A Model Curriculum for ICT in Education

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Vision

The National Policy of ICT in School Education aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socio-economic development of the nation and global competitiveness.

Providing an exposure to the state of the art technologies, building capacities to interact and experiment with them, productively, safely and creatively apply them to address one's own issues and those of the nation and the society at large, emerge as the purpose of the ICT curriculum.

The ICT curriculum for subject teachers aims to build understanding and knowledge of the range of ICT resources and applications available for use in the teaching learning process and appreciation of how integration of ICT in teaching can enhance their own professional capabilities and that of their students.

The programme for ICT teachers envisages building their capacities to enable them to independently manage the ICT infrastructure of their school, to support other teachers and students in the organisation of the ICT curriculum and to assist them to plan, manage and evaluate the use of ICT in teaching and learning.

The programme for students aims to enable them to creatively interact with a wide variety of hardware, software applications, devices and tools, nurturing their inquisitiveness and imagination, enabling them to access a wide variety of information and resources and helping them to solve problems.

This would require a universal, equitable, open and free access to a state of the art ICT and a broad range of ICT enabled tools and resources to all students and teachers. Free and Open Source software will be preferred.

ICT Curriculum

The ICT curriculum is a generic curriculum for teachers and students. Typically spanning two years for teachers (one can complete the course faster), it leads to a Diploma in ICT in Education.

For the student, the course spans three years (if three sessions per week and thirty weeks per year are allotted) and leads to a Certificate in ICT. School Boards may opt to offer a separate certificate or integrate it with the School Leaving Certificate after class 10.

This curriculum is recommended for use with students of classes 6-12. It should not be used at the primary stage (classes 1 to 5). A structured ICT programme at the primary stage is not desirable and can be counter productive.

The National Policy of ICT for School Education defines ICT Literacy in terms of levels of competence. The levels do not correspond to specific classes (for eg, sixth or seventh standard). Different Schools or Boards of School Education may decide to begin the ICT programme from different classes, based on the availability of ICT infrastructure and the provisioning of an ICT class in the timetable.

The competencies are organised into three broad levels, basic, intermediate and advanced.

Stage 1: Basic

Basics of computers and basic use of tools and techniques – operate a computer, store, retrieve and manage data, use a computer to achieve basic word and data processing tasks; connect, disconnect and troubleshoot basic storage, input and output devices, connect to the internet, use e-mail and web surfing, use search engines, keep the computer updated and secure, operate and manage content from external devices (sound recorders, digital cameras, scanners etc.); connect, disconnect, operate and troubleshoot digital devices;

Stage 2: Intermediate

Create and manage content using a variety of software applications and digital devices; using web sites and search engines to locate, retrieve and manage content, tools and resources; install, uninstall and troubleshoot simple software applications etc.

Stage 3: Advanced

Use different software applications to enhance one's own learning – database applications, analysis of data and problem solving, computing, design, graphical and audio-visual communication; undertake research and carry out projects using web resources; use ICT for documentation and presentation; create and participate in web based networks for cooperative and collaborative learning; become aware of issues of cyber security, copyright and safe use of ICT and take necessary steps to protect oneself and ICT resources.

It will be immediately apparent that the levels do not define the content of the curriculum. The curriculum will involve activities which simultaneously use competencies from different levels.

An attempt should be made to ensure that every student completes the advanced stage before completing schooling. The competencies are equally applicable to teachers.

Curriculum Content

To allow for sustainable, equitable and creative participation by all in such a knowledge society[1], the education system must develop ICT competencies and skills through the school years. If the students must develop ICT skills, it goes without saying that the teachers must be equipped to facilitate them to acquire these skills. In addition to building skills and knowledge, ICTs have an enormous potential to bring administrative and managerial efficiencies to the school systems.

The ICT curriculum is considered a significant vehicle for the realisation of the goals of the National Curriculum Framework. It is expected to contribute to enhanced exposure to information and resources, ongoing professional support, improved teaching-learning-evaluation-tracking, and increased productivity.

In keeping with this, the curriculum is proposing is proposing six thematic areas in which ICTs can be explored. ICTs do not merely constitute a specific tool or application. Rather it is a new framework which we must prepare our children for in schools. These strands have been developed based on the various possibilities provided by ICTs and the skills needed for realizing these possibilities. These themes are further built in increasing layers of complexity - in terms of basic, intermediate and advanced.

The six themes in the curriculum are:

- Connecting with the world

- Connecting with each other

- Interacting with technology

- Creating with ICT

- Possibilities in Education

- Reaching out and bridging the divide

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1 Vision of the ICT Policy in School Education – to prepare youth to participate creatively in the establishment, sustenance and growth of a knowledge society

This method of organisation minimises the need for using instructional time for learning how to operate hardware and software, making it incidental. It also accommodates the fact that different generation of ICT devices and software applications have evolved different look and feel and routines. Provision of tutorial support in the form of handouts for all such requirements is proposed.

The onus of mastering the various components of the ICT environment will lie with the student of the programme (subject teachers, ICT teacher or the students).

The Six Themes

4.1 Connecting with the world (CWW)

ICT tools enable anytime, anywhere access to information and resources. Given the proliferation of internet connectivity, the curriculum recognises the fact that being connected to the internet offers tremendous benefits to teachers in terms of capabilities to access information and resources of various kinds and to utilize them in their teaching-learning. Not only will these add to the range of techniques that the teacher uses, but also make a difference to their students' learning.

Becoming aware of the range of materials the web offers to the teachers' own learning as well as teaching aids; critical appraisal of the information and resources; safe, productive, ethical and legal use of these resources; and protecting oneself and others from the harmful effects of the virtual medium are fundamental to teachers' and students' learning.

Therefore, the theme would introduce the teacher to exploring the internet and its resources, using browsers and search engines, choosing appropriate sites, search and retrieval of information and resources, different kinds of websites and interactivity, navigating the web, bookmarks, subscriptions to services and products, downloading information and resources and evaluating them, awareness of formats, techniques, copyright and safety issues, uploading and sharing information, transactions through internet.

4.2 Connecting with Each Other (CWEO)

ICT tools also enable a variety of ways to keep people connected. Synchronous and asynchronous modes also increase the degree of interactivity and helps create communities, which can then collaborate to create interest groups for a common cause. While at the bare minimum, it enables a very rapid way of communicating with a friend, it can be leveraged to break teacher isolation and promote professional growth.

Becoming aware of the various communication possibilities, becoming interested in and participating in professional communities, keeping oneself abreast of the State of the Art are essential to keep the teacher in sync with developments of technology and updated about developments in her own discipline and in educational practice.

Learning to create an email ID, sending and receiving emails, storing and managing communication, handling attachments, maintaining address books, forming or joining email forums, participation in discussion forums, wikis,

video and audio conferencing, social networks, blogging and microblogging, becoming aware of cyber bullying and other social issues become an essential part of the teacher's cyberkit.

4.3 Creating with ICT (CWICT)

ICT tools are not seen as an end in themselves but as an opportunity to create and express. Modern ICT employ a variety of media forms – text, graphics, animation, audio and video, enabling a rich communication. Easy, friendly ways have been discovered to interact with ICT. Together they expand enormously the range of learning that can accrue.

Software applications and hardware devices have become increasingly versatile and cater to a variety of learning needs. The wider the range of tools, devices, software applications and techniques that the teacher and student are aware of and can productively use, the wider will be the opportunities for their imagination and expression. Treating a computer as a mere information delivery device will lead to a gross underutilisation of its capabilities and use in teaching learning.

Creating, curating, managing images and documents, repurposing them into communications, gathering and processing data and presenting them, working with audio and video tools to create media rich communications, learning to program and control devices and processes, become important to the teacher. With access to a range of tools and devices, the repertoire of communication skills will also increase. The teachers' ability to leverage the interactive features into teaching learning will also extend the range of activities students can be involved in and learn from.

4.4 Interacting with ICT (IWICT)

ICT are evolving at a very rapid pace. The type of device, its operating processes, the purpose for which the tool is to be deployed – the range of essential learning in ICT is ever increasing. While the computer has evolved to take on more and more complex tasks, the interface itself has become simpler by the day. From the days of a command line interface to an app based touch interface, computers have become extremely productive devices, finding uses in more and more applications, particularly in the daily routine of every common man. Understanding how ICT systems operate and an appreciation of the range of ICT tools available today can help identify opportunities for teaching learning. Extensive use also helps make informed decisions in selecting most appropriate tools for education.

The fact is that a computer today is not just a large calculator but an integrated communication medium. The more the functions, the more the complexity. The free participatory ways in which this technology has grown has also brought in diverse ways in which different hardware and software achieve similar tasks. Keeping abreast of the technology becomes a challenge. At the same time, trying to learn every new tool in a rote manner would not be fruitful either. A broad conceptual understanding of how ICT devices and tools work, along with an operational knowledge of safe and efficient use of ICT should be the aim. Basic troubleshooting and working around problems will also help.

Connecting input output devices-printers, scanner, webcam, digital camera and sound recorder, projector, headphone, using storage devices and optical disks, mounting and dismounting devices, connecting to the internet - modem, data card, Wi-Fi, LAN, bandwidth and connection speeds, software installation, using different operating systems, file management, settings and configurations, enabling regional language support, trouble shooting and basic repair, virus protection, basic safety of equipment and user will form the focus of the theme.

4.5 Possibilities in Education (PIE)

ICT capabilities have opened out a wide variety of educational applications. Software applications which extend learning, immerse students in experimentation and problem solving, make available data sets to process and retrieve information from are commonly used in education. Online resources – books, courses, media materials have also become common. Interactive possibilities, individual users interacting with packaged material or groups of people interacting with each other have also opened up ways in which education is being transacted.

While the glamour and novelty of the medium attracts everyone, becoming a discerning, critical user of ICT is very essential. Sugar coating of information cannot constitute enriching of experience. Learning to acquire insights into how ICT operate and impact teaching learning, what forms of media and information can be appropriate to learning, how educational goals can become the arbiter of choices made in ICT, assessment and evaluation of ICT tools, devices, information and resources are very important if cost effective and meaningful ICT has to be promoted. This theme therefore forms the bridge between the aspirations of the education system and the run away developments in ICT.

The theme will involve the exploration and experimentation with open educational resources (OER)- access, use and evaluation, creation and contribution of educational resources, research and critical appraisal of the utility and effectiveness of ICT devices and tools, familiarity with virtual environments for self-learning and teaching-learning, familiarity with the web and its range of resources, productivity tools and their meaningful use, tools and forums for planning, organising, teaching learning, assessment and evaluation, tools and forums for professional growth.

4.6 Reaching out and bridging divide (ROBD)

ICT has become available widely, overcoming geographical and social boundaries. But this has not naturally ensured access to its benefits to all. ICT itself has evolved techniques – a DVD or a music player as examples of portability, forums as examples of public helplines and support, public sharing and open educational resources, a wide range of free and open source software augur well for improving access.

Language barriers and professional isolation can deny students and teachers access to the wide range of digital information and resources. Becoming aware of, experimenting with, participation in and creation of resources and support aimed at those denied access will help reach out and bridge the divides. Physically challenged, particularly the blind and the deaf cannot access information as easily.

The theme will involve an exposure to building digital communities, understanding the need for and evolving shared agenda, creating, sharing, and curating resources for the teacher and the student communities, community radio; local language tools and local content, translators and translations, subtitling video; disability and assistive technologies- screen readers for the visually impaired; audio books; talking books; collaborative possibilities – wikis, open maps, data repositories and forums.

Two themes specific to enabling the ICT teacher

Managing the ICT infrastructure (MICT)

Introduction to the specific ICT environment, hardware and software, their operation, troubleshooting, connections, installations, routine maintenance and upkeep, maintaining records and ensuring safety of the equipment, oneself, students and teachers, conforming to correct social, legal and ethical practices

Organising ICT classes for students and teachers (OICT)

Introduction to planning for and conducting ICT training sessions, mentoring students and fellow teachers, evaluating and maintaining records.

ICT Course for Students

Course objectives:

After undergoing the course, the student will be able to:

- Develop digital literacy skills that will enable them to function as discerning students in an increasingly digital society

- Access various tools and applications for learning and skill development opportunities

- Operate a variety of hardware and software independently and troubleshoot common problems and using the ICT facility with care, ensuring the safety of themselves, others and the equipment

- Creating a variety of digital products using appropriate tools and applications and saving, storing and managing digital resources

- Practice safe, legal and ethical means of using ICT

Target audience:

Students of 6th to 10th grade

Course mode:

The programme would be conducted in schools

Duration of the course:

3 years @ 3 sessions per week; at least 30 weeks of engagement per year

Course organisation:

Spanning the three competency levels- Basic, Intermediate, Advanced, the course includes

- Connecting with the world
- Connecting with each other
- Creating with ICT

In the process, students will interact with a variety of ICT tools and devices, hardware and software applications, learning to use them safely and productively. They will also become aware of the social, ethical and legal aspects of ICT and act accordingly.

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Course content

Content	Weightage
Year 1	
Introduction to the Internet and ICT environment - 01	20%
Introduction to programming 01	20%
Introduction to graphics and image editing 01	20%
Introduction to data processing and representation 01	30%
Introduction to audio-visual communication 01	10%

Year 2	
Introduction to ICT environment 01	20%
Introduction to programming 02	15%
Introduction to graphics and animation 02	15%
Introduction to internet and communication 02	15%
Introduction to audio-visual communication 02	15%
Introduction to data processing 02	20%

Year 3	
Introduction to ICT environment 01 (installation, troubleshooting, etc)	25%
Introduction to programming 03	20%
Introduction to audio-visual communication 02	20%
Introduction to graphics and animation 03	25%

Project work:	10%
Examination:	

Note: The content is still being elaborated by the curriculum core group at CIET, NCERT; suggestions and feedback are welcome.

Certification authority:

Board of Secondary Education of the respective State Government

ICT Course for Teachers

Course name*:*

Diploma in ICT in Education

Course objectives:

After undergoing this course the subject teacher will be able to:

- Effectively use ICT tools, software applications and digital resources

- Integrate ICT into teaching learning and its evaluation

- Acquire, organise and create their own digital resources

- Participate in the activities of teachers' networks

- Participate in the evaluation and selection of ICT resources

- Practise safe, ethical and legal ways of using ICT

- Use ICTs for making classroom processes more inclusive and to address multiple learning abilities

In addition to these, the ICT teacher will be able to:

- Manage ICT infrastructure, database, website and ICT enabled activities of the school

- Organize the ICT Curriculum for teachers and students of the school

- Arrange and demonstrate various hardware and software required by teachers and students

- Support the teachers and students to acquire and utilize digital resources

- Support teachers in evaluation and maintaining records

For whom is the course/target audience :

Subject and ICT teachers from any school
Course mode:

Blended course with online and face-to-face/hands on

Duration and organisation of the course:

2 years; entails 3 induction and 12 refresher courses; break-up of the course is:

- Ten day first level induction course
- First set of 6 refresher courses
- Five day second level induction course
- Second set of 6 refresher courses
- Five day third level induction course
- An Examination leading to a Diploma in ICT in Education

Course organisation:

Spanning the three competency levels- Basic, Intermediate, Advanced, the course includes

- Connecting with the world
- Connecting with each other
- Creating with ICT
- Interacting with ICT
- Possibilities in Education
- Reaching out and Bridging the Divide

In the process, teachers will interact with a variety of ICT tools and devices, hardware and software applications, learning to use them safely and productively. They will also become aware of the social, ethical and legal aspects of ICT and act accordingly.

The ten day first level induction course:

	Demo	Handson		Demo	Handson	Special Lecture	Handson
Day 01	Opening + D1	CWW-01		D2	CWW-02	SP-01	CWW-0A
Day 02	D3	CWW-03		D4	CWE-01	SP-02	CWE-0B
Day 03	D5	CWW-04		D6	CWE-02	SP-03	CWW-0C
Day 04	D7	CWW-05		D8	IWICT-01	SP-04	CWW-0D
Day 05	D9	CWW-06		D10	IWICT-02	SP-05	CWW-0E
Day 06	D11	EVAL-01		D12	IWICT-03	SP-06	CWICT-0F

Day 07	D13	CWICT-01		D14	CWICT-02	SP-07	CWICT-0G
Day 08	D15	CWICT-03		D16	PIE-01	SP-08	CWICT-0H
Day 09	D17	PIE-02		D18	ROBD-01	SP-09	CWICT-0I
Day 10	EVAL-02	Exhibition		Closing			

D – Demonstration lecture (to be organised by lead instructor)

SP – Special lecture (for showcasing specific applications related to the day's theme; can involve resource persons)

Handson 0A – 0I (a residential programme is recommended; these sessions are free practice sessions in the evenings outside the course schedule and are open ended)

CWW – Handson sessions for Connecting with the world – exploring the internet and its resources

CWE – Handson sessions for Connecting with each other – email and other personal communication tools

IWICT – Handson sessions for Interacting with ICT – introduction to hardware and software

CWICT – Handson sessions for Creating with ICT

PIE – Handson sessions for Possibilities in Education

ROBD – Handson sessions for Reaching out and bridging divides

EVAL – will involve a test, a portfolio of all work done during the course and assignments

Refresher courses: (offered in a blended – online + inschool face to face)

	Demo	Handson		Demo	Handson	Special Lecture
Day 01	D1	Handson		D2	Handson	SP01
Day 02	D3	Handson		D4	Handson	SP02
Day 03 - 08	Self learning, Assignments and Mentor supported network activities					
Day 09	D5	Handson		D6	Handson	SP03
Day 10	D7	EVAL		D8	Feedback & Exhibition	

These refreshers attempt to bridge areas in technology, gaps in learning, specific tools and devices, pedagogy for technology, improving classroom practices, management of learning, professional development of teachers, tracking learning, creating ICT content, evaluation of ICT, etc.

The courses will be clustered around sub-themes so that each teacher can select from among the sub-themes based on their subject specialisations, classes taught, interest and professional needs.

The five day second level induction course:

	Demo	Handson		Demo	Handson	Special Lecture	Handson
Day 01	Opening + D1	PFL - 01		D2	PFL - 02	SP - 01	PFL - 0A
Day 02	D3	PFL - 03		D4	TinTL - 01	SP - 02	PFL - 0B
Day 03	D5	TinTL - 02		D6	TinTL - 03	SP - 03	TinTL - 0C
Day 04	D7	TinE - 01		D8	TinE - 02	SP - 04	TinE - 0D
Day 05	EVAL 01			Exhibition		Closing	

D – Demonstration lecture (to be organised by lead instructor)

SP – Special lecture (for showcasing specific applications related to the day's theme; can involve resource persons)

Handson 0A – 0D (a residential programme is recommended; these sessions are free practice sessions in the evenings outside the course schedule and are open ended)

PFL – Handson sessions for Planning for Learning

TinTL – Handson sessions for Technology in Teaching Learning

TinE – Handson sessions for Technology in Evaluation

EVAL – will involve a test, a portfolio of all work done during the course and assignments

The five day third level induction course:

	Demo	Handson		Demo	Handson	Special Lecture	Handson
Day 01	Opening + D1	EPIE - 01		D2	EPIE - 02	SP - 01	EPIE - 0A
Day 02	D3	ETTL - 01		D4	ETTL - 02	SP - 02	ETTL - 0B
Day 03	D5	ETTL - 03		D6	ETTL -04	SP - 03	ETTL - 0C
Day 04	D7	CTN - 01		D8	CTN - 02	SP - 04	CTN - 0D
Day 05	EVAL 01			Exhibition		Closing	

Evaluation

A continuous comprehensive evaluation is built into the schedule. Cumulative records in the form of an e-portfolio would be maintained. A centralised examination, qualifying the teacher to a Diploma in ICT in Education to be organised by the Board of Secondary Education or similar agency at appropriate time and periodicity. Due weightage will be given to the performance at the induction and refresher courses.

The entire course is also proposed to be offered by the Central Institute of Educational Technology, NCERT, in collaboration with other educational organisations.

Enrollment:

Enrollment through the year; option for advanced users to by-pass the basic and intermediate levels, directly entering advanced after evaluation.

Certification authority:

Boards of Secondary Education, NCERT

Information on Conducting the ICT Course for Teachers

The course may be organised by State Agencies like SCERT or the Directorate of School Education or similar agency identified by the State Government. Alternately, on request, NCERT can organise the course in collaboration with the States.

The course will be offered in a blended mode. An online course portal containing the entire course materials and transactions will be deployed and managed by the Central Institute of Educational Technology, NCERT, New Delhi. Teachers can be enrolled through a State sponsored arrangement or (in the case of private schools) directly. A mentor would be assigned to each batch of teachers to support the online learning The face-to-face/handson component will be supported by a local instructor/trainer.

Minimum specifications for the ICT Infrastructure and human resources:

- A 20 seater ICT facility, accessible 24 hours, with at least 10 computer access points (desktops or full-fledged laptops. If only virtual devices or thin clients are available, they may be checked to ensure that they serve all the software applications in the curriculum.

- The set up should, to the extent possible, be similar to the one the trainees will encounter in their schools.

- Adequate power backup for the safety of the equipment, a generator backup to ensure uninterrupted training time must be available at the facility.

- Internet connectivity of sufficient bandwidth, available to all the computers, preferrably through a local area network.

- Microphone and headphones at each access point.

- A projection system of adequate luminosity and speakers of adequate output connected to the trainers computer.

- At least one each of the following accessories: an entry level laser printer (black), flatbed scanner, DVD writer and blank DVD-RW, webcam, digital still camera, video camera, wi-fi router, laptop and a tablet PC with wi-fi and bluetooth capabilities, at least two separate bluetooth devices, and a mobile smartphone. These accessories are primarily to demonstrate the utility and scope of such devices. While it

is likely that many such devices would be available with the participants, trainer may ensure that at least the above list is conformed to.

- All computer nodes to carry a Free and Open Source operating system. If *Microsoft Windows* operating system or any other commercial *Linux* operating system is pre-installed, a dual boot system with at least one Free and Open Source *Linux* based operating system must be available with every computer access point.

- The language environment should be set to the State language. Unicode fonts with appropriate range of type faces should be available on each of the computers.

- **Pirated software must not be used. Licensed copies used on more than the permitted number of computers also constitute piracy.**

- A range of software applications of the Free and Open Source genre as per the list supplied, pre-installed on each of the nodes. Copies of all software used during the training programme must be given to the trainees at the end of the programme.

- Where third party freeware or shareware applications should be avoided to the extent possible. If they are used, they must be available across both Windows and Linux platforms and should not have dependencies on other proprietary software.

- The trainers team should include one or more mentors, one or more resource persons for the special lecture demonstrations, one or more advanced users (must be fellow teachers).

- A support / maintenance team to ensure uninterrupted functioning of the equipment must be available at the programme.

- Handouts, lecture notes, examples of activities for every session, example websites, etc. as required. To the extent possible, these should be in electronic form and available at all the computers in the system. To the extent possible, all these materials should be in a language the trainees are conversant with. A copy of this collection must be given to the trainees at the end of the training programme.

- The supplied access to the Training Portal, which includes a Learning Management System should be used. All trainer instructional materials

Note: *CIET, NCERT proposes to make available a custom training portal for this purpose. However, States may make similar arrangements.*

Course content for the subject teacher's programme:

This course assumes that the teacher is a complete fresher to ICT, but being an experienced teacher (TGT/PGT) has a good general understanding of teaching-learning processes and student needs. Together, the three induction courses and the twelve refreshers would constitute a holistic exposure to applications of ICT in education and help teachers independently use ICT for their own professional development as well as for their work in the school.