved from http://www.riemysore.ac.in/ict/unit__3__computer_software.htmlon 21.05.17
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- Redecker Christine. R. (2013). *The Use of ICT for the Assessment of Key Competences.* Luxembourg: Publications Office of the European Union.

8. 9 ANSWERS TO CHECK YOUR PROGRESS:

1) False.
2) False
3) True
4) False
5) Proprietary software is software that is owned by an individual or a company and Open source software is software whose source code is available for modification or enhancement by anyone.
6) UBUNTU; Audacity; Free Mind; eXe; Libre Office; GIMP; Inkscape
7) FOSS grants four essential freedoms to its users:
   - to run the program as you wish for any purpose.
   - to study how the program works and change it so that it does your computing as you wishes. Access to the source code is a precondition for this.

- to redistribute copies so you can help your neighbor.
- to distribute copies of your modified versions to others.

8) a) Video; Animation.

b) Linear; Non-linear

c) 700 MB

d) interactivity

9) a) assistive

b) free and open source

c) mobile

d) assistive