A FRAMEWORK FOR TRAINING IN-SERVICE SECONDARY SCHOOL TEACHERS
ON
INFORMATION AND COMMUNICATION TECHNOLOGY

MHRD in its meeting of PM & EG had suggested that a Curriculum for Teacher training in ICT be developed and a three member committee for the same was constituted with Prof. Vasudha Kamat, Joint Director, CIET, NCERT as a Chairperson and Dr. Gautam Bose, Deputy Director General, NIC and a representative from NCTE as members. The Committee was free to co-opt more members. The Committee with co-opted members is as follows:

Prof. Vasudha Kamat, Joint Director, CIET, NCERT	: Chairperson
Dr. Sridhar Iyer, IIT, Mumbai	: Member
Dr. Sanjaya Mishra, STRIDE, IGNOU	: Member
Dr. Anjlee Prakash, CEO, Learning Links	: Member
Dr. Sahana Murthy, IIT, Mumbai	: Member
Ms. Nisha Dua, Learning Links	: Member

Dr. Jayaprakash Dwivedi attended one meeting as a representative of NCTE. Dr. Bose could not participate in any meeting of the Committee.

The committee met several times face to face and also interacted through emails. The Final Draft developed by the Committee for the consideration of the PM & EG is attached.

Date : 2.2.2010   Prof. Vasudha Kamat
                                                                        Chairperson

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Preface:

It was observed that under the ICT@ school scheme of MHRD, many states are developing their infrastructural facilities for the use of ICT in education. There are three ways in which ICT is introduced in the schools. One, students are trained in ICT (i.e. teaching ICTs especially Office software). Secondly teaching ICT related subjects at Higher Secondary level. Thirdly, using ICT for teaching of various subjects at school level. The first two are used more often than the third one. One of the reasons may be insufficient training to teachers in the use of ICT in education.

Generally as a part of BOOT Model, vendors train the teachers in ICT (Office software and use of Internet) the curriculum of which is generally decided by the vendors (on the basis of their experience in this field). PM and EG felt that the teacher training is more crucial element in this whole process and as such a Committee to suggest the Curriculum for Teacher Training in ICT was constituted.

The Committee felt that instead of prescribing the Topics it is better to prepare a **Curriculum Framework** which could be adopted and adapted by each state on the basis of their requirement and facilities available to them. The Committee was of the opinion that the use of technology should be a well thought out adoption, and for a specific purpose. It is the need that should drive the adoption of technology.

The Committee identified 7 Focus Areas for the framework which are listed below:

Focus Area 1: Knowledge of Computers and Communication Technologies
Focus Area 2: Curriculum Integration
Focus Area 3: Creativity
Focus Area 4: *Communication*
Focus Area 5: *Collaboration*
Focus Area 6: *Legal, Social, Cultural and Ethical Issues*
Focus Area 7: Career Development

These 7 focus areas are further developed into 24 competencies and 42 Indicators. Competencies and Indicators could be further enlarged depending on the present and future needs of the State or organisation.

It is suggested that ICTs be used only where they address one or more of the following needs:

1. Enhance students' learning
2. Aid better teaching
3. Reduce routine drudgery for teachers

It is recommended that ICTs not be used:

1. If they distract attention from the main task to be performed or main concept to be learnt.
2. Without reviewing if the content is accurate (eg a science animation).
3. Without checking if the context is relevant for the local setting, especially if downloaded from the internet from a foreign country (eg a video for a language class).
4. Just because they exist.

This Framework is suggestive and not prescriptive. Explanatory notes on all 7 focus areas are appended. These suggest how the teachers and students could address the focus areas.

Focus Areas, Competencies and Indicators

FOCUS AREAS	COMPETENCIES	INDICATORS
1. _Knowledge of Computers and Communication Technologies_ _(Demonstrate knowledge, skills and understanding of concepts and technologies of ICTs)_	• Demonstrate knowledge and skills related to ICTs. • Apply technology to increase productivity and efficiency in teaching.	a. Define ICT and identify various types of technologies. b. Identify and describe uses, advantages and challenges of digital technologies and resources. c. Identify components of various ICTs and connect them. d. Develop knowledge of how to use and apply different ICTs. e. Use different ICTs for carrying out school activities, management of student learning and enhancement of teaching and student learning. f. Use network technologies to work collaboratively and engage in social networking and knowledge sharing activities. g. Facilitate effective use of current and emerging technology tools.
2. _Curriculum Integration_ _(Integrate ICTs into the teaching and learning processes)_	• Identify and locate technology resources and assess their suitability for student learning. • Use current research on teaching and learning with	a. Identify areas of a subject where ICTs can be applied effectively for teaching and learning. b. Use relevant learning theories for learning with technology to plan curricular interventions. c. Develop appropriate assessment criteria to identify ICT resources to integrate in teaching and

	technology when planning integration of ICTs. • Design appropriate learning opportunities that apply ICTs to support diverse needs of the learners. • Develop assessments to understand effective integration of ICTs • Plan strategies to manage technology and student learning while using ICTs.	learning. d. Prepare lesson plans that integrate ICTs for promoting effective teaching and learning experiences. e. Customize ICT based learning activities to accommodate diverse learning styles. f. Develop ongoing assessments aligned with the syllabus guidelines and student technology framework. g. Use the assessment data to make informed decisions to improve instructional practice and student learning. h. Apply appropriate ICTs for record keeping of learner performance. i. Develop effective classroom management strategies while using ICT. j. Manage technology issues in the classroom.
3. *Creativity* *(facilitate and inspire creative thinking and learning using ICTs)*	• Apply technology to develop students' higher order skills and creativity. • Encourage creative and innovative thinking. • Model innovativeness and creativity by using ICT effectively.	a. Identify and select activities and ICT resources to facilitate creativity and innovation. b. Plan strategies for student use of the activities and resources that promote creativity and innovation. c. Implement the strategies to promote student creativity d. Create digital resources for innovative teaching and learning

		practices
	• Engage students in exploring real-world issues and solving authentic problems using digital tools and resources.	e. Provide opportunity for students to explore real world problems and come up with authentic solutions by making effective use of technology.
4. *Communication* *(use ICTs appropriately and effectively to interact with students, peer and parents)*	• Us ICTs to communicate effectively with students, peers and parents. • Use ICTs to collect, organize and interpret data to improve instructional practice and student learning.	a. Use appropriate software tools to present pictures, texts, graphs, audio, video, etc, for individual and group presentation. b. Communicate with students, peers and parents on a timely manner using appropriate ICTs. c. Use ICTs to report student progress and performance.
5. *Collaboration* *(Use ICTs to promote collaborative learning, teamwork and networking)*	• Use ICTs to support learner-centered strategies. • Encourage collaborative knowledge construction by engaging the students in the ICT environment. • Inculcate team spirit through collaborative projects.	a. Identify learner-centered pedagogic practices in the context of ICTs. b. Use appropriate ICTs to create collaborative learning environments. c. Facilitate group work through appropriate use of ICTs. d. Promote collaborative knowledge construction by effective use of ICTs. e. Promote student reflection using collaborative projects.
6. *Legal, Social, Cultural and*	• Model and teach legal and ethical	a. Identify ethical and legal issues using technology.

Ethical Issues (Demonstrate an understanding of legal, social, cultural and ethical issues through the use of ICTs and about ICTs)	practices related to ICT use. • Apply ICTs to empower and sensitize students on social issues and affirm global diversity. • Facilitate equitable access to ICTs for all students. • Promote and model responsible digital social interaction.	b. Analyze issues related to the uses of technology in educational settings. c. Advocate and establish classroom policies and procedures that ensure legal and ethical use of ICTs, including respect for copyright and intellectual property. d. Use classroom procedures to manage an equitable, safe and healthy environment for students. e. Promote effective integration of ICTs by providing equitable access to appropriate digital tools and resources. f. Apply assistive technologies to instructional processes for equitable access. g. Create awareness of local and global social issues through the use of ICTs.
7. Career Development (Engage in professional communities of practice to share experiences, best practices and results of action research)	• Use ICTs to engage in continuous professional development. • Reflect on professional practice using ICTs. • Demonstrate leadership though continuous growth of knowledge and skills in ICTs and their application.	a. Design personal development plan using ICTs. b. Participate in professional development activities to enhance knowledge and skills related to ICTs. c. Use self-learning skills to identify and use appropriate resources available on the Internet. d. Continually evaluate and reflect on professional practices and emerging technologies to support

	• Participate in learning communities to share expertise and learn from others.	student learning. e. Create/Facilitate/Participate in a community of practice.

Enclosure I: Explanatory Notes on the Focus Areas

Focus Area 1: Knowledge of Computers and Communication Technologies

Focus Area 2: Curriculum Integration

Focus Area 3: Creativity

Focus Area 4: Communication

Focus Area 5: Collaboration

Focus Area 6: Legal, Social, Cultural and Ethical Issues

Focus Area 7: Career Development

Focus Area 1: Knowledge of Computers and Communication Technologies

The goal of this framework is to define a set of guidelines for training teachers to use ICTs effectively in their practice. In order for teachers to be able to do so, they must first demonstrate a thorough understanding of the concepts related to computers and communication technologies. Thus, the first focus area in the framework for training school teachers in ICTs is the knowledge and skills of these technologies. However, this is not a stand-alone focus area. Competence in this area is to be developed while working on one of the other focus areas of the framework such as curriculum integration, collaboration, communication, creativity and so on.

Our approach to training teachers in the use of ICTs is based on three levels. The first step is awareness, where the teacher sees somebody use a given ICT and becomes familiar with its existence. The next step is appreciation, where the teacher does some hands-on activity using the technology and reflects upon its implications. The final step is adoption, where the teacher is able to incorporate the technology appropriately in the curriculum.
While the benefits of ICTs in education have been well established by now, we recommend that technology be used carefully, and only where they address one or more of the following needs:
- Enhance students' learning
- Aid better teaching
- Reduce routine drudgery for teachers

We recommend that ICTs not be used:
- If they distract attention from the main task to be performed.
- Without reviewing if the content is accurate (e.g. a science animation).
- Without checking if the context is relevant for the local setting, especially if downloaded from the Internet from a foreign country (e.g. a video for a language class).
- Just because they exist.

The ICT knowledge and skills that teachers should possess have been classified into the following areas.

1) Basic operations on a computer
> This includes basic abilities to handle hardware (mouse, keyboard, printer) and software (file handling) on stand-alone systems. Some specific examples are:
> a) Navigating through the file system. Be able to locate necessary files and folders.
> b) Storing folders and files. Organizing files, creating folders.
> c) Running applications. Locate and run applications present on the local computer, to fulfill a given task. For example, play a movie related to a topic discussed in the classroom.

2) Office applications

a) Word processing. The knowledge of reading, editing and creating documents is essential for basic tasks such as writing letters as well as more advanced activities such as essay-writing.

b) Presentation. Students can use presentations to communicate their ideas on assignments and projects to the entire class. Teachers may benefit from using presentations to teach certain areas where diagrams, graphs and text are needed simultaneously. Presentations may be a useful tool to summarize school activities while communicating with parents or visitors.

c) Spreadsheet. Topics such as graphing and dependencies between variables are well learned by students using spreadsheets. We give more examples of such activities in the Curriculum Integration focus area. Teachers can also use spreadsheets for classroom management issues such as preparing report cards and obtaining statistics of student performance.

3) Web related skills

a) Find resources on the web. Be able to download and store them. Examples of these could be data for a project, animations (from reputable sources), and worksheets (judiciously chosen).

b) Create resources on the web such as blogs and wikis. We further elaborate on this skill in the focus areas of Communication and Collaboration.

Focus Area 2: Curriculum Integration

Why is this focus area important?

Integrating ICT into teaching and learning is not a new concept. It may be as old as other technologies such as radios and televisions. However, with the rapid development of emerging technology, such as web technology, ICT integration has increasingly attracted the attention of educators. ICT is basically a tool - "Certainly a useful tool that enables us to link various learning communities together in a new and different ways" (Taylor, 2000, p.4). Research has indicated that the use of ICT can support new instructional approaches and make hard-to-implement instructional methods such as simulation or cooperative learning more feasible (Roblyer, Edwads, & Havriluk, 2004)

Integration has a sense of completeness or wholeness (Earle, 2002) by which all essential elements of a system are seamlessly combined together to make a whole. In Education, simply handing out to students a collection of websites or CD-ROM programs is certainly not ICT integration. In a properly crafted ICT integrated lesson, ICT and other crucial educational components such as content and pedagogy are moulded into one entity. As a result, the quality of the lesson would somehow be diminished if the ICT ingredient were taken away from the ICT-integrated lesson. (Williams, 2003)

Effective ICT integration into the learning process has the potential to engage learners. For instance, using multimedia to present authentic and ill-structured problems in problem-based learning can motivate and challenge students and hence develop their problem-solving skills (Bout & Felleti, 1991; Savery & Duffy, 1995). ICT can support various types of interaction; learner-content, learner-learner, learner-teacher, and learner-interface. These types of interactions make the learning process more interactive and learners more active and engaged.

What is the meaning of ICT Integration in teaching and learning process?

Historically ICT has been emerging from the concepts of IT, meaning basically computers and communication technology, and digital data networks as the latest phase of development, but also TV, satellites, phone, etc. Due to a trend of merging different technologies (all technologies seem to merge together in one way or another), there was a reason to start speaking of ICT as opposed to IT. ICT captures all the latest technologies used for communication, data processing and data storage. However, what one commonly hears in discussions is talk of computers: desktops, laptops, servers and Internet facility that are needed in schools.

What are the means and methods to integrate ICT?

Technology cannot be integrated into classroom programs overnight. According to Sandholtz, Ringstaff, and Dwyer (1997), technology integration includes five stages: entry,

adoption, adaptation, appropriation, and invention. Each stage has its own patterns of change and support requirements.

Entry- Teacher uses Computer Technology in a traditional environment.

Adoption – Teachers begin to show more concern about how technology can be integrated into daily lesson plans. Technology is now being used to teach children how to use technology. Common activities include keyboarding, word-processing, or drill-and- practice activities. Teachers begin to anticipate problems and develop strategies to solve them.

Adaptation to and integration of new technologies into traditional classroom practice occur. Students use word processors, databases, some graphic programs, and computer-assisted-instruction packages. Productivity is a major theme. Students produce faster.

Appropriation is more of a milestone than a phase. More interactions between students are observed, and students work with computers frequently. There is evidence of project-based instruction, collaboration and co-operation, and creative schedules.

Invention - Teachers begin to see knowledge as something children must construct rather than something to be transferred. Interdisciplinary project-based instruction, team teaching, and individually paced instruction are hallmarks of this phase. Classroom interactions change. Student experts surface to assist their peers and teachers with technology. Students work together in more collaborative ways.
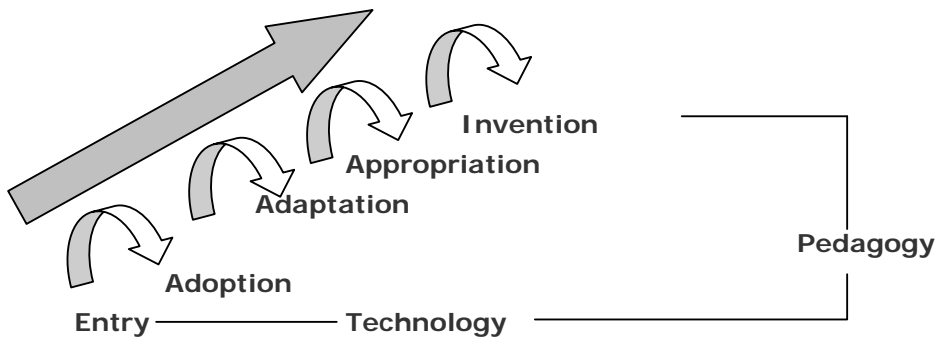
Suggest certain areas where ICT integration has impacted Student Learning?

1. Use of Multimedia to showcase findings and provide suggestions to the real-life connected problem to the real-life audiences. This helps building in the Creative Skills of the Students.
2. Use of Collaborative Websites to work collaboratively on documents, spreadsheets and multimedia contents.
3. Use of Spreadsheets to analyze data and come to a conclusion and develop analytical skills.

4. Use of specialized search engines and meta search engines to facilitate research on Internet
5. Students can use Internet communication tools to:
   - Communicate with others outside the classroom
   - Get feedback on their products
   - Work on a project in groups or pairs in real time
   - Engage in interactive discussions
   - Practice using written language
   - Practice using oral language
   - Share text-based information, documents, and other resources
   - Collect information from a number of individuals

A variety of online tools support student communication:
   - **E-mail** is written electronic communication that is sent and read at any time.
   - **Online Chats** are online environments in which individuals meet and exchange written messages at the same time.
     (http://education.qld.gov.au/learningplace/communication/chat/examples-chat.html)
   - **Instant Messaging (IM)** allows people to receive and send written messages instantaneously, locally and at a distance, to pre-selected online contacts.
     (http://www.speedofcreativity.org/2006/08/28/the-case-for-instant-messaging-in-the-classroom)
   - **Online Surveys and Opinion Polls** enable gathering and analyzing data by posing questions over the Internet.
     (http://www.speedofcreativity.org/2006/08/28/the-case-for-instant-messaging-in-the-classroom)
   - **Voice - Over Internet Protocol (VoIP)** supports real-time oral communication among Internet users. (http://www.wtvi.com/teks/05_06_articles/skype-in-the-classroom.html)

Focus Area 3: Creativity

The major objectives of integrating "Creativity" as a focus area are as follows:
1. To facilitate creative thinking and
2. To use ICT for facilitating creativity

Some of the higher order skills and creative processes could be listed as follws:
Reasoning
Thinking
Interpreting
Articulating
Creating
Analysing
Reflecting

In order to develop these higher order skills, teachers need to engage the students in exploring the real world around them, at the same time relating with similar/dissimilar experiences with others outside. This could be done by identifying and selecting activities which provide experiences from real as well as virtual world.

A subject teacher should be able to identify ICT resources and ICT-based activities through web searches; create interesting digital resources in different formats (image, animation, presentation, video, audio and web pages) to foster creativity and illustrate key learning; plan and implement creative learning strategies in the classroom using various methods like discovery, projects (individual and group), collaboration, etc.; and provide opportunities to the students to use ICTS to analyse, interpret and reflect on real-world problems.

What teachers can do?

All teachers require support in explaining some concepts, processes, procedures. This is more true for creative expressions. The teacher can search for digital resources on the net for creative expressions. E.g. "Save Water". There would be variety of digital resources freely available, in terms of posters, pictures/photographs, audio clips, video clips, stories, articles etc. (for the specific age group with which she is interacting).

Selecting these available resources could be the first step. Using these resources with students, discussing with them and motivating students to bring out best in them using ICT tools could be initiated.

Second step could be students creating new patterns, ideas around the topic in hand.

What teachers can ask their students to do?

(I)   Use web to search for information about their locality (e.g Google Map)
(II)   Take photograph of interesting situations and events

(III)   Create digital video on problems such as pollution, traffic congestion, etc. and share with others by uploading them

(IV)   Use graphics tools to create posters;

(V)   Use presentations to share creative ideas; and

(VI)   Crate groups and join social networking sites for collaboration and reflection.

Focus Area 4: Communication

Why is this focus area important?

We communicate when we share ideas, process information, and gather and analyze data. These activities are an essential component of the teaching-learning process that goes on in schools. It goes without saying then, that communication is a key area that teacher-trainers need to pay attention to.

Description of the focus area

While communication is ubiquitous in an educational setting, the modes along which it occurs are varied. There are multiple ways to classify modes of communication. We need to understand these different ways so that we can identify and make best use of the appropriate mode.

One way of classifying communication is to examine if it is: i) direct or i) indirect. Examples of direct communication are: a teacher giving a lecture in a class, a student asking a question to a teacher, a group of students group making a presentation, students emailing each other, a teacher discussing with parents in a PTA and so on. Indirect modes of communication include gathering information through a medium or via secondary sources. Examples are a teacher sharing video material with students wherein students are given freedom to interpret material.

Another way of classifying communication is whether it occurs in an oral or written manner. Depending on the medium used for communication, it can be classified as face-to-face, distance mode (eg through video conferencing), or online.

We can also classify different modes of communication depending on which people are involved. Given that typical transactions happen between the student, teacher and the outside world, any permutation of the above participants (such as student-student, or student-teacher or student-outside world) can lead to different kinds of communications.

The number of people involved in an exchange can give rise to different kinds of communication. There can be a one-to-one communication such as a student asking a fellow student a doubt after class. A one-to-many situation typically arises when a teacher is explaining a concept to the entire class. A many-to-one mode of communication can exist when a group of students try to ask a question of the teacher. Finally, a many-to-many exchange can occur during a class discussion.

An important way of classifying communication is based on the model underlying its use. There are instances where communication between individuals is modeled as information transfer, for example when a teacher lectures or a student reads from a textbook. In other cases, a more interactive model better describes the communication, such as during a peer discussion in a classroom.

How can ICTs enhance focus area?

We believe that deliberate attention should be paid to the act of communication, whether it is among students or teachers. A number of skills such as the articulation of one's thoughts, organization of ideas, presentation and argument, are acquired during the act of communication. ICTs are a tool that can be used with any of the modes of communication

listed in the previous section to enhance the acquisition of the above skills. We illustrate these ideas in the example below. Wherever applicable, we classify the communication being conducted according to the previous section. We note that even in this brief example, multiple kinds of communications occur.

Example

We give an example of a teacher beginning to teach about climate change. This could occur in a variety of subjects such as environmental science, geography, or science.

The teacher first introduces topic by giving a somewhat controversial problem statement:

"Some think global warming is a very serious situation today." (One-to-many, direct, face-to-face).

Students are asked to research and gather information to support as well as refute this statement. Students can here use ICT tools such as locate CDs in a library or browse the internet to complete the assignment. (Indirect, student to outside world, online).

Students are also required to report their findings to class in a group. (Direct, face-to-face, many-to-many, interactive). Here, the use of ICT can enhance students' presentations. A variety of strategies such as a poster or a chart or a slideshow could be used in students' presentations. Graphical analysis for the chart needs to be done using a spreadsheet. A poster or slideshow will benefit from pictures: for example two pictures of a region affected by climate change, one a few decades old, and another more recent. These pictures could again be located in a journal available on the Internet.

Overlap with other areas

It is to be noted that this is not a stand-alone focus area. In the above example, there is strong overlap between the focus area of communication and that of curriculum integration, collaboration, knowledge of computers and creativity.

Focus Area 5: Collaboration

This focus area, Collaboration, is meant for the teacher to develop competence in using ICT to promote collaborative learning and teamwork among her students. Expectations regarding competencies to be developed and indicators, for this focus area are mentioned earlier. Here we give some examples on implementing this in practice.

The teacher could initiate collaborative activities for students to learn and explore their own geography and culture, in terms of festivals, seasons, food and dress. The class could be divided into teams, each taking on one of the above aspects. They would use ICT to research and gather information and interact with community. They would come together to prepare a presentation, newsletter or document. This could have visuals, video clips, animations, as needed. This would be shared with the classroom, school and community. The teacher could also have the teams linked to teams in another state or country, where they would work on similar topics. Finally, wikis or portals could be used to share the projects. This would enable them to work in teams and also network with other students. The teacher could initiate collaborative activities for students to learn about games and toys that are local to their geographical region. The students could then use ICT tools to prepare a presentation of the activity being carried out, using videos and other means. Further, the students could also use ICT tools to depict the activity, such as by paint or by writing a simple program (in a programming environment such as Scratch). These could then be shared as mentioned above.

Each group of students could be asked to watch an educational video and collaboratively come up with a set of quiz questions based on the video. Other peer groups could then be challenged to watch the video and answer the questions online. An atmosphere of healthy competition in these activities would foster learning.

Each group of students could also be asked to perform virtual experiments, using relevant animations and simulations, say in Physics. This could be on topics to be taken in in the subsequent class. The students could play with the simulation after school and collaborate to record their observations and findings. These could be presented when the topic is later taken up in the class and the teacher could develop the lesson starting from the students' own experience.

It is to be noted that:
I.   The above are only some examples. They are neither exhaustive in their mention of ICT tools, nor in their coverage of school subjects. Their purpose is only to stimulate thought on how ICT could be used to encourage collaboration.
II.   This focus area is not stand-alone. It has a strong overlap with the focus areas of Communication, Curriculum and Knowledge of Computers.

Focus Area 6: Legal, Social, Cultural and Ethical Issues

Why is this focus area important?

In an age of continuous and rapid advances in digital communication, it becomes imperative that educators are not only able to use ICT but are also able to advocate and explain the right use of ICT. They must be fully aware of relevant issues that may arise as a result of increasing dependency on digital media for information and interaction. These issues may revolve around piracy, cyber bullying, hacking, identity theft and even copyright violations. Awareness on such issues should be inculcated in students as well and teachers must take active steps to model appropriate behaviour in their social interaction with others and while disseminating information. They must cite sources of information, give credit to authors, acknowledge the contributions of others where applicable and exhibit digital etiquette at all times. They must explain the importance of ethical standards involving the use of technology. They must exercise vigilance in advocating use of emerging modes of interaction in the digital age and guide students in the precautions one must take to ensure personal safety while exchanging information. Educators must pay attention to the following areas in order to deal appropriately with legal, social and ethical issues:

1. The right way to communicate using digital media
2. Proper conduct during interaction
3. Safety of user as well as equipment
4. Rights and privileges in the digital era and corresponding behavioural expectations
5. Relevant legal provisions governing technology users

Description of the focus area

The focus area revolves around the following issues:

(a) legal issues or any problem related to legal provisions that govern the use of technology and their applicability
(b) social issues or any misdemeanour related to etiquette that governs interaction amongst those who communicate using digital media
(c) cultural issues or any acceptance problem related to diversity that exists among the multitude of users of Internet
(d) ethical issues or any conduct contrary to the moral principles that should lead all actions taken by a digital citizen

The **legal issues** mainly arise due to illegal practices such as violation of intellectual property laws, unauthorized access to confidential information, identity related frauds and even cyber crimes. The teachers should encourage responsible and fair use of technology as well as respect for IP. They should exhibit necessary knowledge and skills for using technology in legally acceptable and secure ways.

The **social issues** arise when people violate behaviour norms that are representative of a civilized and socially acceptable manner of communicating with others. They may be in the form of inappropriate language, comments or abuse of dignity of another human being. Teachers should understand the concepts of ICT and its impact upon the local and global society. They should take relevant steps to promote and model safe and healthy use of technology.

The **cultural issues** originate from the diversified population that comes from various backgrounds and finds itself on a common platform while using technology. The needs of these learners differ as does their perception. Cultural issues may take the form of discrimination based on cultural identity. Teachers should give adequate time and attention to choosing those technology resources that respect learner diversity and help the learners to use technology that addresses their social needs and cultural identity. Technology resources chosen should help learners build their interaction with the global community.

The **ethical issues** mainly deal with doing the right thing. In a digital era where anonymity is easy to maintain, it becomes equally easy to engage in practices which may not be in line with morally correct behaviour. Ethical issues may take the form of cheating, copying, or taking credit for someone else's work. The important issue is that many students may not give thought to whether it is correct to indulge in these practices even though they may never be caught. The teachers should practice and promote ethical use of technology and software as well as any content. They should deal strictly with plagiarism issues and open source/open access licensing of copyrighted materials. Not only should they be aware of but also model appropriate use policies of ICT resources. They should encourage an environment of respect, honesty, self and collaborative learning. Positive values should abound in the classroom.

What teachers can do? - Examples

1. With the advent of the Internet and the ability to quickly copy anything, it is easy for students to forget that much of the material on the Internet is a property of someone else. Students in order to complete their research assignments may copy paste information without giving due credit to the authors. They may also use images to enhance the presentation of their content without giving credit where it is due. Students may not even be aware of the rules related to copyright. However ignorance of the rules cannot be used as an excuse for technology misuse. Teachers must educate students about copyright and fair use rules.
   The strategies given below can be followed for ensuring students understand copyright and "fair use."
   a. Teachers to model in their work.
   b. Have posters around the classroom with guidelines.
   c. Reward students who are using guidelines properly and add to grading criteria sheet.
   d. Make sure students know how to cite the work – that needs to be taught to them.
   e. Caution students against copying and pasting info –plagiarism
   f. Buddy check to make sure they are in compliance.
   g. Organise discussion groups and have them do their own do's or don't list and share with class.

2. Students use digital content such as music files, games, videos and various software without understanding how to use them in an ethical manner or even why this is a relevant issue. They must be taught about the economic and moral implications of piracy or unauthorised use.

3. Concerns should not relate only to the security of equipment but also the physical and psychological well-being of students. If the computer tables on which the students are working are not of the right height they may cause physical problems arising due to wrong posture and it is up to the teachers to ensure that students do not cause themselves any harm while using technology. Excessive use of technology in the form of videogames or social networking sites may bring on addictive symptoms and may cause students to become socially withdrawn from real world and lead to psychological problems. Teachers must thus guide students in proper use of technology.

4. Students may visit sites which may release harmful viruses in the school computer network thereby causing loss of work and to school property. They must be taught safe and secure practices to use the Internet.

5. Students may hack into a teacher's email account and obtain some confidential information. Teachers have to make students aware of legal and moral implications of hacking and other unlawful activities that they may indulge in without realising the consequences.

6. Many people have access to the information that is posted online. Students may register for certain Web sites while doing class projects and reveal a lot of personal details. They must be taught to guard their privacy and protect their personal information on the Internet.

7. Listed below are some of the steps that can be undertaken to ensure student safety when using the Internet:
    a. Have a filtering system in place.

    b. Constant supervision necessary.

    c. Check histories.

    d. Provide students web sites to visit.

    e. Educate through stories of what can happen.

    f. Limit space – discourages downloading.

    g. Make a restrictive agreement before students can go online.(Acceptable Use Policy)

    h. Preview sites before having students use them.

    i. Getting info via teachers email so teacher can preview.

    j. Tell the students a story about all adults on the net who pretend to be kids via chat rooms.

    k. Bookmark favourite sites for students to visit.

8. Teachers need to ensure equal access to technology for all students. Some of the ways by which teachers can provide opportunities to increase access for all students are listed below:
    a. Use the rotation method to ensure access to all students.

    b. Use cooperative learning strategies.

    c. Use hubs to connect computers to the network.

    d. Schedule groups with a time limit and specific search task.

    e. Connect the computer with a presentation device for small group or whole class viewing/discussion.

    f. Use offline browsing software to save sites to a disk, CD, or network.

    g. Partner students who do not have computers at home with those who do.

        Work with school lab/library for before and after school access.

Focus Area 7: Career Development

As a teacher it is important to engage oneself in contemporary professional practices to not only progress in career but also remain up-to-date and improve teaching and student learning. The Career Development focus area in the framework envisage to encourage teachers to understand how ICTs can play a significant role in professional development and use ICTs to emerge as a leader in teaching practices.

Using ICTs, the teachers should be able to engage in continuous professional development opportunities to keep themselves abreast of latest developments in their subject, pedagogy and technology; share lessons learnt and problems with other teachers; advise/guide/ mentor other teachers online; reflect on professional practice and issues concerning teachers, teaching and learning; conduct action research and share results using ICTs.

What teacher can do?
- Create a blog for self reflection and invite colleagues to read and comment;
- Create group blogs to collaboratively discuss specific issues;
- Create/join groups/ discussion forums to share experiences and remain up-to-date in the subject, pedagogy and technology;
- Join wiki-based collaborative content development forum and contribute;
- Conduct action research 'using ICTs' and 'on ICTs' and share in professional gatherings.