

Block

# 1

## **ICT IN EDUCATION AND ITS IMPLICATIONS**

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**ICT for Teaching and Learning** 5

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# BESL-122 APPLICATION OF ICT

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## Course Cum Block Introduction

ICT has become ubiquitous in our daily lives. Technology in all its glory has the potential to change the face of the teaching-learning process. This can be possible only if teachers are equipped with skill sets that will help them realise the potential of ICT in the Classroom. The course aims at helping teachers tap into the diversity of learning experiences provided by digital media.

You must have observed that other courses in this Programme have more than one Block. In this Course, however, we have only one Block which is divided into four units: the first unit – *ICT for Teaching and Learning*- equips the teachers with strategies to adopt and adapt ICT in their classrooms. It dwells on how constructivism coupled with ICT tools can change the face of the teaching-learning process.

The second unit – *Use of ICT in Evaluation and Research*- will provide a glimpse as to how using ICT can help the teacher gain a perspective into the learning curve of the student. The unit also discusses various methods that teachers can use in their daily classroom experiences to incorporate ICT in the assessment process. The unit also discusses how teachers can turn into researchers and methodically solve problems they face in their professional spheres.

The third unit – *ICT for Administrative Support*- outlines how ICT is an integral part of school administration. It also discusses the various ways in which ICT can be and is being used across schools. The unit also suggests ideas of linking administrative data with curricular activities to make the learning process joyful.

The fourth unit – *ICT for Building Knowledge Society*- discusses how the knowledge of ICT helps to build a knowledge society. The unit also describes ways in which teachers can participate in developing a knowledge society by tapping into various professional development avenues.



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# UNIT 1 ICT FOR TEACHING AND LEARNING

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## Structure

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Concept of ICT
- 1.4 Context and Rationale of ICT use
- 1.5 Role of Teachers
- 1.6 ICT use for Supporting Traditional Teaching and Learning
- 1.7 ICT-Mediated Shift Towards Constructivist Approaches
- 1.8 ICT Integration in Teaching
- 1.9 Let Us Sum Up
- 1.10 Unit-End Activities
- 1.11 Answers to Check Your Progress
- 1.12 References

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## 1.1 INTRODUCTION

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Evolving Information and Communication Technologies (ICTs) if used appropriately, benefits activities in which knowledge and communication play a critical role, like improved teaching and learning processes, increased student engagement, seamless communication with parents, school networking, more efficient management and monitoring within the school (United Nations Educational Scientific and Cultural Organisation [UNESCO], 2011). Therefore, educational systems around the world are under increasing pressure to use new ICTs (UNESCO, 2002). In response to this demand India has been taking initiatives such as formulation of a policy on ICT in School Education (2012), ICT@Schools Scheme (2004, revised in 2010) and National Mission on Education through ICT (NME-ICT) (2008-09). Following these initiatives, access to ICT in educational institutions is being enhanced. Teachers are also being urged to integrate ICT in educational activities.

Integration of ICT requires an understanding of the concept of ICT. However, as a practice it is defined in the context in which it is undertaken and comprehending the context of ICT use in school education is also essential. This unit introduces you to these aspects and also includes deliberations on the role of teachers in an ICT-enabled education system and the mechanisms for ICT integration in teaching and learning. This unit thus provides a theoretical basis for ICT use in schools, especially in teaching.

Since, ICT use is supposed to be guided by the recognition of its potential to reform education by implementing the contemporary approaches to teaching and learning, this unit presumes an understanding of the theoretical underpinnings of these approaches, in other words the theories on learning, as well as an understanding of pedagogies and pedagogic practices like content analysis, formulation of instructional objectives and instructional strategy.

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## 1.2 OBJECTIVES

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**After studying this Unit you are expected to:**

- explain the concept of ICT;
- describe the context of ICT use in education;
- depict the role of the teacher in ICT-mediated teaching and learning;
- demonstrate the use of ICT in supporting knowledge construction; and
- describe the method of ICT integration in teaching-learning process.

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## 1.3 CONCEPT OF ICT

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What is the meaning of the term ICT?

ICT is often associated with devices, such as computers and software, but it also encompasses more conventional technologies like radio, television and telephone technology (UNESCO, 2007). Christensson (2010) says that ICT refers to technologies that provide access to information through telecommunications. This places radio, television, CDs, conferencing facilities and the likes in the category of ICTs but not a chart paper nor an over head projector. The National Policy on ICT in school education (2012) of India defines ICTs as

“all devices, tools, content, resources, forums, and services, digital and those that can be converted into or delivered through digital forms, which can be deployed for realising the goals of teaching-learning, enhancing access to and reach of resources, building of capacities, as well as management of the educational system” (p.4). This document further says that not just hardware devices connected to computers, and software applications are included within this definition, but also interactive digital content, internet and other satellite communication devices, radio and television services, web based content repositories, interactive forums, learning management systems, and management information systems are included within the concept of ICT. Apart from these techniques and technologies, the document adds to this list the processes for digitisation, deployment and management of content, development and deployment of platforms and processes for capacity development and creation of forums for interaction and exchange.

We find that this definition of ICT is not just comprehensive but also describes ICT in the context of education. The emphasis of this definition is on technologies that make accessible digitised content. Teaching aids like a working model of a pulley and a chalkboard are therefore excluded from the concept of ICT.

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## 1.4 CONTEXT AND RATIONALE OF ICT USE

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A school being a social agency, educational practice including ICT use in school needs to be conceptualised in the societal context. The societal context however being dynamic, the practice of using ICT will have to be geared to the contemporary context. In other words, we need to consider the societal requirements and how use of ICT in education can fulfill it. Hence the practices during the knowledge age will not be the same as that during the industrial age.

This is because in a knowledge society the focus needs to be on learning as development of human capabilities that are fundamentally social and socio-technical where innovation, knowledge creation and communication are the key to individual as well as social development, against the tradition of transmitting knowledge into the minds of the learners followed during the industrial age (Tuomi, 2008). The UNESCO (2002) refers to this tradition as the factory model of education whereby huge numbers of learners are prepared for low skilled jobs by teachers acting as repositories and transmitters of information for filling up the deficits in knowledge.

Since ICT use in schools in India is guided by a national policy, the vision and the mission of the policy can help us to define the context of ICT use. The vision of this policy is that “the youth is prepared to participate creatively in the establishment, sustenance and growth of knowledge society leading to socioeconomic development of the nation and global competitiveness” (p.3). In order to fulfill the vision, the Policy has many requirements like optimum utilisation of ICT for collaborative activities leading to the creation and sharing of localised and digitised resources (on websites, blogs, e-groups, forums, wikis, NROER), the development of professional networks of teachers [like Andhra Pradesh Maths Forum of Teachers and Subject Teachers Forum (STF) of Karnataka State], resource persons and schools to catalyse and support resource sharing, up gradation, and continuing education of teachers (through telecast/broadcast, video conferencing including use of EDUSAT networks) and for providing support to students; network of school managers and administrators resulting in improved efficiencies in the schooling process is also required. Finally it calls for a critical understanding of ICT, its benefits and the precautions to be taken while using it. We find that the policy underscores the need to use ICT for creating learning communities, which not only seek and access information but also create and share digitised resources. These are also the requirements of a knowledge society. The needs of a knowledge society and especially the need for preparing a workforce for the knowledge society through ICT-mediated education can be inferred as the context for ICT use in schools. Hence ICT needs to be viewed critically for its utility to fulfill the knowledge society needs.

The constituents of the context of ICT use in schools comprise four themes as per the UNESCO (2002). They are - ‘context and culture’ requiring technology use in contextually and culturally appropriate ways; ‘leadership and vision’ , which is about effective planning and implementation of technology use; ‘planning and management of change’ that necessitates keeping pace with evolving technology and being able to manage change; and ‘lifelong learning’, which is about technology mediated continuous learning. India’s national policy also requires *localised* resource creation in all the 1652 Indian languages (NCERT, 2006) and sharing as they are more contextual and culturally appropriate. It also requires vision and hence, critical viewing of ICT and planning its optimum use.

As per UNESCO (2002), in a technology based globalised economy, there is a need to shift from traditional approach of teaching and learning towards approaches that employ the new digital technologies for creating learning environments in which students are engaged learners, able to take greater responsibility for their own learning and construct knowledge. It entails ICT use for shifting the focus on learning from teaching and from traditional approaches of transmission for knowledge acquisition, towards knowledge creation, making



learning an active, collaborative and contextualised process. Therefore, the contemporary theories of learning, the needs of a globalised world and the potential of the emerging technologies comprise the context of ICT use. Teaching with ICT is therefore not supposed to be a linear transmission of bits of information and learning is not supposed to be acquisition of information thus transmitted, but construction of knowledge should be an integrative and contextualised process. For instance for developing the concept of the Taj Mahal instead of a lecture on its dome supported by text projected through a slide show presentation programme in the first period followed by that on its minarets in the second and then on its marble in the next period, a virtual tour to Agra with suitable visuals and narration helps in conceptualising the monument as a whole within its historical, geographical and architectural context in an integrated manner. When the virtual tour is undertaken as a group that discusses their ideas on the Taj and seeks more information on it, learning is learner centered, self regulated and in a social context.

UNESCO (2011) aligns educational and socio economic goals and requires teaching methods which are appropriate for evolving knowledge societies and ICT use is supposed to be in view of the factors that determine socio-economic productivity in a knowledge society .

We find that the vision of the UNESCO frameworks and that of India’s National Policy on ICT in School Education are fundamentally similar. Both require ICT use in the context of the contemporary theories on learning that underscore cooperation and collaboration over traditional forms of teaching. They also require ICT use to be such that the socio-cultural demands of a knowledge society are met. The knowledge society requires human resources capable of using ICT for knowledge sharing and creation. It is crucial to keep this context in mind while using ICT as introduction or even integration of technology in teaching sans learners being engaged in information processing, collaborative content creation and problem-solving may not necessarily cause marked reforms in instructional practice (UNESCO, 2008).

**Check Your Progress 1**

Answer the following questions:

1) Explain the concept of ICT.

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2) Mention three uses of ICTs.

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3) Which ICTs do you use in your daily life?

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## 1.5 ROLE OF TEACHERS

ICT provides information, facilitates information processing, and supports problem-solving and collaborative learning. Will the role of teachers then become redundant? The National Policy on ICT use in Schools envisions the need for teacher education for ICT-mediated teaching and learning. The UNESCO (2002) has developed frameworks to guide teacher education programmes for making teachers capable of using ICT in schools. The teacher therefore needs to continue playing a crucial role in ICT-mediated teaching and learning but the role is being redefined because of the changing context of ICT use in education and the realisation of the potential of ICT to align teaching and learning with the knowledge society requirements.

India’s National Policy on ICT in School Education says that teachers will participate in selection and critical evaluation of digital content and resources and also develop their own digital resources. The UNESCO (2002) requires teachers to carry out technology infusion in the instructional practices through planning, implementing and managing instructions, assessing and evaluating learning, and move towards more student-centered approaches from a stage when it is used to support traditional teaching and learning; use ICT for creating networks, for seeking and sharing resources with professionals and the community; be aware of the moral and legal aspects of ICT use like copyright, intellectual property rights, and an understanding of health related issues emerging from prolonged ICT use like the impact on eyes, posture, general fitness, etc.; select appropriate technology and update their ICT skills to keep pace with the emerging technologies. Therefore the teacher has many roles to play.

The UNESCO (2011) also indicates roles to be played by teacher while using ICT in education. This document has proposed a framework comprising three overlapping approaches.

- 1) The first approach, the *technology literacy approach* is about development of skills to use ICT.
- 2) The second approach is the *knowledge deepening approach* that requires ICT use for applying concepts learnt to complex and real-world problems through student-centered pedagogies involving collaboration and problem-solving. The teacher is therefore expected to structure tasks, facilitate collaborative learning, manage information, integrate appropriate tools, applications, digital resources and networks so that learners can access, communicate, collaborate, analyse and solve problems using ICT.

- 3) The third approach is the *knowledge creation approach* that aims at creating human resources capable of knowledge creation, innovation, lifelong learning, critical thinking, creative expression, metacognition and self management. Teachers need to progress from the first to the third approach while carrying out various activities using ICT.

For the first approach, understanding ICT in education, teachers need to develop awareness of ICT policy, its understanding and thereafter carry out innovation. The second approach pertains to curriculum and assessment and teachers are expected to use ICT to collaboratively develop educational content which will benefit teachers and learners, teach and also assess learning using ICT. The third approach, 'pedagogy' requires teachers to integrate technology in instructional processes and progress to complex problem-solving by collecting and processing information, discussing it using ICT and applying previous learning to solve the problem, which may be for instance how to teach in a multi grade classroom, how to implement formative assessment and so on and also carry out self management and hence metacognition that involves self assessment. For the next activity 'ICT', teacher is expected to progress from using basic to, complex to pervasive tools, used for activities like accessing resources and communicating and keep pace with evolving technologies. For the activity 'organisation and administration' teachers' progression is expected from learning in standard classroom to collaborative groups to learning organisations. This requires teachers to shift from teaching for individualised learning towards collaborative learning using technologies like web 2.0 technologies such as blogs, wikis, social networking sites, email based discussion groups and so on. For the activity 'teacher professional learning' a teacher is expected to progress from digital literacy to being a model learner who learns throughout life using ICT for creating knowledge and sharing it.

We thus see that a teacher has an important role in critically selecting ICT, planning and arranging ICT-mediated teaching and learning and also in assessing learning.

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## 1.6 ICT USE FOR SUPPORTING TRADITIONAL TEACHING AND LEARNING

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ICT is commonly used for supporting traditional methods of teaching like lectures. This method only alters the source of information and replaces the teacher with a technology. This kind of use encourages individualised learning and fails to tap the potential of technology for interactive and collaborative learning (Laurillard, 1993) and technology is selected not because of its potential to reform education but mainly because it is accessible and can substitute the teachers for instance in distance learning. This is definitely an important use of ICT and is the mainstay of distance education. Nevertheless if it is used in a school, within a classroom only because the school possesses the particular technology and there is a policy requiring ICT use, it amounts to a technocentric approach to technology integration. This approach undermines pedagogical appropriateness of technology and requires instructional procedures to fit into the demands of the technology in which the institution has invested. For example slide show presentation programme may be used to support a lecture but it may not benefit instructional procedures except by replacing a chalkboard. ICT is used in these cases to strengthen or replicate traditionally imparted instructions involving

mainly lectures and thereafter to support text-based drill-and-practice instruction (Dwyer, Ringstaff & Sandholtz 1990). For instance, ICT can help in correct pronunciation through drill. This is a powerful use of ICT but not its optimum use, about which we shall discuss in the next section. Therefore as long as the pedagogy remains traditional, like delivering a lecture on Taj Mahal and using slides to project the main points, digital technologies will be used as Laurillard (2002) says only for supporting the traditional teaching-learning model. This approach may lead to occasional use of technology to justify the investment in technology and the policy on it but does not justify the use. Technology in such cases is the end rather than the means for transforming education and such investments in ICT may eventually remain underutilised (Suri, 2008) and we know that ICT is often used only to support presentations. This approach with the teacher holding the center stage in spite of using technology and the teacher using the technology while students remain passive recipients makes instructions even more teacher centered.

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## 1.7 ICT-MEDIATED SHIFT TOWARDS CONSTRUCTIVIST APPROACHES

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Oliver & Herrington (2003) say that too often the opportunities and advantages of the use of technology in the learning process are poorly exploited. This is likely when technology is used only for supporting transmission comprising lectures. We have discussed this in the earlier section. Thomas, Schanefeldt & Young, (1993) say that apart from transmission there can be transaction with the help of technology, which assumes learners to be active, rational thinkers who participate in problem-solving and also transaction which creates knowledge, through social interaction and reflection and fosters personal and social change if the instructional design is open to learners' participation through discussions and collaborations for solving problems by considering each other's views.

Traditional teaching and learning is mainly based on behaviourism. A concept is analysed into segments. A segment is taught, assessed, the right responses are reinforced and the student progresses to the next segment and as mentioned earlier ICT is used to support these activities. The approaches based on the contemporary theories of learning however oppose this approach. Constructivism is one such approach. A teacher can develop a constructivist environment by creating learning communities that comprise students, teachers and experts who are engaged in authentic tasks in authentic contexts (UNESCO, 2002). For instance one learns to drive by actually driving a car, i.e. by carrying out an 'authentic task', in an authentic context, which is in a busy street, where the learning is to be later applied. Let us consider another example. Some of us may not be able to differentiate between a wheat and a rice plant which one working in the authentic context 'field' can distinguish between the two, even if she never went to school.

Learning in authentic contexts is however not always possible. ICT helps in making things concrete through visuals, which may be animated and through virtual realities with simulated environments. Within virtual worlds people act, confront problems, interact, make decisions and try to solve problems. ICT use in education can thus take the learner closer to the authentic context.

You may have come across children doing their project work with the help of ICT. They evaluate sources of information and collect data, analyse it while processing it by techniques like tabulation, making calculations and so on then synthesise it as they project their findings and reflect on ways to make it better the next time. ICT is thus definitely used by individuals for constructing knowledge. However, learning is facilitated in a social context by observing, modeling, discussing and by doing things together. For instance we observe how a flat tyre is replaced and try it and the mentor monitors it. Now imagine a learner listening to lectures, learning the content by rote, reproducing it for assessment and then trying to do this task.

The ability to continually advance knowledge collaboratively is one of the requirements of the knowledge age (Tan, Hung & Scardimalia, 2006) but what amounts to collaboration? Collaborative work involves coordinated, synchronous activity with intertwined inputs emerging from a continued attempt by learners to build and maintain a shared conception of the problem and ways to solve it (Dillenbourg, 1999). ICT has the potential not merely to transmit information and thereby substitute the source of packaged information but also to support collaborative knowledge construction (Dias, 1999; Jarvela, Hakkarainen, Lipponen, & Lehtinen, 2001) and this potential has to be tapped by teachers. Web 2.0 technologies like wikis, blogs and podcasts if effectively deployed can enhance learning experiences, and deepen levels of learners' engagement and collaboration within digital learning environments (Boulos, Inocencio, & Wheeler, 2006). This is because sociability aspects of Web 2.0 tools built through their social software make them ideal for educational purposes as they can support conversational interaction, feedback and social networking (McLoughlin & Lee, 2007). We know that children are at home with these technologies and those not having the facility will be quick learners once they access the facilities. There is therefore, an emerging need for pedagogies that harness web 2.0 technologies to promote collaborative learning (Safran, Helic, & Gütl, 2007).

We have discussed earlier that learners need to solve problems in the real world for becoming a part of the knowledge society workforce. ICT can be used for problem-based learning and support higher cognitive abilities like analysis, synthesis, and evaluation to develop higher order thinking by engaging students in problems from the real world. For instance students may create a database of children of their community who have been vaccinated, discover the trends and draw inferences by data processing and share it with the community. ICT like spreadsheets and discussion forums may be used for working collaboratively on this problem. This type of activity with dialogue and discourse and collaboratively creating knowledge leads to distributed cognition. In fact ICT is actually being used for collaborative learning and problem-solving by children. Many children take help from each other for carrying out the projects assigned to individuals by the school and apart from discussions over phone; they post problems and seek online answers. Suppose a child posts her problem that she cannot understand a poem her teacher has taught on a social networking site. Her friends, holding different views may explain it differently. The learning therefore follows a social process with the consideration of multiple perspectives and with negotiation of meaning a shared understanding is reached. Knowledge is thus constructed in a social context with the help of ICT. The teacher may also join the group to keep the discussion focused, monitor the progress, assess continually the understanding and provide necessary support. UNESCO (2008) therefore suggests that ICT use

may be for information processing, collaborative content creation and problem-solving for reforming instructional practices.

ICT supports several learner centered approaches to teaching and learning. For instance, during *blended learning*, a learner learns in a classroom as well as at a distance from it using ICT. It is common for teachers to teach a topic in a classroom and ask students to work on an assignment or a project using ICT and submit it online. In a *flipped classroom* teachers may suggest resources and learners may learn at home using ICT for instance by using a video. The teacher supports and assesses the learning through classroom based projects, worksheets, discussions and so on. *Distributed learning* involves a multimedia method of instructional delivery with face to face instructions, online instructions, streaming video conferencing, television and radio programmes to form judicious combinations of electronic and traditional means. For instance, you may hold a discussion in your classroom on deforestation and suggest your learners to watch a video on it and read the content given in websites that you and the learners select.

ICT use therefore needs to be mainly for implementing the contemporary approaches to teaching and learning. It has to be used to enhance learner engagement and support collaboration, problem-solving, contextualised learning, knowledge creation and knowledge sharing. Many children are already using their computer and even smart phones for these activities on their own. It is common to find them discussing their project and home work with their peers using ICT. You may encourage, monitor and support them for carrying out learning in this way.

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## 1.8 ICT INTEGRATION IN TEACHING

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How to integrate ICT in teaching? Which factors guide the selection of technology? Access to ICT and the ability to use it are definitely crucial for ICT use but now that both are enhanced, we need to focus on the other factors that determine seamless integration of ICT in instructional processes. How can we integrate ICT in instructions? The Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009; Mishra & Koehler, 2006, 2008) is a framework that guides integration of technology into teaching and learning in meaningful ways (Bull & Bell, 2009; Abbitt, 2011). The constituents of this framework are the following:

- **CK (Content Knowledge):** the in-depth knowledge of the content, which includes the knowledge of the concepts, theories, ideas, and other such aspects of a discipline to be taught like life science, history, etc.
- **PK (Pedagogy Knowledge):** knowledge about how to teach the content, i.e. the methods of teaching and developing instructional strategies based on an understanding of how learning takes place, ways for representing the content and assessing learning, managing classrooms while teaching and the like.
- **TK (Technology Knowledge):** skills for operating ICT and also an awareness of various technologies, their nature, potential and the ways of using them for accomplishing instructional tasks.
- **PCK (Pedagogy Content Knowledge):** enables teachers to interpret the content, keeping in view learners' prior knowledge, their common misconceptions, instructional goals, and the nature of the content.



- **TCK (Technology Content Knowledge):** is about the role of technology in representing content, through processes like magnification, simulation, virtualisation, serving as a metaphor, and so on. It helps teachers in distinguishing between technologies that constrain and those that can facilitate the teaching of the content.
- **TPK (Technology Pedagogy Knowledge):** knowledge of how technology supports or constrains pedagogy.
- **TPACK (Technological Pedagogical Content Knowledge):** is an integrated knowledge that encompasses the knowledge of technology, pedagogy and content, their intersections and the way they affect each other.

How will you use this framework? Study the examples given below. The first two examples explain the components of the TPACK framework. For the rest you may do it yourself.

### Example 1

A language teacher, using her Pedagogical Knowledge (PK) decides to adopt an interactive teaching-learning session for teaching articles. With her Pedagogy Content Knowledge (PCK) she thinks of common grammatical mistakes children make and using her Technology Knowledge (TK) and Technology Content Knowledge (TCK) she decides to use an interactive whiteboard on which she writes grammatically wrong sentences. She asks her students to point out the mistakes and supports them in constructing correct sentences with the help of her Content Knowledge (CK). She groups her students and assigns each group a computer. As the groups discuss and reach an understanding and correct the grammatically wrong sentences on their computers that are connected to her computer, she carries out formative assessment and records the grades.

We see that the pedagogy she chose involved interaction and group discussion and thus student engagement and her choice of technology eliminated the need for repeatedly writing whole sentences on the chalkboard, cleaning it and rewriting them. The pedagogy and technology are thus suitable for the content she wishes to teach. She has also progressed from a stage of teacher using the technology to learners using it for applying knowledge.

### Example 2

A life science teacher wishes to teach the topic 'cell'. She will naturally possess the Content Knowledge (CK) required. Applying Pedagogical Knowledge (PK) and Pedagogy Content Knowledge (PCK) she may carry out content analysis, formulate instructional objectives and an instructional strategy with teaching methods relevant for teaching cells. In case her class has many students but limited facilities she may use pedagogy like lecture-cum-demonstration method. She will bring into play her Technology Knowledge (TK), Technology Pedagogical Knowledge (TPK) and Technology Content Knowledge (TCK), and choose a technology that supports this teaching method and represents the content better. She may therefore use a microscope to demonstrate epithelial cells scraped by her students from their cheeks. She may again use her Pedagogical Knowledge (PK) and use a collaborative project method for teaching the types of cells which she cannot demonstrate using a microscope and with her Technology Knowledge (TK) she supports the use of a web 2.0 technology like a blog for the project.

### Example 3

Teachers teaching Science, History and English collaborate to teach Taj Mahal through project method. The students collect information on the history of the Taj, its structure and the impact of air pollution on the marble from various websites. They write an essay on it using this information in groups using the wiki. The essay written by a group is edited by others and finally by the teachers.

### Example 4

A yoga teacher wants to teach certain asanas to his students. He groups his students. Each group visits some websites to find out the benefits of the asanas and posts a write up they have prepared on the benefits, on a blog they have created. The teacher checks their understanding and posts his comments on it. In the next class he demonstrates the asanas and shows them videos of the asanas. During the next period he divides the students into pairs. There is peer assessment as each student watches the other performing the asanas and using the video corrects the postures. The teacher facilitates and monitors the process.

### Example 5

A science and a mathematics teacher ask their students to study the height and weight of the students of the first three grades of their school and use spread sheets to record the data. The students determine the range of the data, distribute it in five to ten equal intervals beginning from the lowest and ending at the highest range and indicate the frequency (number) of children corresponding to each interval and then represent the entire information graphically. They also identify those with stunted growth, those underweight and overweight and interview their parents to determine the cause. The interview is recorded using a video recorder and a video is created using the graphical representation of the findings, the recorded interviews and narrations highlighting the need for nutritious and balanced diet, locally available inexpensive but nutritious food, physical exercise, sanitation, immunisation and other means for disease prevention. The knowledge thus created and recorded is then shared with the parents of the children studied.

The TPACK framework has gained wide popularity. However it may not be the only and necessarily the best way to integrate technology. You may also look for other such frameworks but you may consider the following while attempting to integrate ICT in teaching:

- The content to be taught;
- The instructional objectives;
- The pedagogy to be adopted;
- Technology that will support the content to be taught and the pedagogy to be adopted;
- The instructional design for integrating technology, in other words at which stage will the technology(s) be integrated and how it will be done;
- How to create learning communities and support knowledge construction in a social context using the technology?
- How to assess learning?



- Based on the outcomes of the assessment, decide the need for reformulation of the instructional strategy and re-teaching.

### Check Your Progress 2

Answer the Following Questions:

- 1) What is the role of ICT in traditional teaching and learning?  
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- 2) How can ICTs be used optimally?  
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- 3) Apart from factors like access to technology and the ability to use it, which factors determine technology choice?  
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.....

## 1.9 LET US SUM UP

ICTs if used appropriately benefit educational activities, especially teaching and learning. Therefore, educational systems including those in India are shifting towards ICT use in teaching. The National Policy on ICT in School Education (2012) of India defines ICTs as devices, tools, content, resources, forums, and services, digital and those that can be converted into or delivered through digital forms, useful for realising educational goals. These will not only include hardware devices and software applications, but also interactive digital content, internet and other devices like radio and television, etc. The context of ICT use in education is also important. The UNESCO frameworks (2002 & 2011) and the India's National Policy on ICT in School Education (2012) are fundamentally similar. Both require ICT use in the context of the contemporary theories on learning that underscore cooperation and collaboration over traditional forms of teaching and individualised learning for knowledge acquisition and also the socio-cultural demands of a knowledge society that requires a manpower capable of using ICT for knowledge sharing and creation.

Teachers need to participate in selection and critical evaluation of digital content and resources and also develop their own digital resources. They also need to carry out technology infusion in the instructional practices through planning, implementing and managing instruction, assessing and evaluating learning, and move towards more student-centered approaches and also use ICT for creating networks, for seeking and sharing resources with professionals and the community; be aware of the moral, legal and health aspects of ICT use. Besides teachers need to progress from technological literacy to knowledge deepening and knowledge creation in the various aspects of teachers' activity.

ICT has the potential to not only support traditional teaching and individualised learning but also social constructivism by supporting collaborative learning and knowledge creation. Therefore ICT needs to be selected with care keeping in view the need of the content, i.e. how to represent the content better and also the pedagogy as content, technology and pedagogy influence each other and comprise the factors that guide the selection of technology. It can be integrated into the instructional process by considering the various knowledge domains of the TPACK framework that guides technology integration into instructional processes.

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## 1.10 UNIT-END ACTIVITIES

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- 1) Select a topic you may like to teach. Which pedagogy will you adopt? Why? Which technology will be appropriate for the pedagogy and the content chosen? Why?
- 2) Develop a lesson plan for teaching a topic of your choice with appropriate technology (s).
- 3) Select a topic you may like to teach. Which technologies and pedagogies will make the teaching learner centered? Explain.

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## 1.11 ANSWERS TO CHECK YOUR PROGRESS

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### Check Your Progress 1

- 1) The National Policy on ICT in School Education (2012) of India defines ICTs as all devices, tools, content, resources, forums, and services, digital and those that can be converted into or delivered through digital forms, which can be deployed for realising the goals of teaching-learning, enhancing access to and reach of resources, building of capacities, as well as management of the educational system.
- 2) e-libraries, Digital resources within Open Educational Resources (OERs), Smart phone
- 3) Radio, Television, CD-ROMs etc.

### Check Your Progress 2

- 1) It is used only to support traditional forms of teaching like a lecture delivered by a teacher or for repeated exercise, i.e. drill.
- 2) By using its potential to process information, project findings and create knowledge as a team and share knowledge.
- 3) The content to be taught and the pedagogy to be adopted

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## UNIT 2 USE OF ICT IN EVALUATION AND RESEARCH

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### Structure

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Concept of Evaluation and Assessment
- 2.4 ICT-enabled Assessment – Use of Application Software and Online Resources
- 2.5 Developing E-Portfolios
- 2.6 Teacher Research – Hows and Whys?
- 2.7 ICT in Action Research
- 2.8 ICT for Continuous Professional Development (CPD) of Teachers
- 2.9 Let Us Sum Up
- 2.10 Unit-End Activities
- 2.11 Answers to Check Your Progress
- 2.12 References

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### 2.1 INTRODUCTION

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In the last unit, we discussed concept of ICT, context of ICT use and role of teacher in the perspective of ICT-mediated teaching and learning requirements. This unit is divided into three sections – ICT-enabled assessment; ICT for teacher research and ICT for Continuous Professional Development (CPD) of teachers. In this unit, we will focus on how using ICT in assessment can help teachers make learning a meaningful process. We will also discuss how teachers can turn into researchers and methodically solve the problems they face in their professional spheres.

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### 2.2 OBJECTIVES

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**After studying this unit you are expected to:**

- differentiate between evaluation and assessment;
- define the concept of ICT-enabled assessment;
- cite examples of how one can use ICT in school for assessment;
- explain the development of e-portfolios in school assessment;
- discuss the role of ICT for teacher research ; and
- elaborate the role of ICT for Continuous Professional Development (CPD) of teachers .

## 2.3 CONCEPT OF EVALUATION AND ASSESSMENT

Before moving ahead we need to have a clear understanding between the two concepts Assessment and Evaluation – let us visit Ms Radha’s class VIII. Ms Radha for the last three weeks has been teaching her students how to write newspaper articles, e-mails and description of pictures in English. After 3 weeks she gives her class a topic for newspaper article to write on. She receives the responses. As she reads the responses, she automatically writes Good, Interesting, Needs improvement, Excellent on the newspaper articles of her students. Here Ms Radha is evaluating the newspaper articles i.e. she is passing a judgment regarding the quality of the work of her students.

To understand the concept of assessment, let us visit Ms Radha’s Class IX. In this Class Ms Radha has been teaching her students to use correct prepositions – she teaches them the various rules associated with prepositions. In order to check her students, she gives them a worksheet. When Ms Radha checks the worksheets she realises, amongst many things, that 28 out of 30 students can use prepositions correctly. Ms Radha is able to assess her students on the learning outcomes that she has planned for the topic in her class.

In our classrooms we generally focus on **Assessment** and thus, this unit would focus on how ICT can help teachers in Assessment.

### So what is the Purpose of the Assessment?

Educators generally agree that there are two primary purposes for assessment: (1) to analyse student progress to determine the status of learning i.e. *assessment of learning*, and (2) to serve as an essential component of the learning process in order to promote and enhance further learning i.e. *assessment for learning*. These two purposes of assessment are not mutually exclusive, and there is no need to choose between them, it is useful to distinguish between their purposes and outcomes. If the assessment is *summative*, then the result will sum up learning achievement and can be used to give students a grade. In *formative assessment*, the teacher and students will use the results to shape further instruction and learning.

#### Check Your Progress 1

Write short notes (2-4 lines) on

1) Assessment of Learning:

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2) Assessment for Learning:

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## 2.4 ICT-ENABLED ASSESSMENT – USE OF APPLICATION SOFTWARE AND ONLINE RESOURCES

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### What are application software and online resources?

Evaluation and Assessment on a continuous basis, along with physical maintenance of cumulative records of a child’s performance is always a challenging task for the school systems. It also takes away a considerable time of teachers, hence ICT-enabled assessment is gaining popularity.

Teachers generally use application software in their teaching-learning process. Application software are software for end users and therefore are also called end-user programmes. The most common examples of application software are the software that help users in creating documents, spreadsheets, databases, and publications doing online research, sending email, designing graphics. A word processing application and online databases provide unlimited opportunities for teachers to design assessment tasks for students. Many open source application software are easily available such as Open Office. There are many collaborative platforms which have features like document processing, spreadsheet programme, presentation programme, survey form etc.

ICT has the potential to help teachers to assess students during their various stages of learning and also empower students to take control of their learning experience. ICT also enables students and teachers to document various stages of learning – this documentation cumulates into a portfolio of the student (**discussed in section 2.5 of this unit**). In the following sections we will combine concepts from Assessment, School Subjects and ICT to gain a better understanding of how the use of ICT in assessments can shape learning.

- **KWL CHART:** KWL Chart can be used with any content area to get students to start thinking about what they KNOW about a topic, what they WANT



TO KNOW about that topic, and what they have LEARNED at the end of the unit. This KWL Chart allows students to personalise their learning and helps the teacher gauge the student's pre-learning.

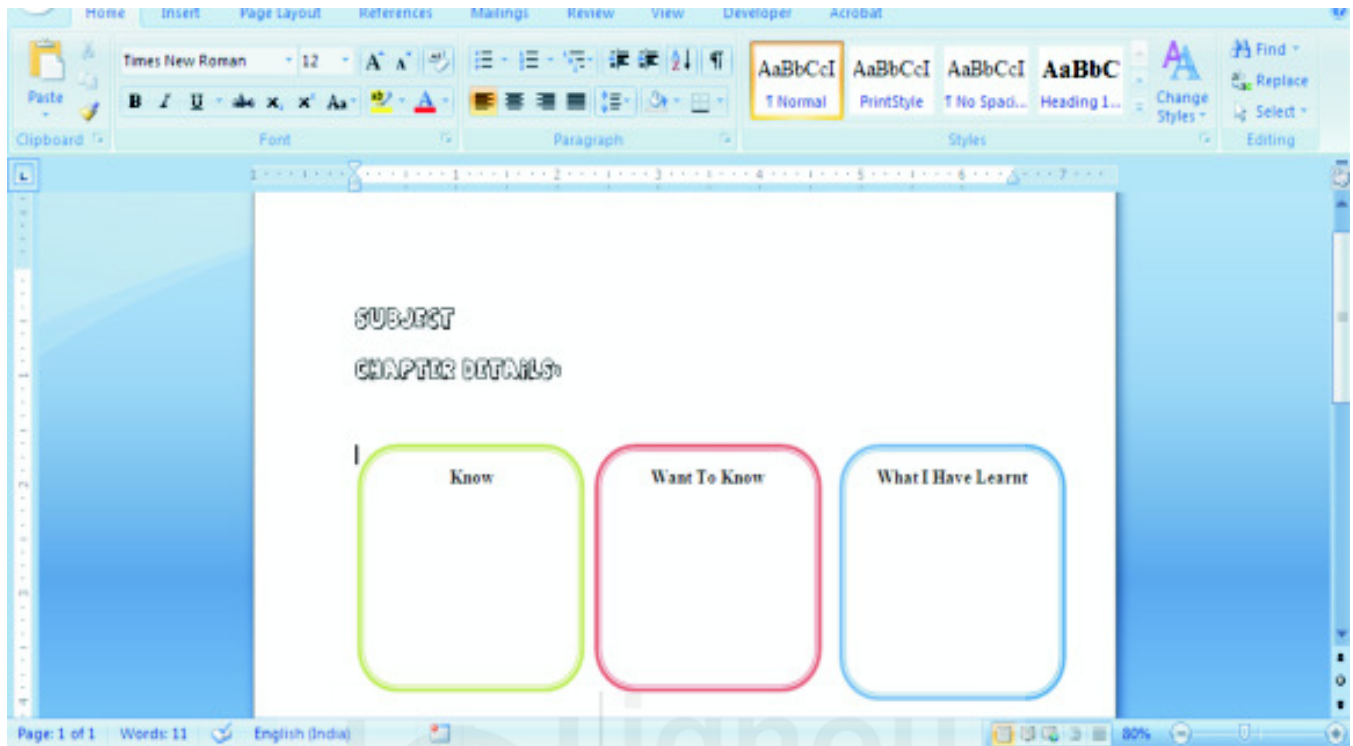


Figure 2.1: KWL Chart using Word Processing Software

**Application Software Used:** Word Processor – a Word processing software is a great tool that can help the student plan, modify and save the document.

- ONLINE SURVEYS FOR COLLECTING INFORMATION ABOUT STUDENTS' BELIEFS AND PREVIOUS KNOWLEDGE:** Many times as teachers you will experience that knowing what a student believes about a subject will help you approach the topic in a better manner. Like for example, with the proliferation of ICT, teachers and parents are very worried about the digital footprint that children create while they are online. If as a teacher you wish to discuss the concept of Internet safety you will need background information from each and every child about how they behave online. One way to do this – is to ask questions in the classroom and get students to raise their hand. Although this is a low cost technique and can be done anywhere, this method doesn't give the teacher an opportunity to gauge the understanding of the student. Using a survey in such a scenario would definitely help – but if the already burdened teacher has to collate data, many teachers would refrain from taking such initiatives. Online survey tools like Survey Monkey ([www.surveymonkey.com](http://www.surveymonkey.com)) allow teachers to create their own surveys. Online surveys help a teacher by presenting the collated data either as a chart or in a tabular form; it gives the students the flexibility to answer the survey whenever they wish. To ensure students don't take the help of others or don't get others to fill their survey form, it is necessary to frame the sentences accordingly.

- **BLOGS:** Blogs are web pages that are frequently updated by either an individual or a group of people. Apart from having the ability to share information and knowledge, blogs also give opportunity to the readers to comment and share on the information in the blog; it also allows the author of the blog to reply to the comments. The blog automatically arranges all posts (web pages) written by the author chronologically. It also allows the author to classify the posts based on categories.

To understand how blogs can be used as an assessment tool, let us glimpse into Ms Radha's Class 6 English Class. In their Honeysuckle Textbook, Ms Radha's students learnt about a different kind of school. Her students had a lot of questions and views about schools for differently abled children, but as Ms Radha couldn't spend as much time as she wished in the classroom hours, she decided to collect a few videos of how differently abled students were studying in regular schools and how the government was taking initiatives to bring in the concept of *inclusive education*. Ms Radha presented all this information in her class blog and students who didn't get an opportunity to speak during the classroom discussion also had an opportunity to present their views in front of everyone.

- **E-RUBRICS:** *A rubric is a coherent set of criteria for students' work that includes descriptions of levels of performance quality on the criteria* (Brookhart, 2013). Therefore, rubrics have two major aspects: *coherent sets of criteria* and *descriptions of levels of performance* for these criteria. Rubrics are descriptive and not evaluative. The effectiveness of the rubrics lies in the selection of the criteria and descriptions of the levels of performance under each criterion. Rubrics can be created using free rubric making tools for teachers. Teachers can use Rubrics for assessing:
  - ✓ students' written work;
  - ✓ laboratory activities;
  - ✓ portfolios of students' work;
  - ✓ projects;
  - ✓ demonstrations;
  - ✓ presentations; and
  - ✓ group work.
- **PEER REVIEW:** An interesting concept in assessment and evaluation that teachers can help teachers empower their students is *Peer Review*. As a concept peer review is not a critique or a comment on capabilities of fellow pupils, but is a systematic process of allowing pupils to gauge others work, reflect on their own work after observing the work of others, and be able to share their ideas so that others can improve their work. An effective and fair way to teach students the process of peer review is to create rubrics. Rubrics can serve two purposes: one it clearly lays down the expectations of the teacher vis-à-vis the assignment and second it acts like pointers for peers to assess their fellow classmate.

Rubrics could either be made on document processing software or teachers can make use of online websites Online rubric tools allow teachers to share their work and knowledge with other fellow teachers and it contributes to their own professional growth (See Section 2.8 of this Unit)

### How to use Peer Review in class?

- ✓ Students must be introduced to the whole idea of 'Peer Review' before giving any assignment and it must be made clear to them that the main objective of peer review is bringing improvement in their writing work.
- ✓ While introducing the concept of peer review, teachers must emphasise that it is a common practice to use it in professional settings, using online environments.
- ✓ Students can be handed over peer review forms, prepared as a MS Word document or online feedback forms. Mock peer review sessions can be held for preparing them filling of these forms. Teachers can provide them with guidelines for filling these forms. They must be given guidelines on writing constructive and positive comments and not to get biased by the name of the author.
- ✓ Wherever teachers are making use of technology in the peer review process, students must be familiarised with the use of technology especially use of e-mails, making track changes etc.
- **LEARNING LOGS:** Learning logs are short, ungraded and unedited writing that reflects on learning activities. Learning logs can be created in Word and used electronically or in print format. Each teacher has her own template in which she would expect her students to log their learning journey.
- **WIKIS:** Wikis are simple websites that allow their users to create and edit content. Different wiki services offer different features, although they commonly include the ability to compare previous versions of a page, discuss issues prior to making changes and track who edited what and when.

A wiki is a collaborative learning environment which provides an opportunity to students as well as teachers to construct knowledge. Wiki engages them in a dialogue where they have to present arguments and most importantly learn how to solve the arguments as only one version of a thought can exist in the page. Users also acquire techno personal skills which involve not only the technical expertise but also inter-personal skills that help a student negotiate in knowledge building or knowledge construction.

Before using wikis for assessment, a teacher must ensure that students are well versed with the wiki software. They know how to edit, create new

pages and create hyperlinks between pages. It is also important to the teachers that they could track who had made which edits and comments so as to have a fair idea about their individual contributions in the collaborative work.

- **VIDEO RECORDING:** Video recording can be used as a formative assessment tool as it helps in engaging and directing students with their assessment tasks. For example, students are given certain topics to plan their presentations, or one student interviewing another student, demonstrations/setting up apparatus or students conducting some activity. The videos of these performances/presentations are recorded by either peers or the teacher. Students then watch videos of their performance and can evaluate themselves and/or their peers as well. Teachers can watch their students' videos repeatedly to complete assessment rubrics more accurately. Video recordings of learning experiences are great forms of documentation and are very useful when assessing student learning. Some examples where video recording can be useful are:
  - ✓ video recording of students during setting up an activity in the science lab and recording of them talking with peers as they use the materials;
  - ✓ recording of a student reading a story with a friend.
- **CONCEPT MAPS:** Formally, a concept map is a graph consisting of nodes and labeled lines. The nodes correspond to important terms (representing concepts) in a domain. The connecting lines denote a directional relationship between a pair of concepts (nodes). The label on the line (explanation) conveys how the two concepts are related. The combination of two nodes and a labeled line is called a proposition. A proposition is the basic unit of meaning in a concept map and the smallest unit used to judge the validity of the relationship drawn between the two concepts (e.g., Dochy, 1996). Concept map assessments are characterised in terms of:
  - ✓ a task that invites a student to provide evidence bearing on his or her knowledge structure in a domain;
  - ✓ a format for the student's response; and
  - ✓ a scoring system by which the student's concept map can be accurately and consistently evaluated.

Without these three components, a concept map cannot be considered as a measurement tool. This characterisation made evident the variation in concept mapping techniques used in research and practice (Ruiz-Primo & Shavelson, 1996)

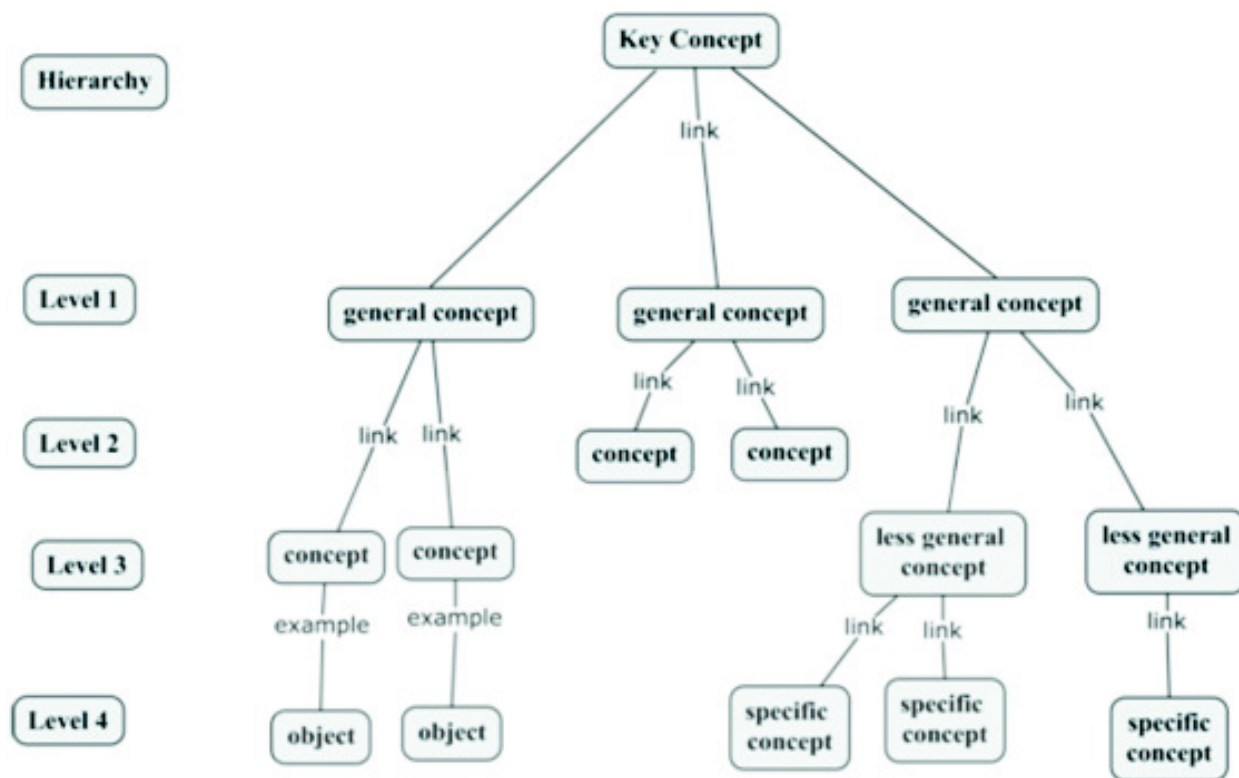


Fig. 2.2 : A Typical Concept Map showing relationships, hierarchy, and cross links

Students can make concept maps by using software or web based tools.

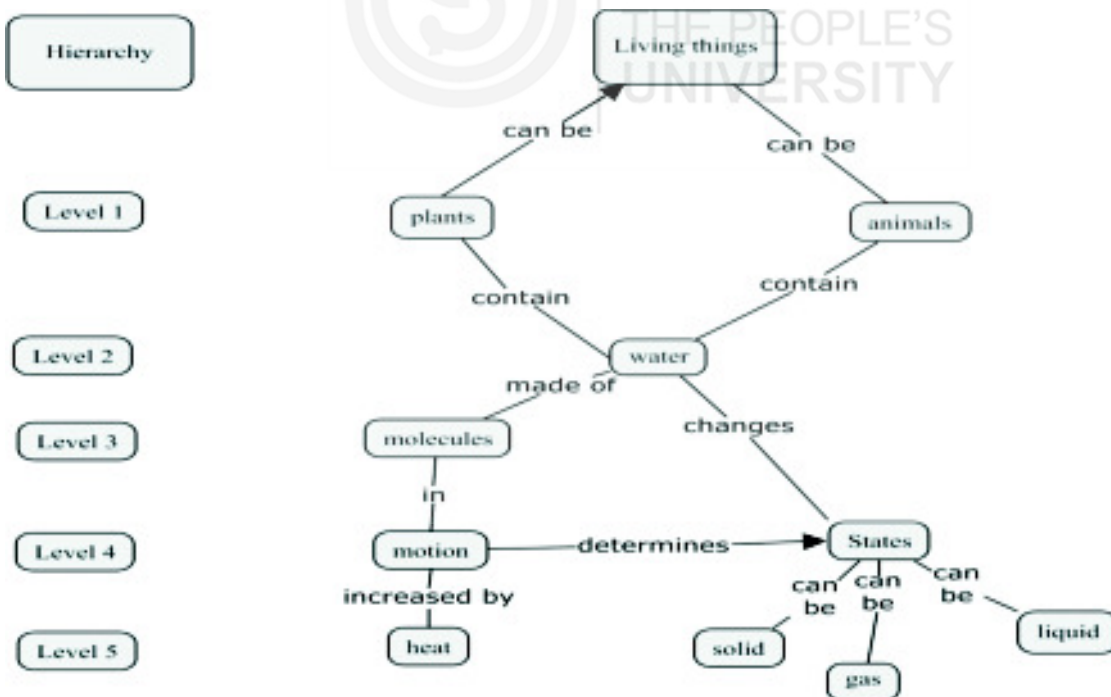


Fig. 2.3 : A Sample Concept map of Water showing some related concepts and Propositions

A less formal approach to grading Concept Maps is to use and provide a set of assessment criteria within a rubric such as the following:	<b>Exemplary</b>	<b>Good</b>	<b>Acceptable</b>	<b>Unacceptable</b>
<b>Breadth</b>	Map includes the important concepts and describes domain on multiple levels	Map includes most important concepts; describes domain on limited number of levels	Important concepts missing and/or describes domain on only one level	Map includes minimum concepts with many important concepts missing
<b>Interconnectivity</b>	All concepts interlinked with several other concepts	Most concepts interlinked with other concepts	Several concepts linked to other concepts	Few concepts linked to other concepts
<b>Use of descriptive links</b>	Links succinctly and accurately describe all relationships	Links are descriptive and valid for most relationships	Some links unclear or vague; some invalid or unclear	Links are vague; show inconsistent relationships
<b>Efficiency of links</b>	Each link type is distinct from all others, clearly describes relationship; used consistently	Most links are distinct from others; discriminate concepts; present variety of relationships; used fairly consistently	Several links are synonymous; don't discriminate concepts well; don't show a variety of relationships; used inconsistently	Most links synonymous or vaguely describe relationships and aren't distinct from other links
<b>Layout</b>	Map is contained in a single page, has multiple clear hierarchies, is well laid out and provides a sufficient number of relevant examples with links	Map is contained in a single page, has several clear hierarchies, is fairly well laid out and provides a sufficient number of fairly relevant examples with links	Map is not contained in a single page, has unclear hierarchies, is poorly laid out and provides some fairly relevant examples with links	Map is not contained in a single page, is confusing to read with no hierarchical organisation
<b>Development over time</b> (for concept maps where a "base map" is constructed at the beginning of the course and a corresponding "final map" at the end of the course)	Final map shows considerable cognitive progression from Base map and a significantly greater depth of understanding of the domain	Final map shows some cognitive progression from Base map and a somewhat greater depth of understanding of the domain	Final map shows minimal cognitive progression from Base map and a slightly greater depth of understanding of the domain	Final map shows no significant cognitive progression from Base map and no increase in the understanding of the domain

**Box. 2.1** shows a less formal approach to grading Concept Maps by using and providing a set of criteria within a rubric (UCD TEACHING AND LEARNING/RESOURCES - Based on [http://cte.uwaterloo.ca/teaching\\_resources/tips/rubrics%20for%20concepts%20maps.html](http://cte.uwaterloo.ca/teaching_resources/tips/rubrics%20for%20concepts%20maps.html))



**Area: Animal Husbandry- Poultry Farming, Class IX**

**Evaluation Activities for the Topic (using Web 2.0 tools)**

- ✓ Create a **digital portfolio** on poultry farming – develop the portfolio using mahara
- Portfolio artefacts
  - News letter
  - Project report
  - Blog posts
- ✓ Online reflective journal
- ✓ Performance Assessment of various tasks during the lesson
- ✓ Peer Assessment
- ✓ Create **digital rubrics** along with students for assessing the portfolio and other activities
- ✓ Develop **digital checklist** for all other activities and products they are involved in
- ✓ Conduct a traditional multiple choice **online test**

**Box 2.2** shows evaluation activities which can be conducted for a class IX topic, Poultry Farming by using Web 2.0 tools such as digital portfolio, blog posts, digital rubrics, digital checklists etc.

**Check Your Progress 2**

1) How can KWL charts help the students as well as teachers?

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2) What are the advantages of using a concept map software?

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**2.5 DEVELOPING E-PORTFOLIOS**

Teachers are expected to determine to what extent students have understood the concepts and how can they apply this understanding in day-to-day learning tasks and in the process students become capable of assessing themselves. Portfolio assessment, when done well, helps us in this work. The Literacy Dictionary (Harris & Hodges, 1995) defines portfolio as “a selected, usually chronological collection of a student’s work that may be used to evaluate learning progress” (p. 190). The



characteristics of Portfolio assessment are:

- Portfolios provide information for both summative as well as formative assessment.
- A portfolio may contain students' written work, tests, journals, reports, peer reports, quizzes, rating sheets, multimedia products, including videotapes, audiotapes, CDs, and DVDs.
- Portfolios provide samples of students' ongoing work – the steps showing his progression in learning.

Maintenance of a physical portfolio of artefacts developed cumulatively by students has always been a challenging task. Therefore, the electronic portfolios provide better opportunities and help to easily preserve and showcase students' work. The availability of digitised portfolios means that students' complex performances and projects can be stored with relative ease, and unwieldy projects may be tamed by the use of a digital portfolio (Kimball, 2003).

### **How do Portfolios help teachers?**

- 1) Portfolios provide different samples of students' work during different conditions and finally portraying a holistic picture of what teachers are testing for. The performance of a student in one condition may be affected by various factors such as mood, health etc., the portfolio helps a teacher understand the learning journey undertaken by the student and therefore portfolio assessment provides a better validity.
- 2) The main objective of the assessment is improvement of learning as well as instruction. This is possible by giving constructive feedback for improving performance. Portfolios provide an opportunity for teachers to observe differences, strengths and weaknesses within a portfolio between different types of students' work and give constructive feedback for further improvement like on writing skills, organisation, analysis, presentation etc.
- 3) Portfolio assessment provides an opportunity to do away with conventional holistic scoring and grading. Is it simple to sum up a student's performance in one single number? No, it is not. Multidimensional performance cannot be measured on a mono dimensional scale.

A student can easily create a portfolio in a public folder on an Online file storage site. An Online file storage site supports multiple file types such as photos, documents and videos which can be used collaboratively by sharing folders e.g. Mahara

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## **2.6 TEACHER RESEARCH – HOWS AND WHYS?**

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### **Why should teachers conduct research?**

Research can help them in coping with day-to-day challenges in a better way and in becoming better practitioners. Every classroom is different and what works in one classroom may not work in another classroom. Teachers need to examine their teaching practices; classroom management strategies and therefore they need to do research right in their classrooms. Teaching is a very challenging profession and at times of need, teachers have no right person/model to seek guidance. It is not worthwhile to use old teaching strategies again and again.

Teachers must devise new and creative ways to teach, assess and suggest new initiatives in curricular reforms. The research conducted by teachers links their learning with teaching and provides effective solutions for the real problems faced by them. Teachers also have certain unexamined assumptions and beliefs related to teaching and learning which guide their teaching practices. Teachers must bring them to surface and examine them.

The research conducted by teachers is done mainly to improve their practices obviously informed by educational theories whereas academics conduct research to generate new knowledge. But the teacher research must not lack in rigour or methodology. If needed, research guidance may be provided by an experienced teacher or the school head regarding problems faced such as writing objectives, selection of research designs, and availability of tools etc. Action research is one such research methodology that can be used by teachers to maintain the rigor of research and draw benefits from a detailed study.

### **Action Research by Teachers**

Reflective teachers regularly perform research investigations when they use trial and error to see what strategies work for students and when they use assessment and evaluation data to make modifications to their teaching. Recording, analysing, and making sense of the data teachers collect will help them make informed decisions in their teaching practices (Morphew, 2012).

Gillies (2009) describes three steps in action research

- 1) The first step involves identifying a *topic* or focus of inquiry.
- 2) The second step is *collecting and analysing data*, such as student records, test scores, and retention rates.
- 3) The third step is *action planning* based on the findings in the second step. When teachers modify their teaching strategies based on analysis of data, they are following the process of action research.

Although some data are readily collectible, other data need to be generated. For example, teachers may track changes in student learning based on changes in their instructional approaches. Newly generated data (such as test scores, e-portfolio artefacts, perceptions) and following these changes can help teachers select future action; they can continue, modify, or discard the instructional approach. Action research should ideally be a continuous one that helps teachers improve their teaching effectiveness.

Not only can classroom research help teachers become better, more-informed educators, but if they share their results with others through presentations, publications, or word-of-mouth, they can help other teachers do the same. This is where teachers' reciprocal roles in the educational community come full circle; the research they use from others informs their teaching practices, and their teaching practices inform research.

In addition to informing instructional strategies, action research can inform teachers' classroom management and design of classroom curricula. Working to improve these three teacher-level factors is challenging when resources are limited, but improvement is still possible. For example, numerous challenges present themselves when technology resources are limited, and management of resources will need to be modified so that all students have access. The action research and development process can be outlined here:

- 1) Identify a problem or need;
- 2) Collect information and resources;
- 3) Prepare the project
  - a) formulating objectives
  - b) select activities
  - c) assemble and prepare materials
  - d) plan procedures
- 4) Introduce and implement the project;
- 5) Monitor procedures and reactions;
- 6) Identify strengths and shortcomings of the project;
- 7) Correct errors, difficulties, and omissions; and
- 8) Appraise the project's ongoing and long-term results.

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## 2.7 ICT IN ACTION RESEARCH

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In order to understand more about Action Research and the use of *ICT in Action Research* let us take the case of Mrs Asha:

Mrs Asha was teaching science to class IX and X and was quite popular among her students for adopting interesting methodologies for science teaching but still her students were not doing very well. She was concerned about her students and decided to meet Mrs Sharma who was an expert in school-based research. Mrs. Sharma advised her to conduct action research to improve her students' knowledge. She conducted action research to improve her class IX students' science content knowledge.

*The Need:* Although Mrs Asha was very well liked by her students and even students who moved to next grade often visited her. She kept inquiring about their achievements in theory paper as well as practicals and realised that most of them are not doing well in science theory paper. The reason she saw that during class IX, they were not given adequate exposure to learn basic science content.

*Obtaining Information:* To determine whether the need she identified was widespread, she contacted a number of her former students and met them personally and others who could not meet personally through e-mail. They suggested that they did in fact need better preparation in science content knowledge. Higher class science teachers (grades X, XI) also confirmed the students' opinion. Most of the students in class X were lacking adequate science knowledge. School online database was accessed by Asha for obtaining information related to students belonging to different session years. She also created an online discussion forum for connecting with her present and former students. Through e-mail, she was in touch with their parents. Students were also expected to maintain a blog reflecting on their experiences. The literature review was done using online libraries, journals and databases.

*Project Objectives:* Asha specified the project objectives:

- A list of reading materials and websites related to selected science topics for students to go through;
- Small group discussions;

- Inquiry learning using lab activities wherever required; and
- Understanding scientific method.

*Project Activities, Materials, and Resources:* Asha provided a list of activities, materials and procedures such as:

- A pretest covering various selected science topics,
- The activities for providing opportunities to students to practice in the science lab,
- Monitoring of these lab activities by the teacher,
- Small group discussions,
- Interactions between the teacher and the students,
- A posttest covering selected science topics to see gain in their content knowledge

*Ongoing monitoring:* Asha kept a close watch for student difficulties and errors. She helped students and corrected their work appropriately either by re explaining or restructuring activities. Students were sharing their problems through e-mail and discussion forum. All the students were writing their blogs reflecting on their day-to-day learning, problems faced.

*Evaluation:* Asha evaluated the project by

- Analysing pretest and posttest scores to determine students learning,
- Asking for parents' responses to various questions,
- A video with narration of any science hands-on-activity (at least 7-10 minutes),
- A photo essay on a topic given to a group of two students

Then she published the action research findings in an online journal.

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## **2.8 ICT FOR CONTINUOUS PROFESSIONAL DEVELOPMENT (CPD) OF TEACHERS**

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Christopher (1999) argues that teachers' professional development should be seen as a lifelong activity that focuses on both their personal and professional lives, and on the policy and social context of the workplace. This is an important consideration for the school leader, as the teachers will always be learning just as the students will always be learning. There is no end point when all knowledge and skills have been acquired. Research evidences show that teachers in lower and upper secondary schools cited the issues of ICT and using new technologies in class as significant professional development needs (OECD, 2014). Alongside professional development in a formal setting, establishing communities of practice among teachers to facilitate collaboration and exchange can help teachers improve their teaching practice and overcome individual challenges (Vieluf et al., 2012). This collaboration is seen as an important way of improving teaching and learning by avoiding the "silo model of education", where innovations remain in individual classrooms and are not spread (Plotkin, 2010). Online technologies in general and some kinds of online professional teacher development programmes in particular can help build the community that is so often missing from the daily lives of teachers. Teachers can interact with each other online in real time or asynchronously, offering them time to reflect on an ongoing exchange.

## What are the options for lifelong learning of teachers?

In this section, we will discuss options available for lifelong learning of teachers such as OERs, and MOOCs.

- 1) According to the William and Flora Hewlett Foundation, “OERs are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open Educational Resources (OERs) include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.” In many cases the author has assigned a Creative Commons license to the resource indicating that it can be used freely.

We need to initiate OER movement at school level especially after Right to Education (RTE) Act 2009. In schools, a culture of professional development can be created and teachers must be trained to search, adapt, contextualise, translate, contribute and share OERs related to classroom teaching-learning. Teachers can develop and contribute:

- Lesson plans, teaching aids, presentations, projects, videos of simulated classes of different disciplines, need based modules of different subjects etc.
- Continuous & Comprehensive Evaluation (CCE) introduced in schools in Oct. 2009 has shifted the focus from examination to effective pedagogy. We need to look at the holistic assessment of a learner which also includes co-scholastic areas of Life Skills, Attitudes and Values, Sports and Games as well as Co-Curricular activities. CCE activities can be brought under the OER movement to allow students to explore knowledge through various projects conceptualised by teachers. Scholastic assessment can be done by both formative as well as summative assessment. Formative assessment can be done by conversational skills, assignments, oral questions, projects, quizzes and group work. Teachers can help students, parents and other fellow teachers by developing modules on CCE activities; You Tube videos on role-plays (related to curriculum topics), Projects, Quiz questions and bring them under the umbrella of the OER movement.



Fig. 2.4: NROER Repository page (<http://nroer.in/home/>)



The Ministry of Human Resource Development (MHRD), Government of India has launched a National Repository of Open Educational Resources (NROER). The development of it has been a combined effort of the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India, the Central Institute of Educational Technology, National Council of Educational Research and Training and Metastudio, which is the platform that hosts the Repository.

The creation of NROER will provide a solution to the challenges faced by the education sector of our country. NROER intends to provide educational opportunities to all, especially reaching the unreached. It involves collaboration of all those who are interested in the cause of education. Another important highlight of this platform is resources being offered in all school subjects and grades in multiple languages. It brings together all the digital resources for a school system such as educational videos, audio, images, documents and interactive modules and also allows you to contribute your own resources.

The Repository is based on the concept of **Semantic Maps**. It has organised its collections into the ever growing semantic maps of concepts. The semantic map acts as a learning resource for teachers, through which they can continuously assess the curriculum critically and can assist in the construction of their own unique learning themes for their classrooms. All the digital resources are all mapped to subjects, which currently are divided into 5 categories namely, Math, Science, Social Science, Languages and Art Education. Each subject has a list of concepts. Teachers get access to a library from where they can access audio, videos, learning objects, images, question banks, activities/presentations etc. related to the concepts. Teachers get freedom to upload resources which are subject to review by experts. In addition to this, NROER allows teachers to download, share, comment and rate media resources.

This is an initiative towards inclusive education. NROER carries CC BY-SA license which allows it to legally reuse, revise, remix and redistribute content.

Some other OERs such as Vikas Pedia, Sakshat.ac.in, epgpathshala.gov.in, National Digital Library, IIT-Kharagpur, Online Labs are worth mentioning here. The Online Labs host experiments in Physical, Chemical and Biological sciences for the students from classes 9 to 12 with content aligned to the NCERT /CBSE and State Board Syllabus.

- 2) MOOC is an acronym for Massive Open Online Course. *Massive* refers to the potential of extremely large enrolments; thousands of students register from all over the globe. *Open* can mean a few things, such as open enrolment to anyone who has Internet access regardless of their prior learning. It can also mean that, at least initially, courses were free to anyone interested in registering. Some hold that open should refer to the concept of open access, meaning that the content is not only free and available to all, but holds at most a Creative Commons licensing status so that the content can be downloaded, saved, and even adapted for one's own purposes (with credit to the developer). *Online* is the means of content delivery, and *Course* implies that there is some traditional convention of how a course operates, such as requiring enrolment, a start and end date, instructor-developed content



delivered to the learner, and some means of assessment.

MOOCs help teachers in continuing their education and updating themselves with latest technologies and theories. The most popular and well-designed MOOC providers are Coursera, Edx and Udacity. Some of the MOOCs worth mentioning here are:

- *Common Core in Action: Math Formative Assessment* – This six-week online course provided by the New Teacher Center via Coursera provides opportunities for participants to learn the tools and skills needed to implement the Common Core State Standards in a math classroom. Teachers learn how to engage students as active learners, plan instruction and making students learn to express reasoning. Participants choose from 60 classroom challenges, complete an initial assessment and continue formative assessments to continuously monitor achievement.
- *Using the Next Generation Science Standards for Students’ Deeper Understanding* – A four-week online professional development course is offered by Rice University (via Coursera) which equips educators with capabilities to integrate scientific and engineering design practices in the classroom. This course is designed for science teachers having at least three years of teaching experience.
- *Mastering Language for the Common Core State Standards: Focus on Elementary Grades Mathematics* – Stanford University Online (via Class Central) offers this online course for educators aiming to meet the student language demands during content instruction.

**Check Your Progress 3**

Answer the following questions:

1) What is action research?

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2) Expand the term OERs.

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3) What do you understand by NROER?

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## 2.9 LET US SUM UP

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In this unit, we discussed the role of ICTs in student assessment, research done by teachers and Continuous Professional Development (CPD) of teachers. ICT-enabled assessment *can be done by teachers by using KWL charts, online surveys, blogs, peer reviews using rubrics, learning logs, wikis, video recordings, concept maps* and developing *e-Portfolios*. Digital portfolios make it possible that students' complex performances and projects can be stored with relative ease and can be accessed easily for assessment purpose. Teachers can harness the potential of ICT in assessment by understanding the needs of the students, availability of time and resources and nature of the topic. In this unit, we also discussed the need for teacher research (action research) and role of the ICTs in various steps of the action research process conducted by teachers. Research conducted by teachers relies heavily on online databases, online literature review, reading materials, websites, online surveys etc.

In the last section of the unit, the role of OERs and MOOCs in the professional development of teachers was discussed along with relevant examples. NROER repository launched by MHRD offers resources for all school subjects and grades in multiple languages. It brings together all the digital resources for a school system such as educational videos, audio, images, documents and interactive modules and also allows you to contribute your own resources. MOOCs help teachers in continuing their education and updating themselves with latest technologies and theories. Currently, the most popular and well-regarded MOOC providers are Coursera, Edx and Udacity.

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## 2.10 UNIT-END ACTIVITIES

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- 1) Discuss different uses of ICT-enabled assessment for teachers.
- 2) Which resources from NROER platform, you would like to adapt keeping in mind your context?
- 3) What classroom problems, you would like to solve through action research? Make an action research proposal for any ONE classroom problem faced.
- 4) Discuss advantages of e-portfolio assessments for your students.

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## 2.11 ANSWERS TO CHECK YOUR PROGRESS

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### Check Your Progress 1

- 1) Assessment of Learning: to analyse student progress to determine the status of learning.
- 2) Assessment for Learning: to serve as an essential component of the learning process in order to promote and enhance further learning.

### Check Your Progress 2

- 1) KWL Chart allows students to personalise their learning and helps the teacher gauge the student's pre-learning.
- 2) Concept map software are easy to use and create professional looking concept maps instantly. The software contain diagram views/ templates that make it easy for students to add new concepts and links as they see fit.

### Check Your Progress 3

- 1) Action research is conducted by teachers mainly to improve their practices obviously informed by educational theories.
- 2) Open Educational Resources (OERs)
- 3) National Repository of Open Educational Resources (NROER) developed through the combined efforts of the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India, the Central Institute of Educational Technology, National Council of Educational Research and Training and Metastudio.

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# UNIT 3 ICT FOR ADMINISTRATIVE SUPPORT

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## Structure

- 3.1 Introduction
- 3.2 Objectives
- 3.3 ICT-Mediated Administrative Support in Schools
  - 3.3.1 Administrative Support for Students
  - 3.3.2 Administrative Support for Teachers
  - 3.3.3 Administrative Support for School Functioning
- 3.4 Skills with Regard to ICT for Data Management System
  - 3.4.1 Data Gathering
  - 3.4.2 Data Storing
  - 3.4.3 Data Analysis
- 3.5 MIS: Maintaining Institutional Records
- 3.6 Let Us Sum Up
- 3.7 Unit-End Activities
- 3.8 Answers to Check Your Progress
- 3.9 Suggested Readings

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## 3.1 INTRODUCTION

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We are living in a knowledge society where information is power. In schools information with regard to students and school related processes can shape future, guide administrators, help policy makers and ensure learning is a meaningful activity as envisaged in all policy documents of the country.

This unit will focus on the ways in which ICT can be used in School Administration so as to ensure the dynamics of the school life experiences are not lost but enriched for all stakeholders involved.

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## 3.2 OBJECTIVES

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**After reading this Unit, you are expected to:**

- explain how ICT can help in School Administration;
- cite examples of how ICT use in School facilitate smooth administration;
- list down the skills needed to manage the School Database;
- discuss the precautions that need to be taken for Data gathering, Data storing and Data analysis in schools;
- explain the concept of MIS;
- identify the characteristics of a good school MIS; and
- discuss the National Policy on Information and Communication Technology (ICT) in School Education (2012) with regard to School MIS.





**The second part of the administrative support** for students is with regard to the maintenance of records like attendance register, test (formative evaluation) results, examination result (summative evaluation), participation in co-scholastic activities, hobbies, details of fee paid, next fee installment due, bank details of parents, bus route taken etc. All these records are used by the school administration to plan the academic activities of the students. These records also help track the students' journey in the school, presence in the school campus, record of absence from the school etc. Example: SMS alert portal/services in schools that help the school, teachers and parents to connect almost on a daily basis and now are an integral part of the administrative support that schools makes use of.

The **third part of the administrative support** for students is with regard to maintenance of their Health records. This forms an integral part of the school records maintained by schools and needs to be kept confidential yet accessible to all stakeholders involved.

### 3.3.2 Administrative Support for Teachers

Teachers are the backbone of the school – the success and failure of the school life experiences of a student largely depends on the experiences provided by the teachers and experiences of the teachers. Therefore, schools value their teacher resource and monitor the teachers' progress and growth in the school very carefully.

Administrative support to teachers in schools happens in two major ways – both these ways may appear to be distinctive, but in reality we see they are linked to each other.

- 1) **Academic Support:** This support includes help to teachers to store their lesson plans, e-resources, academic progress tracking sheets of students, report cards/e-portfolios of students, co-scholastic performance sheets of students.

ICT in this field is not about storing documents, but also about helping teachers analyse and improve the student's performance. Data stored is of no value if it doesn't help improve the current situation i.e. learning environments and learning outcomes of the students.

ICT support in academic matters helps the school share the homework, assignments, test and other schedules with parents so that parents are well informed. Sharing of academic resources amongst teachers ensures each teacher is able to benefit from the experience of the others and resources of the school are optimally utilised.

- 2) **Non-Academic Support:** This support is with regard to the Human Resource Management. It includes service matter details regarding the salary of the teacher, tax deductions, tax savings, life insurance policy, loans taken by teachers, EPF, leave details (both casual and earned leave details) etc. Apart from this it includes details of the last increment/incentives, awards (like National Awards for Teachers and National ICT Award for School Teachers), qualifications of the teachers acquired while in service, workshops attended, workshops conducted, conferences and seminars attended, professional growth of the teachers. This information along with the information collected

and analysed in the academic support helps the school administration gain insight into the teachers' performance very transparently and career growth opportunities and transparency within the system.

### Check Your Progress 2

- 1) List five records that your school maintains for teachers.
  - a)
  - b)
  - c)
  - d)
  - e)
- 2) Suggest any two records for teachers that can help your school administration improve the teachers' performance
  - a)
  - b)

### 3.3.3 Administrative Support for School Functioning

As explained earlier, the two main stakeholders of a school system – teacher and the student – can function optimally if various data pertaining to them are stored and analysed in time. ICT can help schools set reminders for contract renewals, tender bidding dates, quality checks present in the school. ICT can also help schools keep and retrieve records pertaining to the Class and support staff in the school. These records can be presented and used at any given time.

Our knowledge society demands information gets disseminated as soon as possible. ICT not only helps in collecting and storing that data, but also helps in dissemination of the information. It is for this reason, today all boards – Central Board of Secondary Education (CBSE), Indian Certificate of Secondary Education (ICSE), State Boards and organisations like National Council of Educational Research and Training (NCERT), National University of Educational Planning and Administration (NUEPA) are making use of ICT and internet based tools to gather and disseminate information – be it regarding survey of schools such as All India School Education Survey (AISES), National Achievement Survey (NAS), District Information System for Education (DISE) and Secondary Education Management Information System (SEMIS) policy matters or question papers or results (Board, NTSE). Schools in their day-to-day functioning and processes make use of the websites and implement the policies and circulars formulated by these agencies at the grass root level.

#### Box 3.1

Case Vignettes showing how using ICT in school administration helps teachers in their lesson planning and academic experiences for students

**Case 1:** Rama was a Class 10 Class teacher. Once while discussing the future plans of her students, she realised that many of her students only knew of two career options if they took Commerce stream – MBA and CA. As a conscious teacher Rama wanted her students to get a glimpse of careers like

Actuaries, Company Secretaries, Financial Officer, Bank PO, Investment Bankers, and Hedge Fund Managers etc... So instead of just discussing these career options, Rama tapped into the school Database and identified many parents of the school who were practicing these career options.

**Case 2:** Sheila is teaching Civics in Class VI. Her students are studying about Ward Councilors and their role and function. While perusing through the school database, Sheila comes to know of a Class VIII parent who used to be a Ward Councilor of their city. To help her students understand the roles and functions of a Ward Councilor better, her lesson plan involves getting her students to interview the parent.

**Case 3:** Mr Sharma is the School Principal of Happy School. He wants that his teachers take active role in various academic responsibilities other than teaching. To begin with he wants a teacher who can work as a coach for students who are not doing well in Mathematics. Instead of calling the HoD of Mathematics Department and asking for a name, Mr Sharma begins to sift through the performance reports of the teachers of the Mathematics Department. While seeing the records, he comes across the performance record of Ms Bharti. According to available historic record, Ms Bharti has ensured all her students have scored more than 80% in Mathematics. Mr Sharma looks further into the records to realise that when students came to Ms Bharti in the earlier academic session their class average was a mere 60 %. Mr Sharma, also found a record of the class which was taught by Ms Bharti last year and this year by another teacher. Mr Sharma was happy to note the students still maintained their average of above 80%. The school database revealed letters parents had written in praise of Ms Bharti's dedication. The Principal was able to zero down on his choice of teacher for helping students with problems in Mathematics.

**Case 4:** Ritika is a Class 11 Physical Education Teacher. She wants to purchase new sports equipment for the school. Instead of directly approaching the vendors who come to school, Ritika uses the School database to find the contact of Mr Subhash. Mr Subhash is Sanskriti's father who not only runs a successful sports shop but also a Sports Consultant. When Ritika contacts Mr Subhash, Mr Subhash is extremely happy to help her. He gives her professional advice and also helps Ritika find sponsors from Companies to establish a new facility of a squash court.

**Box 3.1** discusses various case vignettes where using ICT in school administration helped teachers in their lesson planning and academic experiences for students

Apart from this ICT can help schools maintain inventories of the assets of the school, stock position of items, sports and other curricular activities schedule and most importantly ICT can link the Library to student data, number of books and periodicals in the library, e-catalog of the school library to the website and help manage library resources better for teachers.

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## 3.4 SKILLS WITH REGARD TO ICT FOR DATA MANAGEMENT SYSTEM

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Working with any Data Management System necessitates three skills:

- 1) Data Gathering
- 2) Data Storing
- 3) Data Analysis

Let us understand this a bit further:

### 3.4.1 Data Gathering

In schools data can be quantitative or qualitative or pictorial or video based.

- *Quantitative Data*: Can be in the form of report cards, attendance of students and teachers, board results, class statistics, demographic profile, fees etc.
- *Qualitative Data*: Can be in the form of letters, memos, appraisals, feedback of teachers, students, counselor's report, notices, circulars, policy decisions, minutes of meetings of various councils like Academic Council, Examination Cell, Parent Teacher Association, Staff Council etc.
- *Pictorial Data*: Are in the form of pictures and photographs captured during the various activities of the school.
- *Video Based Data*: Are in the form of videos captured during the events of the school.

*Precautions to be kept in mind while gathering data in Schools:*

- 1) *Purpose of each data field has to be clear.* It is important each data field that is collected has utility in the school programme. Like for example, data regarding siblings of a student is very important – it helps the teachers contact family in case of any emergency. Data related to Uncles and Aunts doesn't bear any relevance. In case of residential school, data with regard to Local guardians is very important. This is apart from the parents' contact details.
- 2) *Format for collecting data:* Today, all data that we collect in the schools are useful and meaningful, only if they can be incorporated into other software and can be disseminated via a platform independent medium. Like for example, it is a common practice for schools today to take pictures and videos of students participating in co-scholastic activities. But if the video is extremely bulky the school will not be able to share it with the parents unless the school uploads these on the parent portal of the school. Instead if the format/size of the video is such that the teacher is able to email the video to the parents, the parents will be able to see the video and the school is able to share the data.
- 3) *Proper Storage:* Data gathering would be a futile activity if it is not stored properly for future retrieval. Therefore, adequate measures and systems should be in place for data storage.

- 4) *Right to Privacy and Permissions:* Privacy of all concerned stakeholders is essential while collecting data and that is why any data that is collected in schools comes with an inherent declaration that the data can be used by the school. If a parent doesn't give permission to use the collected data, the school authorities are bound not to use the collected data. That is why all schools make it a mandatory practice of getting parents to sign relevant declarations that permit schools to use data.
- 5) *Verification of Data Gathered:* Every input planned for, needs to be verified by someone else. This would ensure the data captured is authentic and free from errors.

### **3.4.2 Data Storing**

ICT-enabled schools collect data daily. They further collate this data and analyse it weekly or monthly or quarterly or yearly. Data therefore should be stored for easy retrieval.

Data is either stored on the Servers or Hard Disks, Pen Drives or CD ROMS.

*Precautions while Storing Data:*

- 1) *Location of Sensitive Data:* Sensitive data pertaining to students' records/e-portfolios/rubrics or teachers' service matters/ACRs etc. needs to be securely stored.
- 2) *Accessibility to Data:* Storing data is meaningful if accessibility to data is also restricted – this ensures the data is safe and only authorised people can access it or modify it. Log in IDs and passwords may be created for parents, teachers etc. to ensure safe access and use of data.
- 3) *Backups:* A good practice while handling any data is to ensure that the data is backed up regularly. It is also necessary to back up the data at different locations.
- 4) *Log Report:* Another good practice is to ensure there is a log report created of all backups taken. This would help one revert back to earlier data incase the data gets corrupted.
- 5) *Naming Data:* Data stored is of no use, if it cannot be retrieved quickly when needed. A good practice therefore is to have a standard naming nomenclature/classification that will ensure all data that is stored is easily retrievable.

### **3.4.3 Data Analysis**

Data collected and stored will be useful if it is meaningfully analysed – meaningful analysis helps school administrators understand positive trends as well as negative trends.

*Data Analysis in schools can be in the form of:*

- 1) Charts and Pie Diagrams
- 2) Bar Diagrams
- 3) Averages

- 4) Future projections

*Data Analysis in Schools can help the school administration:*

- 1) View the performance of individual student or teacher,
- 2) View the performance of a class as a whole,
- 3) Do a subject wise comparison to understand perspective of the classroom dynamics,
- 4) Plan the future course of action in terms of teacher retention, contract renewal, make budgetary provisions, do a cost benefit analysis of new ventures, understand the income and expenditure pattern in the school etc.

*Precautions while analysing Data:*

- 1) *Comparing apples to apples:* A common pitfall that happens when analysing any data is that we try to compare apples to oranges – that means if we are comparing class 10 boys with Class 3 boys on their mathematical score, the data will prove inconclusive (apples to oranges comparison); instead if we compare Class 10 Mathematics result of 2015 with that of 2014 we can get data that will help us understand the present situation more clearly.
- 2) *Understanding error margins:* Data is filled by humans and there can be a scope for error margin. A good strategy therefore is to either eliminate the scope for error margin or to account for error margin in the final analysis.
- 3) *Using both Quantitative and Qualitative Data:* In a living environment like a school, a school administrator cannot just bank on quantitative data; she has to ensure quantitative data is supported by qualitative data. That will make the data meaningful and context oriented.

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### 3.5 MIS: MAINTAINING INSTITUTIONAL RECORDS

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The genesis of Management Information System (MIS) was the need to assist management of an organisation in gathering, processing, storage and retrieval of relevant, up-to-date data and follow up on the daily activities of the entity. Used in the School environment, it became – SMIS – School Management Information System.

Simply put, the School MIS is *integrated software that allows data gathering, data storing, data retrieval and data analysis.*

#### **Characteristics of a good MIS:**

- 1) **Understandable Data:** Data captured by the MIS should be in understandable format by the reader and data user. Abbreviations, notes etc should be easy to understand and comprehend.
- 2) **Relevance of Data:** Data captured by the MIS should be relevant to the school scenario and should help school authorities improve the situation in schools.



- 3) **Completeness of Data:** Data collected by the MIS should incorporate all parameters needed by the school administration to take requisite decisions.
- 4) **Availability of Data:** Data captured by the MIS should be readily available – ideally accessing the data should be platform independent. With the advent of mobile technologies, the data should be in modules so that data can be viewed on the mobile phone also.
- 5) **Reliable Data:** All data available via the MIS should be reliable – this includes the data that has been gathered by the software and the data that is projected after data analysis.
- 6) **Concise Data:** Reports generated via the MIS needs to be concise and only relevant data should be visible – irrelevant redundant data should be screened out by the software itself.
- 7) **Timely:** Data should be available timely – reminders for data up-gradation should be inbuilt – so that decisions are taken at the right time and in the right manner.
- 8) **Cost Effective:** Data gathered should be cost effective and relevant to a particular situation – Data should help provide viable solutions to problems as and when needed.

When we take the concept of the MIS to a school – we realise that school MIS should have the following characteristics:

- 1) **Access to Data:** School data pertains to students and it is imperative the data is well protected as it directly deals with the privacy of the child. Therefore, any MIS in a school should have a two/multi tiered system of data access – for example Principal can access data of the whole school; class coordinators can access data to their whole class; class teachers can access data of their section of the class; subject teachers of their own subjects; the office administration staff working with fees doesn't need access to the school report card of students.
- 2) **Accessibility to Data:** Data accessibility means the data should be available anytime and anywhere. Having the entire database on the internet is expensive therefore; schools need to decide which portion of their database should be available via the internet.
- 3) **Interlinking MIS Modules:** All data gathered on the MIS should be interlinked via the various modules of the MIS – like for example there is a student named Amit in Class 7 – if the Principal wants, she should be able to see all the data with regard to Amit: his class test reports, his last year's report, the books he has issued in the Library, the health report, the activities he has participated in, his sibling details. This is possible if the entire database is interlinked across the various Modules. The school data can also be linked with All India School Education Survey (AISES), National Achievement Survey (NAS), District Information System for Education (DISE) and Secondary Education Management Information System (SEMIS) to facilitate better planning and implementation of various interventions in imparting

quality education- but extreme care needs to be taken that personal data of students is not accessible to all.

- 4) **Report Generation:** The School MIS should have the ability to generate necessary reports by a click of the button, it is only then the MIS would have any value. Report generated has to be easy to understand and should be in a format that could be shared as and when needed.
- 5) **Support for various Formats:** A good school MIS should have provisions to upload and share data in various formats – like texts and pictures. In case of pictures, the MIS should allow the user to tag the pictures correctly so that they can be easily retrieved.
- 6) **Customisation:** Every school is different. It is therefore imperative that any MIS that is procured for the school should have options to suit the individual school's needs. This is possible only when the MIS can be customised.
- 7) **Specifications:** Any good MIS of school should not demand high-end hardware. This is an important factor in helping schools regulate their budget and spend money on things useful for the teaching-learning process.

MIS has been shown to strengthen the bond between the teaching and school administration team, helping both small and large schools to work efficiently and that is why the National Policy on Information and Communication Technology (ICT) in School Education (2012) envisages the scope of School Management Information System (School MIS) as:

- A nationwide network will be established in which schools, teachers, students, school managers, and the community at large participates. This implementation will include the School Management Information Systems (School MIS); digital repositories of tools, content and resources; professional development and continuing education platforms; and guidance, counselling and other student support services.
- School MIS will emerge as a single window clearing house on all information related to the secondary school system. The information will facilitate research and analysis activities and guide decision making at different levels in the education system, contributing to enhanced efficiencies.
- The scope of information to be collated by the MIS will be broad and include student and teacher tracking, particularly for their academic needs. The norms will also define standards of technology including language fonts, word processors, technical dictionaries, etc. Open standards facilitating universal access to information, content and resources will be ensured.

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## 3.6 LET US SUM UP

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Let us go over some of the concepts we have studied:

- School administration support activities can be divided into three broad areas: Administrative Support for students; Administrative Support for Teachers and Administrative Support for School Functioning.

- Administrative Support for students includes maintaining records, updating records like school report cards, library reading logs, participation in school activities etc. Administrative Support for teachers includes maintaining lesson plans, students' performance reports, teacher appraisals, details of teacher's professional growth etc. Administrative Support for School functioning includes maintenance and dissemination of all school circulars and records; ensuring all databases is up-to-date.
- Working with any Data Management System necessitates three skills: Data Gathering; Data Storing and Data Analysis.
- In schools data can be quantitative or qualitative or pictorial or video based. Data is either stored on the Servers or Hard Disks, Pen Drives or CD ROMS. Data collected and stored will be useful only if it is meaningfully analysed – meaningful analysis helps school administrators understand positive trends as well as negative trends.
- School MIS helps collect, manage, analyse and store data.
- National Policy on Information and Communication Technology (ICT) in School Education (2012) discusses the benefit of School MIS as a single window clearing house on all information related to the secondary school system. The information will facilitate research and analysis activities and guide decision making at different levels in the education system, contributing to enhanced efficiencies.

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### **3.7 UNIT-END ACTIVITIES**

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- 1) Discuss how using ICT in school administration can help teachers in their own classrooms.
- 2) What precautions should be kept in mind while gathering data in schools?
- 3) What precautions should be kept in mind while storing data in schools?
- 4) What characteristics will you keep in mind while choosing an MIS for your school?

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### **3.8 ANSWERS TO CHECK YOUR PROGRESS**

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#### **Check Your Progress 1**

- 1) Sibling Record can help teachers contact sibling in case of any emergency.
- 2) Knowledge of Father's or Mother's profession can help teachers plan for their class career counseling exercises.

#### **Check Your Progress 2**

Answers would depend on the present situation in your own school.

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## 3.9 SUGGESTED READINGS

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- Becta (2004), A review of the research literature on the use of managed learning environment and virtual learning environments in education, and a consideration of the implications for schools in the United Kingdom. Available at: [http://becta.org.uk/page\\_documents/research/VLE\\_report.pdf](http://becta.org.uk/page_documents/research/VLE_report.pdf)
- Condie, Rae and Munro, Bob, British Educational Communications and Technology Agency (BECTA), corp creator. (2007) The impact of ICT in schools: Landscape review.
- Department of School Education and Literacy (2012): National Policy on Information and Communication Technology (ICT) in School Education, Department of School Education and Literacy, Ministry of Human Resource Development, Govt. of India, Shastri Bhawan, New Delhi-110001 Available at: [mhrd.gov.in/sites/upload.../revised\\_policy%20document%20ofICT.pdf](http://mhrd.gov.in/sites/upload.../revised_policy%20document%20ofICT.pdf). Last accessed on 30 Dec 2015
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# UNIT 4 ICT FOR BUILDING KNOWLEDGE SOCIETY

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## Structure

- 4.1 Introduction
- 4.2 Objectives
- 4.3 What is Knowledge Society?
- 4.4 Importance of ICT for Democratising Access (Including Special Need People both with Learning Disabilities as well as Physically Challenged Learners)
  - 4.4.1 Massive Open Online Courses (MOOCs)
  - 4.4.2 ICT for Differently Abled
- 4.5 ICT for Decentralisation and Opening of Knowledge Bases
  - 4.5.1 Open Access (OA)
  - 4.5.2 Open Educational Resources (OERs)
- 4.6 Role of Teachers
- 4.7 Ethical use of ICT
  - 4.7.1 Risks in the use of ICT
  - 4.7.2 Copyright
  - 4.7.3 Plagiarism
  - 4.7.4 Safe use of ICT
- 4.8 Let Us Sum Up
- 4.9 Unit-End Activities
- 4.10 Answers to Check Your Progress
- 4.11 References
- 4.12 Suggested Readings

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## 4.1 INTRODUCTION

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Information & Communication Technology (ICT) has become an often used word in the present day society and its presence is felt in all spheres of life. Technology is all pervasive in the society in which we live today. We are trying to keep pace with the rapid and fast-changing developments in ICT which have changed our lives and are further expected to transform the way we live, communicate with each other and access information. ICT comprise of many technologies for capturing, interpreting, storing and transmitting information. Access to ICT is considered important for an individual to fully achieve educational and economic development goals. In fact, ICT access has become so important that the lack of it has been termed the digital divide. To bridge the digital divide, digital inclusion is about opportunities, outcomes and practices with regard to availability of ICT to all. It means providing equality of opportunity so that all members of society can benefit from the affordances that technologies offer and is also about equality of outcome.

The development of ICT has generated a shift in the educational paradigm and so there is the transition to a knowledge society. This creates the need to cultivate

new competencies for citizens in knowledge societies. This unit will focus on the role of ICT in a knowledge society. This unit also discusses various ways in which teachers can participate in developing a knowledge society.

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## 4.2 OBJECTIVES

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**After going through this Unit, you are expected to:**

- define the concept of knowledge society;
- explain the characteristics of a knowledge society;
- discuss the need and importance of ICT for democratising access;
- elaborate the role of teacher in the ICT ; and
- describe the ethical use of ICT.

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## 4.3 WHAT IS KNOWLEDGE SOCIETY?

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We all live in society. Today we hear of knowledge societies. The question arises what is knowledge society??? A knowledge society is the one wherein knowledge is created, shared and used for the prosperity and wellbeing of its people. Knowledge society is based on the presumption that knowledge is available to all and is not restricted to anyone.

According to Evers (2003), characteristics of a knowledge society are:

- its members have attained a higher average standard of education in comparison to other societies and a growing proportion of its labour force are employed as knowledge workers, i.e. researchers, scientists, information specialists, knowledge managers and related workers;
- its industry produces products with integrated artificial intelligence;
- its organisations – private, government and civil society – are transformed into intelligent, learning organisations;
- there is increased organised knowledge in the form of digitised expertise, stored in data banks, expert systems, organisational plans, and other media;
- there are multiple centers of expertise and poly-centric production of knowledge; and
- there is a distinct epistemic culture of knowledge production and knowledge utilisation.

It is clearly evident that new technologies in the knowledge society are bringing economic and social transformation. This is highly dependent on the increased ability of people to obtain and process information using the ICT. With the increasing use of ICT, knowledge creation as well as its usage has been radically changed. So the new generation has to be prepared for the fast changing knowledge society.

The African Leadership Institute for Community Transformation (ALICT) talked of Education, ICT, Science and Technology and Innovation being the four main pillars of knowledge society. Therefore, democratising access to resources through the use of ICT is one of the foremost goals of education.



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## 4.4 IMPORTANCE OF ICT FOR DEMOCRATISING ACCESS (Including Special Need People both with Learning Disabilities as well as Physically Challenged Learners)

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Democracy as an ideology has led to democratisation as a way of life in present day society. ICT has made this process of equity and equality to a new level. It enables learning ‘anywhere, anytime, and anyhow’. The knowledge in the present era is no longer constrained by geographic proximity. ICT offers more possibilities for finding, sharing, archiving, and retrieving knowledge than it was possible in early years thus making learning in the knowledge-based society to be holistic, lifelong activity cutting across different learning generations and life spheres. Thus the focus of learning, knowledge and thus education should not be confined to traditional formal learning institutions such as schools and universities using existing training practices, but also embrace adult education, informal learning, and workplace-based learning. Furthermore, the knowledge society and widespread use of ICT generates a demand for new digital skills and competences for employment, education and training, self-development, and participation in society.

ICT has the potential to open up access of educational resources and learning for all and thus improve management efficiencies of the education system. But there also exists digital divide; ICT also widens the disparities between those who have access to ICT and those who do not. The ICT-enabled resource access also acts as a barrier to those who do not have access to ICT. Therefore, there should be an urgent attempt to make ICT accessible to all. If we look at the growth of technology in the last decade, we notice that most radical growth has been in mobile telephony. Therefore, to democratise learning, we need to take into account the ICTs which are accessible, affordable and easily available. This is to bridge the gap between ‘haves’ and ‘have-nots’. Thus, it is imperative that we modify our pedagogic approaches to suit the content as well as the contexts.

With a view to realise the goals of Digital India and to reach out to all, the National Council of Educational Research and Training (NCERT) has launched an *e-pathshala* mobile app on 7<sup>th</sup> November, 2015. All the digital textbooks of NCERT can be freely accessed on mobile handsets/ smart phones (as e-pubs) by all the stakeholders (students, teachers, parents and teacher educators). Mobile users may download the e-pathshala mobile app from Android, iOS and Windows app stores. The app interface is also available in English, Hindi and Urdu. The e-pathshala initiative has evinced interest of the clientele groups with 16,12,926 visitors; The app has a rating of 4.4 out of 5 on Google play store, 3.5 out of 5 on Apple Store, and 5 out of 5 on Windows Store. In all 1,01,475 users have downloaded the app from Google Play Store, 5209 from Apple Store and 1712 from Windows Store.

#### 4.4.1 Massive Open Online Courses (MOOCs)

MOOCs are becoming very popular since 2012 and are growing very rapidly everywhere. Udacity, EdX, and Coursera are the collaborative work of leading American universities to offer MOOCs, which are the free and open online courses for anyone, anywhere and anytime i.e. world's best academic programmes freely accessible to masses. In India, Government of India is launching MOOCs through a web portal called *Swayam*. This is the ultimate democratisation of access to knowledge in the knowledge society. India is fast moving towards being a *knowledge society*.

MOOCs have the potential to change the entire education system (Dunn, 2012 and Mitra, 2012). Mitra further elaborates that with MOOCs, web's infrastructure is built, the platforms have emerged, everyone is connected on social networks and open education resources are available everywhere; we now need to connect the dots and create a meaningful digital learning ecosystem in a way that augurs well with the digital lifestyle of today's learner. MOOCs can be connectivist (c-MOOCs) and content based MOOC (x-MOOCs) (Yuan and Powell, 2013). In most of the MOOCs students typically watch short video lectures, complete automatically graded tests or assignments, and use online communities to work through new concepts they want to learn. MOOCs are available to all, free of cost to any place where there is access to ICT.

#### 4.4.2 ICT for Differently Abled

Over the years there has been a considerable increase in the availability of ICT to support differently abled learners. ICT provides a range of assistive technology tools- hardware and software, known as Assistive Tools/Technologies (ATs) which enable many learners with physical, sensory and learning difficulties to overcome their barriers with autonomy, willingness and self esteem. An assistive technology device is "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customised is used to increase, maintain, or improve functional capabilities of a child with a disability" [Technology Related Assistance to Individuals with Disabilities Act of 1988 (Tech Act)]. AT helps the differently abled to accomplish their tasks easily and to lead an independent life. It provides wide support ranging from communication to mobility, assisting many learners to engage with learning, thus democratising access and eliminating exclusion.

Access is restricted only by the availability of resources and the abilities of the user. But lack of awareness regarding assistive technology can adversely affect effective integration as most of the tools are ICT based.

Assistive technology serves two major roles: to augment an individual's strengths, thereby making up for the effects of the disability, and to perform the tasks in ways/modes different from the conventional methods i.e. by devising alternative modes. Assistive technology has tremendous potential for supporting learners with disabilities in academic achievement, improving organisation and fostering social acceptance. These technologies help in increasing learner independence and participation in classroom activities and making them active participants in the classroom as well as school activities. In the next section, some of the assistive tools/technologies used by differently abled learners will be discussed.

Sanyog is one of many indigenous assistive tools developed by Indian Institute of Cerebral Palsy (IICP) Kolkata, and IIT Kharagpur. Sanyog is a software for Alternative and Augmentative Communication (AAC) using an iconic communication device that accepts icons as input and facilitates the development of language and communication skills of users with complex communication needs. It allows the individuals to form and vocalise their own messages. The software forms syntactically and semantically correct sentences in Indian languages such as Bengali, Hindi as well as in English.

IICP has developed a few more Assistive Technologies (AT) like *Gupshup* which is a talking board software that supports Bengali, Hindi and English languages. This teaching aid facilitates the teachers of special children in the schools. There is a *Gupshup Book* which is a talking album, photo album and message provider software. Another AT which is a virtual adaptive mouse is *SweepSticks*. *SweepSticks* has been developed primarily to provide alternative mouse access to people with neuromotor disorders, especially those suffering from cerebral palsy.

Indian Picture Symbols for Communication (IPSC) is a software which helps facilitators in the replication of linguistically and culturally appropriate symbols thereby planning and producing communication displays for AAC users. Depending on the availability of fonts for different languages in a computer, the text can be typed in any language on the top of the picture symbols. The display can be printed or saved for later use. IPSC teaching manual along with demonstration software is available. In this picture symbol database, there are 1956 symbols in colour of culturally and linguistically appropriate symbols for communication for helping persons with neuromotor disorders who have problems in reading text.

MediaLab Asia is an autonomous body aided by Dept of IT which is also working in the area of AT. An AT to help visually challenged learners is SAFA – Screen Access For All. It reduces the dependency on others to access digital knowledge sources. SAFA is a screen reader software available in eight Indian languages. It is freely downloadable software. Few tools for converting text to Braille are also developed by MediaLab Asia, New Delhi. In fact Braille is also available in regional languages Hindi and Bengali.

ICT skills are the 21<sup>st</sup> century skills to survive in the fast changing world. In a knowledge society, there is a shift from imparting content knowledge to the development of knowledge society skills such as higher order thinking skills, lifelong learning habits, ICT skills and the ability to think critically, communicate, and collaborate, as well as to access, evaluate, and synthesise information. Students are the future of any society; the development of ICT skills and competencies in them is important for operating in an ICT-rich workplace and society. Therefore, all efforts should be focused on resolving the structural problems and deficits in education systems such as using ICT to enhance administrative and teaching efficiency, alleviate under-resourcing, support teachers who may be under-equipped to deal with new teaching challenges, etc.

### Check Your Progress 1

**Notes:** a) Write your answers in the space given below.

b) Compare your answer with those given at the end of this unit.

1) State whether true and false

- a) Knowledge society exists from prehistoric times.
- b) There is only one center of knowledge in knowledge society.
- c) Swayam is Indian attempt to run MOOCs.
- d) Assistive technologies help only the visually challenged learners.

2) Why MOOCs are becoming so popular in providing education to learners?

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## 4.5 ICT FOR DECENTRALISATION AND OPENING OF KNOWLEDGE BASES

Please recall the characteristics of knowledge society wherein “there are multiple centers of expertise”, there is no more centralisation of knowledge creation, dissemination or usage. Thus ICT has led to decentralisation of knowledge creation, production, dissemination as well as its use. It has created a networked world wherein the knowledge is distributed amongst the members of the networked group. ICT has made the network spread over the world and thus removing the isolation of the yesteryears. Many attempts are made all over the world to open the access to knowledge to all learners. ICT has helped in this venture. The movement of Open Access (OA) and Open Educational Resources (OERs) has become a great initiative in democratising the access of resources in general.

### 4.5.1 Open Access (OA)

Open Access is a compound word wherein its constituent words denote *Open* means no or minimum restriction and *Access* means it is available, thus the word “Open Access” means that things are available to all with no or minimum restrictions. The term is usually used to describe academic publications (research articles) which are available free to read and remixed for academic purpose. Open access is to all forms of published research output, including peer-reviewed, non peer-reviewed articles, conference papers, theses, book chapters, monographs, etc. This has been the result of social movements - especially since the early

2000s - the core of which were that the knowledge should be available free and there should be more access to these publications. Thus in a nutshell, **Open access (OA)** refers to online research outputs that are free of all restrictions on access (e.g., access tolls) and free of many restrictions on use (e.g. certain copyright and license restrictions).

Budapest Open Access Initiative (BOAI) in 2002 popularly known as The Budapest statement reaffirmed the commitment to OA in 2012 defined open access as follows:

*By “open access” to [peer-reviewed research literature], we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited (Source: <http://www.budapestopenaccessinitiative.org/boai-10-recommendations>).*

The Bethesda Statement on Open Access Publishing in June 2003, and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in October 2003 strengthened the cause of open access, reiterating the OA to be unrestricted online access to scholarly research primarily intended for scholarly journal articles

#### GRATIS AND LIBRE OA

On the basis of difference in degree of open access to the resources, Open access was classified in 2006 to be of two types

- Gratis OA refers to free online access.
- Libre OA refers to free online access along with some additional re-use rights which are usually covered by Creative Commons licenses wherein attribution to the original authors is specified.

Efforts are made to make reference materials available through Open Access. One of the directories for Open Access Journals is the *Directory of Open Access Journals (DOAJ)*. The DOAJ indexes high quality, peer reviewed Open Access research journals, periodicals and their articles’ metadata for public. It aims to cover all open access academic journals and is not limited to particular languages or subject areas. The Directory aims to increase the visibility and ease of use of open access academic journals—regardless of size and country of origin—thereby promoting their visibility, usage and impact. It may be accessed from <https://doaj.org/>



**Open access logo, originally designed by Public Library of Science.**

Source:[https://en.wikipedia.org/wiki/File:Open\\_Access\\_logo\\_PLoS\\_white.svg](https://en.wikipedia.org/wiki/File:Open_Access_logo_PLoS_white.svg)

**Fig. 4.1** : Showing Open Access Logo originally Designed by Public Library of Science



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*Journal of Kırıkkale Education Faculty*, 2013, 14(1): 243-253  
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### 4.5.2 Open Educational Resources (OERs)



Source: <http://wa2.www.unesco.org/new/typo3temp/pics/5d3118e041.jpg>



The term Open Educational Resources (OERs) was used for the first time by UNESCO's 2002 Forum on Open Courseware to refer to "*freely accessible, openly licensed documents and media that are useful for teaching, learning, and assessing as well as for research purposes*". William and Flora Hewlett Foundation defined OERs as "*teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge*".

United Nations Educational, Scientific, and Cultural Organisation (UNESCO) has been promoting OERs and making countries aware of the potential of OERs. The fundamental belief in the use of OERs is that it can widen access to quality education, particularly when shared by many countries and higher education institutions. In fact, UNESCO has made OER Declaration in 2012, in OER World Congress held in UNESCO HQ which is on the lines of the Universal Declaration of Human Rights promoting access, equity and quality in the teaching and learning resources.

Some of the popular OER initiatives which are appreciated and are serving many people round the world in providing OERs are: MIT OpenCourseWare (MIT OCW); China Open Resources for Education (CORE); OER Africa; JISC (UK), Wikipedia and Wiktionary; OER Commons; Curriki; WikiEducator; National Repository of Open Educational Resources (NROER). The movement of OA and OERs has opened access to knowledge bases, as never before, for use by all.

ICT has got tremendous potential to bring forth the access to all resources. Thus ICT knowledge is a must for equalising access to knowledge. Teaching 'ICT literacy' is no longer sufficient, as higher order skills of how to participate in a knowledge society as a citizen, worker and scholar are required. The requirement of skills for students, educators, employees and employers has changed – and still changing in a knowledge society. ICT can be used to tackle some of the challenges facing education and be a key driver of development strategies. For this it requires sustained investment and efforts at all levels, especially at regional and continental levels, to harness ICT for education and development, which will streamline and support national efforts.

ICT is allowing for exponential increase in the decentralisation and transfer of data through increasingly globalised communication systems, and connecting growing numbers of people through those networks. The world has become a 'global village' due to reach of ICT networks beyond the traditional geographical boundaries.

ICT needs sustainable growth and development for equitable benefits to all. It must reach all and here the role of the teacher becomes very crucial. Teachers can take the benefit of ICT to the next generation in the smoothest possible way. In the next section, we will discuss the role of teachers in spreading ICT empowerment in a knowledge society.

### Check Your Progress 2

**Notes:** a) Write your answer in the space given below.

b) Compare your answer with those given at the end of this unit.

1) State whether true and false

- a) Open Access (OA) is provision of research outputs to all.
- b) Libre OA allows reuse of material under some restrictions
- c) Open Educational Resources (OERs) can only be used by teachers and learners.
- d) OERs are only audio and video resources.
- e) OER Declaration was accepted in 2012 in Paris.

2) Write about some of the OER initiatives taken in India

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## 4.6 ROLE OF TEACHERS

Educational systems and institutions have a major role in inclusion, particularly with reference to the digital divide. Knowledge and technologies have changed at a pace as never before. The technologies prevalent in the society which are used for connecting people and also the world around us need new skills and sensibilities among users to understand the technology-enhanced world. These new abilities and skills required for the present day society need to be designed, developed and taught to the learners. Thus teachers play a very important role in preparing the learners for the ICT-enabled world.

Teachers play a pivotal role in educating the new generation in the new skills. Teachers need to be convinced of the value and utility of ICT-enabled learning programmes, otherwise they will not be motivated to use them. A word of caution which all teachers should keep in mind while preparing for the knowledge society is that ICT is a tool for accessing information and not the information or the knowledge itself. Being digitally literate or educated should not be considered as a goal in itself, but simply means to achieve the goals of knowledge society. Therefore, the teacher training should not just focus on the competent use of ICT or teaching the skills of ICT, but on its pedagogical use. It needs to be reiterated that introducing technology alone will not change the teaching and learning process, as the presence of ICTs do not transform teacher or the classroom practices in itself. The integration of ICT in the teaching-learning process depends on the selection of the pedagogical practices of teachers which has an impact on the learners' understanding as well as their academic achievements.

The teachers in the knowledge society should themselves be proficient in ICT competency to use it for knowledge creation and dissemination. A teacher should

- use ICT to make learning more flexible, dynamic and personalised;
- supply appropriate and improvised content ranging from learning materials to learning support tools;
- do systemic research, monitoring, and evaluation of ICT for education and development.

What is the new role of teachers in ICT classrooms? Technologies cannot replace a teacher, but these have redefined the role of a teacher. Let us discuss the new role of a teacher in ICT-enabled classrooms.

Teachers in a knowledge society are no longer expected to impart only content knowledge, but higher levels of cognitive skills, information literacy and ability to work collaboratively. The importance of these skills was also recognised in the industrial society, but the emphasis was more on memorisation of facts and learning from printed materials such as books. ICT has made the access to the resources much easier besides making certain existing resources to become obsolete like overhead projectors and chalkboards. All learners have access to the same networked resource on which the teacher is presenting information, especially if students are not physically in the same location. Due to use of ICT in teaching, we now need new assessment methods too.

### **Teachers' role in the ICT environment**

Teachers of the ICT-enabled knowledge society will need to have new ICT skills to become technically competent besides having mastery over their subjects. Mere being master of the subject or the content will not suffice anymore. According to UNESCO (<http://www.unescobkk.org/education/ict/themes/training-of-teachers/guidelines/teachers-role-and-needs/>), modern age ICT competent teachers must be able to:

- operate computers and use basic software for word processing, spreadsheets, emails, etc.;
- evaluate and use computers and related ICT tools for instruction (including subject specific tools like Geogebra, PhET, Stellarium, Bhuvan Maps etc.);
- apply current instructional principles, research, and appropriate assessment practices to the use of ICTs;
- evaluate educational software;
- create effective computer-based presentations;
- search the Internet for resources;
- integrate ICT tools into student activities across the curriculum;
- create multimedia content to support instruction;
- create hypertext documents to support instruction;
- demonstrate knowledge of ethics and equity issues related to technology; and
- keep up-to-date as far as educational technology is concerned

Therefore the teachers' role needs to be relooked. The teachers are required to be

- *facilitators*: all the knowledge is easily available but learners must make judgments about the quality and validity of the new resources and knowledge and teachers can help learners in doing so;

- *open minded, analytical and independent* professionals;
- *mediators* between learners and knowledge: teachers can help them in realising what they need to know and where that knowledge can be found (locating reliable sources of information); and
- *providers* to simplify and reinforce understanding.

There is a set of new competencies and reiteration of old competencies for teachers to be able to integrate the use of ICT into their lessons. These competencies are creativity; flexibility; logistic skills like assigning work, grouping students and devising new locations for learning to take place; skills for project work; administrative and organisational skills; and collaborative skills.

Even in a knowledge society, the role of a teacher remains in the centre of the teaching-learning process. ICT has made easy availability of resources for students, but still use of ICT in planning of a lesson, preparation and follow up is left to the discretion of the teacher. Lesson planning is crucial in ICT - enabled teaching and learning as it is vital for learners to remain focused. ICT in teaching and learning uses many individual and group strategies, planning helps in optimum integration and better time management. Thus, this skill is of much importance. Research has shown that student work is often unfocused and can result in lower attainment.

ICT can be used to reinforce existing pedagogical practices as well as to change the way teachers and students interact. ICT helps teachers create more 'learner-centric' learning environments and they can challenge the pupils' understanding and thinking, either through whole-class discussions and individual/small group work using ICT. Therefore, teacher training needs to take care of the teachers' proficiency in ICT usage. Besides, it also need strong government support in advancing ICT availability and usage in education as a broad social and economic development enterprise. Also investments in affordable and accessible ICT and stable and sustainable energy (electrical) supply are required. Use of ICT is restricted by a number of factors such as bandwidth limits, shortage of IT professionals, and lack of educators with ICT skills.

**Check Your Progress 3**

**Notes:** a) Write your answer in the space given below.

b) Compare your answer with those given at the end of this unit.

1) Discuss the role of teachers in ICT empowered knowledge society.

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## 4.7 ETHICAL USE OF ICT

It is clear from the previous sections that ICT tools have enormous power to engage and challenge learners for maximising learning. But along with meaningfully engaging students in the use of ICT, they must be made aware of the issue of *safe and ethical use* of ICT in classrooms. In Box 4.1, there are certain guidelines provided for teachers by The International Society for Technology in Education (ISTE) for use of ICT in classrooms.

### ISTE Standards for Teachers for use of ICT in classrooms

- 1) *Teachers should facilitate and inspire student learning and creativity. Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.*
- 2) *Teachers should design and develop digital age learning experiences and assessments. Teachers should design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximise content learning in context and to develop the knowledge, skills, and attitudes identified in the Standards.*
- 3) *Teachers should model digital age work and learning. Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.*
- 4) *Teachers should promote and model digital citizenship and responsibility. Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.*
- 5) *Teachers should engage in professional growth and leadership.*
- 6) *Teachers should continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.*

**Box 4.1:** The International Society for Technology in Education (ISTE) has come up with standards for teachers for use of ICT in classrooms (<http://www.iste.org/standards/iste-standards/standards-for-teachers>)

As teachers, we need to realise the safe and ethical use of ICT, besides inculcating and instilling in children the safe and ethical use of ICT. It is imperative to use ICT safely, responsibly and ethically. Enthusiasm for embracing these new technologies and the digital world in general is at an all time high. Therefore, it is crucial that both students and teachers model legal, safe and ethical behaviour in the use of ICTs.

### 4.7.1 Risks in the Use of ICT

Use of ICT also involves risks that come with the use of ICT. These risks have to be acknowledged and need to be addressed holistically. As a teacher we have to come up with strategies so that learning can be managed in a safe and supportive environment. Broadly the risks may be classified under two main headings –



- **Personal risk** which involves exposure to inappropriate content or undesirable contact, cyber bullying and the release of private information and many more incidences which puts the learners or the teachers at risk. We need to be aware of privacy and confidentiality in relation to online communication. email is generally considered personal and private and should not be cited without permission. Some conferences do not declare open to public, so information and messages should not be used outside the conference without permission. Online discussion is among people of all cultures and therefore one should be careful to avoid any issue which may be considered offensive. Although most people are tolerant and either remain quiet or express displeasure, but it is possible that someone could sue for libel. Netiquette is informal rules, code of conduct which must be followed while participating in online communication which is acceptable behaviour.
- **Legal and ethical** risks which may result in breaches of copyright and privacy by learners or the teachers may result in legal implications. If one is quoting something written by someone else, one should put it in quotation marks and acknowledge the source. We also need to be aware of privacy and confidentiality in relation to online communication besides considerations of plagiarism and copyright. *Copyright* and *Plagiarism* are the two most important concepts when we talk about ethical use of ICT enabled resources.

#### 4.7.2 Copyright

The World Wide Web has provided enormous opportunities to publish and when a large number of learners/ teachers/others are publishing on the internet then finding out the original author becomes crucial. The issue of copyright is all the more important. A researcher/learner can think that different sources of text information, images, audio and video files are freely available and therefore can be accessed from the web and can be saved and easily used in her work as per the requirements. But we need to create awareness in this regard. In Box 4.2, the points related to copyright find a mention.

##### **Important Points related to Copyright**

- *Just because something is on the web does not mean it is freely available for you to use in your own work. As with any material which is protected by copyright, you should seek the author's permission if you wish to use it.*
- *With text you can use up to 5 per cent of any one piece of work without seeking permission. With images, sound, animations, and video clips, you should seek permission, unless you are specifically told you can download and use them freely.*
- *Another important thing to keep in mind is that information published on the Web may have been put there by someone who does not hold the copyright to it. Simply because material appears on the Web does not mean that it is in the public domain, or that it has been published legitimately.*
- *If one wishes to reuse a lot of material taken from the web, one should make a link to the page where it appears, rather than incorporating it into one's own page. When one provides links on the webpage, one should*



*place them in an appropriate context, and identify the sites to which they connect.*

- *Copyright law allows special concessions for teaching and learning and learners but these are very limited. As a learner one is permitted to use copyright material only for one's own personal study purposes like doing an assignment. Any other use of copyrighted material is not allowed without prior permission.*
- *One should not alter images or other copyright material. (However, illustrations may be resized, and editorial deletions can be made to texts so long as these are clearly indicated).*

**Box 4.2:** Copyright (Source: <http://www.open.edu/openlearnworks/mod/page/view.php?id=48435>)

### 4.7.3 Plagiarism

Another related concept is *Plagiarism*, which is very important in the present scenario because it is a serious offence to take the ownership of someone else's work. Plagiarism is considered as 'Academic dishonesty' and invites penalties as per the policies of the institutions.

Resources are made available by the authors or non-authors, but we cannot copy and use them in our work. Due credit needs to be given to the original author either by writing it as a reference or as an acknowledgement as and when needed. A learner/researcher can write the material in her own words. We must acknowledge the source of any 'third party' material if included in our work. If we fail to do so, then it is considered as a case of *plagiarism*.

It is up to us as teachers to educate our learners about the safe, responsible and ethical use of digital technology. It is also up to us to model this behaviour at all times. (Please refer to ISTE standards for teachers discussed earlier in Box 4.1)

To address the issue of ethical practices in the use of ICT, the foremost step is that all involved in the educational system are digital media literate.

### 4.7.4 Safe Use of ICT

As discussed in earlier sections, the safe and ethical use of ICT is very important in the present context, especially as we are moving towards being a knowledge society. It should be ensured that the learners are introduced to appropriate online content and sites so that they are able to understand the virtual world and act accordingly. This online world needs to be analysed and then responded to. Everything online is not good or bad and the skills to differentiate between good and bad needs to be taught to learner right from the beginning. It involves analysing online symbols, identifying animations and avatars as online constructs and understanding that the violence in digital games does not reflect real life behaviour. Also the cautions from the strangers in the physical world apply to strangers in the virtual or the online world too. This will help in overcoming *cyber bullying* and *cybercrimes* in the long run.

Inculcation of positive online behaviours for peer and personal safety is very important as virtual world has its own etiquettes and behavioural norms which need to be developed in learners. It involves the ability to develop positive,

appropriate and constructive online relationships with peers, family and strangers in a variety of media. Learners must be taught the basic concepts underlying the positive online behaviour. It starts with the inculcation of respectful communication through online medium or the netiquette. This means using appropriate language and being kind while communicating online. Young learners should take into loop trusted adults and online help and protect their personal information. The virtual contact should be appropriate and preferably under adult supervision. Learners should abstain from sharing personal information and responding to unwelcome contact.

Learners should be taught to identify forms of Cyber bullying and respond to it in a positive manner rather than being scared. Also ways how to prevent, report and deal with it should be taught to learners.

### Let's know about cyber safety

There is absolutely no need to mention the advantages of Internet and Social Networking sites. We have embraced their potential for communication, entertainment and information seeking.

But over the period, it is seen that a lot of teenagers are being harassed and fall prey to the abuse of Social Media. You can easily prevent yourself from being a victim, if you take a few precautionary measures while being online.

#### ▶▶ How Social Networking sites can be dangerous

- Sharing and posting too much of personal information such as phone number, address, location, photos, etc., can be misused.
- Trusting strangers believing their profile to be true can be dangerous, as they may not be the same as stated.
- Snapshots of charts, photos, videos, etc., are saved and will be used for blackmailing and threatening.
- Being cyber bullied by posting negative, derogatory comments, posts, photos, etc. to tarnish one's image.
- Lots of predators and adult criminals are lurking online to trap children.

#### ▶▶ Tips for safe Social Networking

- Always keep your personal information strictly personal.
- Customize your privacy settings so that others can see only the basic information.
- Just know about and manage your friends. Don't trust all the online friends.
- Let your friends know that you are uncomfortable if they post something inappropriate about you.
- Do not publish any information that reveals your identity.
- Always use strong passwords. Don't share them with others.
- Never share your pictures, photographs, email accounts, etc., with anyone.
- Keep your personal messages strictly personal. Once posted they are published for ever.
- If ever threatened or bullied seek the help of parents/teachers.

**Helpline Phone Numbers**  
**Crime Stopper: 1090**  
**Cyber Cell (Tvm): 9497975998**  
**Control Room: 100**  
**Child Helpline: 1098/1517**

**Box 4.3:** Let's know about cyber safety [The last inner cover page (back inner)] of Standard IX Mathematics book to be provided to students from June 2016)

Recently, Kerala has included in their school curriculum, precautionary measures to be taken by teenagers while being online. A box item on cyber safety has been developed which is recently printed on the inner cover page of the textbooks of Kerala SCERT/School Board. Please see Box 4.3 and Fig. 4.3

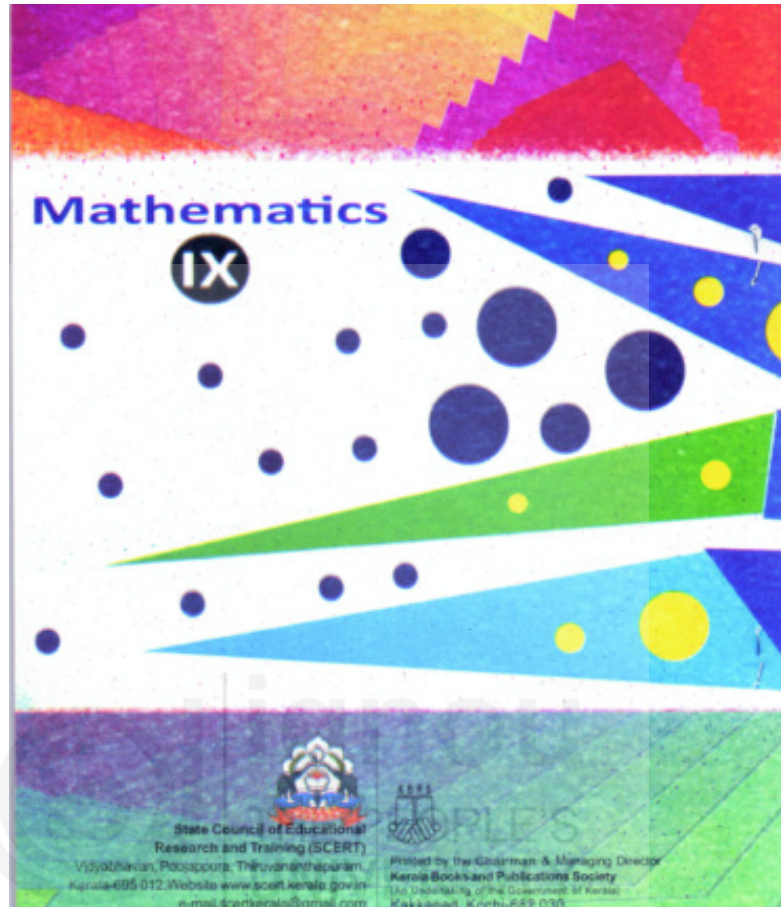


Fig. 4.2: Back Cover page of Class IX Mathematics Book published by SCERT, Kerala

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## 4.8 LET US SUM UP

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Information & Communication Technology (ICT) has become one of the most often used words in the present day society and its presence is felt in all spheres of life. The development of ICT has generated a shift in the educational paradigm and thus there is the transition to a knowledge society. This necessitates the need to cultivate new competencies for citizens in knowledge societies as new technologies are major drivers of economic and social change. Thus the new generation has to be prepared for the fast changing knowledge society. ICT has made democratisation of education a possible goal. It enables learning ‘anywhere, anytime, and anyhow’. ICT offers more possibilities for finding, sharing, archiving, and retrieving knowledge than it was possible in earlier years. Open Access (OA) thus makes learning in the knowledge-based society to be holistic, lifelong activity cutting across different learning generations and life spheres. The term Open Educational Resources (OERs) was used for the first time by UNESCO’s 2002 Forum on Open Courseware. Open Educational Resources (OER) are freely accessible, openly licensed documents and media that are useful for teaching, learning, and assessing as well as for research purposes. Educational systems and institutions have a major role in inclusion, particularly with reference to the digital divide.

Knowledge and technologies are changing today at a pace as never before. These new abilities and skills required for the present day society need to be designed, developed and taught to the learners. Thus, teachers play a very important role in preparing the learners for the ICT - enabled world. It is clear from the previous sections that ICT tools have enormous power to engage and challenge learners for maximising learning. But along with meaningfully engaging students in the use of ICT, they must be made aware of the issue of *safe and ethical use* of ICT in classrooms. Use of ICT also involves risks that come with the use of ICT. These risks may be personal or legal. Some of the prevalent issues are copyright and plagiarism which need to be acknowledged and addressed holistically.

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## 4.9 UNIT-END ACTIVITIES

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- 1) Discuss the features of a knowledge society.
- 2) MOOCs are based on the principles of democracy. Justify your answer.
- 3) Differentiate between Open Access (OA) and Open Educational Resources (OERs).
- 4) Find any five OERs in your subject area.
- 5) Explain the risks involved in the use of ICTs. How can we minimise these risks?
- 6) Discuss the relationship between copyright and plagiarism.

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## 4.10 ANSWERS TO CHECK YOUR PROGRESS

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### Check Your Progress 1

- 1) State whether True or False
  - a) False
  - b) False
  - c) True
  - d) False
- 2) MOOCs are the free and open online courses for anyone, anywhere and anytime i.e world's best academic programmes freely accessible to the masses. This is the ultimate democratisation of access to knowledge in a knowledge society. India is fast moving towards being a knowledge society. In India, Government of India is launching MOOCs through a web portal called Swayam.

### Check Your Progress 2

- 1) State whether True or False
  - a) True
  - b) True
  - c) False
  - d) False
  - e) True

- 2) Some of the initiatives of OERs in India are: Sakhshat; NROER; E-Gyankosh etc.

### Check Your Progress 3

- 1) Teachers prepare the learners for ICT - enabled world. Teachers use ICT in planning, preparation of the lesson plan. and follow up. Teachers make judgements about the quality and validity of new resources. They help learners in locating reliable resources of informations as well.

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