

# **ICT IN EDUCATION CURRICULUM FOR STUDENTS**

Guided by the National Policy on ICT in School Education , the curriculum for students is designed to promote creativity, problem solving, and introduce students to the world of information and communication technologies with the specific purpose of widening their horizons and better informing them of choices in their career pursuits. In particular, the curriculum focuses on training the student to working with a variety of resources; learning to critically appraise information and resources; and making safe, productive, ethical and legal use of these resources a habit.

Students are also introduced to ICT outside the classroom context. Their curiosity and desire to learn will prompt them to more intensely participate in ICT activities. While introduction to social networks and blogging would become inevitable, making them aware of cyber bullying or other means of violating their rights should become an essential part of the training. While experimenting with hard and software the range of learning is very high. Channelising these tendencies and co-opting them into the teaching-learning process can help teachers create able support to the ICT system in the school.

The impact of ICT on the overall development of the personality can be extremely significant. In particular its effect on the improvement of communication skills is treated as a central goal of the ICT curriculum. Language barriers and isolation can deny students access to the wide range of digital information and resources. Physically challenged particularly the visually impaired and auditory impaired needs additional

support. Heightened awareness on the part of the system will help address these students' problems of access.

Based on the availability of ICT infrastructure and the provisioning of an ICT class in the timetable, different schools or Boards of School Education can exercise the choice to begin the ICT programme with any appropriate class, but ensure that every student completes the advanced stage outlined in the National Policy on ICT in School Education before completing schooling.

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 counterproductive. The ICT curriculum for students is also conceived as an important vehicle for the realisation of the goals of the National Curriculum Framework. It attempts to introduce students to a dynamic, immensely popular field, exposing them to a wide range of information and resources, motivating them to explore and participate in. It can not only support learning, but also introduce them to diverse activities which challenge their intellect and imagination.

To this end, the curriculum is organised into four strands:

1. Connecting with the world
2. Connecting with each other
3. Creating with ICT
4. Interacting with ICT

The scope of these strands remains the same as that for teachers. In terms of activities however, the syllabus articulates content differently, taking into consideration the age

profile of students, their unique needs and the objective of preparing them for their future.

The ICT curriculum broadly attempts to equip students with an ability to negotiate a range of devices, tools, application, information and resources. The course is offered in chunks of three periods in a week, which include one teacher led session and two hands on sessions. The teacher led session aims to demonstrate techniques and processes and present a context to the learning. Following this, students engage themselves with activities which are designed to provide adequate hands on experience.

## **Class I to V**

As per the recommendations of NCF 2005, ICT is not recommended to be offered as a separate course at primary level. Rather ICT based games will be integrated into core subjects so that students learn ICT incidentally along with learning of their subjects. 130 games have been identified that needs to be integrated across class 1 to 5. These games are all open source that has scope for translation into regional languages, as most of the states prefer the content in regional language for primary level. These games will inculcate the ICT skills in children and also helping them to learn the subjects better with the support of ICT.

## Objectives

After the ICT intervention games, the students will be able to:

1. Create digital art and textual materials
2. Use e-resources for learning of curricular subjects
3. Interact with ICT devices confidently
4. Practise safe, legal and ethical means of using ICT

## List of Games

S. No	ACTIVITY	DESCRIPTION
1	Make the ball go to tux	Using two keys at the same time
2	Simple letters	Pressing the alphabets in keyboard that are visible on screen
3	No with dice	Typing number using keyboard that is visible on the dice
4	Falling Words	Typing words using keyboard that are visible on the screen
5	Click on me	Selecting objects using mouse
6	Move the mouse	Moving the mouse until all the blocks disappear as it deals with motor coordination
7	Click the mouse	Selecting objects by clicking on the mouse

8	Control hose-pipe	Selecting objects by clicking on the mouse and it deals with motor coordination
9	Mining for gold	Dragging objects using mouse
10	Click and draw	Using mouse to zoom in and zoom out
11	Double click the mouse	Double clicking the mouse on rectangular until all the blocks disappear as it deals with motor coordination.
12	Penalty kick	Selecting objects by double clicking and it deals with motor coordination.
13	The history of Louis Braille	Practicing clicking with mouse
14	Discover the Braille system	Practicing Braille system
15	Braille the falling letters	Practicing Braille codes.
16	Braille lotto	Braille system based games
17	Mixing colors of light	Mixing color using mouse to create a new color
18	Colors	Recognition of different colours.
19	Rebuild the mosaic	Creating patterns by using mouse
20	Mixing color of paint	Creating a perfect match to the cue by mixing the color tube by just clicking on plus and minus sign.
21	Advanced colors	Creating advanced colours by mixing
22	Maze	Moving in maze using keyboard

23	3D Maze	Moving in 3D maze using arrow in keyboard
24	Maze	Moving in maze using arrow keys from the keyboard
25	Maze	Moving in maze using arrow in the keyboard.
26	Memory game with images	Pairing of cards using mouse.
27	Railway	Building train by using keyboard using logic ordering
28	Audio memory game	Identifying audio
29	Audio memory game against tux	Identifying audio and removing wrong ones using mouse
30	Memory game with images against tux	Identifying image and pairing together using mouse.
31	Matching items	Mapping concepts by dragging and dropping
32	Complete the puzzle	Completing puzzles by dragging and dropping
33	Chronos	Telling story by logically arranging the images using drag and drop
34	Find your left and right hands	Distinguishing between various views
35	Algorithm	Moving and clicking the mouse using algorithm

36	Learning clock	Distinguishing between time-units by moving and clicking the mouse.
37	Find the details	Completing the puzzle by dragging
38	Double entry table	Counting by moving using mouse
39	Locate the region	Locating the region by using the mouse.
40	Locate the countries	Locating countries by using the mouse.
41	Explore world animals	Learning about animals by selecting using using mouse.
42	Explore farm animals	Associating the animal sounds with animal name and what the animal looks like by clicking on it.
43	Melody	Listening to the sound sequences played and repeat it by clicking on the elements.
44	Play piano	Listening to the sound sequences played and repeat it by clicking on the elements.
45	Play rhythm	Learning musical notation and musical staff using keyboard and mouse
46	Explore world music	Learning the beat rhythm precisely and accurately based on what is visible and audible using mouse.
47	Music instruments	Recognition of musical instruments by clicking on correct instrument using mouse.
48	Name that note	Learning note position and naming convention using mouse.

49	Piano composition	Music composition with a piano using keyboard using mouse.
50	Parachutist	Safety landing using mouse.
51	Operate a canal lock	Operating a canal lock by using mouse.
52	Learn about the water cycle	Learning water cycle by clicking on different active elements in order to reactivate the entire water system using mouse.
53	Learn about an electrical system based on renewable energy	Building electrical system based on renewable energy by clicking on different active elements using mouse.
54	Intro gravity	Maintaining the spaceship in the middle without crashing into planets or the asteroids using mouse.
55	Land safe	working with up, down, right and left key of the keyboard for the safe landing of the spaceship
56	Place your satellite	Controlling the speed of the satellite and mass of earth using mouse
57	Electricity	Working with electricity
58	Pilots submarine	Handling submarine using mouse
59	Sea race	Giving instructions to computer to perform an action
60	Sea race	Giving instructions to computer to perform an action
61	Learning chess	Playing chess using mouse

62	Enrich your vocabulary	Identifying words using audio, text and image
63	Lower case letter learning	Identifying the alphabet
64	Upper case letter learning	Identifying the alphabet
65	Reading Practice	Matching word and reading
66	Missing letter	Identifying and completing word using keyboard
67	Horizontal reading practice	Matching words by clicking
68	Vertical reading practice	Matching words by clicking
69	Image Name	Matching image with name by drag and drop
70	Word number memory game	Identifying the number name
71	The classic hangman game	Reading and spelling
72	Assemble the puzzle	Solving puzzle by dragging and dropping
73	The tangram puzzle	Solving tangram puzzle by dragging and dropping
74	Build the same model	Building models with motor coordination of using mouse and keyboard
75	Simplified Tower of Hanoi	Dragging and dropping to complete a given tower.

76	Photo Hunter	Identifying differences in the two pictures
77	Animal 4 D	Learning about animals by zooming in and out
78	A Sliding-block puzzle game	Solving puzzle using mouse click
79	Tower of Hanoi	Moving and stacking disc using mouse to find solution
80	Sudoku	Solving problems logically
81	The fifteen game	Clicking and swapping blocks to identify path
82	Lights off	Switch off all the lights by clicking on mouse
83	Practice the addition operation	Performing addition and recognition of written numbers.
84	Practice the subtraction operation	Performing subtraction and recognition of written numbers
85	Practice the multiplication operation	Finding product of two numbers in limited time
86	Equality Number Munchers	Games on of addition, multiplication, division and subtraction
87	Inequality Number Munchers	Games on of addition, multiplication, division and subtraction
88	Multiple Number Munchers	Identifying multiples

89	Factor Number Munchers	Identifying factors
90	Prime Number Munchers	Identifying prime number
91	Addition memory game	Addition game
92	Addition and subtraction memory game	Games on addition and subtraction
93	Subtraction memory game	Subtraction game
94	Multiplication memory game	Multiplication game
95	All operations memory game	Games on addition, multiplication, division and subtraction
96	Division memory game	Division game
97	Multiplication and division memory game	Games on multiplication and division
98	Addition memory game against tux	Addition game
99	Addition and subtraction memory game against tux	Games on addition and subtraction
100	Subtraction memory game against tux	Subtraction game

101	Multiplication memory game against tux	Multiplication game
102	All operations memory game against tux	Games on addition, multiplication, division and subtraction
103	Division memory game against tux	Division game
104	Multiplication and division memory game against tux	Multiplication and division game
105	Balance the scales	Balancing using keyboard and mouse by doing mental calculation and arithmetic equality
106	Practice addition with a target game	Throwing darts at a target and counting the score using mouse
107	Match the given value with the right combination of numbers and operations	Match a given value by doing set of arithmetic operations
108	Balance the scales and calculate the weight	Balancing using keyboard and mouse by doing mental calculation, arithmetic equality and unit conversion.
109	Simple Vector drawing tool	Drawing basic shapes using mouse
110	Redraw the given item	Drawing images by moving and clicking a mouse
111	Mirror the given item	Copying images by moving and clicking a mouse

112	Practice money usage	Counting money
113	Give tux his change	Counting money
114	Give tux his change, including cents	Counting money
115	Money	Counting money
116	Count the items	Counting using keyboard and mouse
117	Enumeration memory games	Numeration using keyboard and mouse
118	Number with pairs of dice	Counting using keyboard
119	The magician hat	Subtraction of numbers
120	The magician hat	Adding numbers
121	Numbers in order	Ordering number using drag and drop
122	Practice subtraction with a fun game	Counting the number on the dice and practice subtraction
123	Count the items	Counting numbers from 1 to 1000
124	Draw number	Counting 1 to 50 and drawing the picture by clicking on each number in the right order
125	The football game	Playing football by clicking and dragging mouse
126	Tux Paint	Creating digital art

127	Hexagon	Moving and clicking on objects to follow logical thinking
128	Word Processor	Using word processor for inputting text
139	Create a drawing or an animation	Fast use of mouse to create drawings based on basic shapes
130	Chat and draw with your friends	communicating with others through chatting

Flexibility is provided to identify more relevant games based on subjects and to be included at primary level. Also the interactive activities developed by NCERT and shared through NROER will also be integrated contextually.

## **Class VI to VIII**

A separate ICT in Education course is recommended for class VI to VIII and it attempts to equip students with an ability to negotiate a range of devices, tools, application, information and resources. The course is offered offered in chunks of three periods a week, which include one teacher led session and two hands on sessions. The teacher led session aims to demonstrate techniques and processes and present a context to learning. Following this, students engage themselves with activities, which are designed to provide adequate hands on experience. Each activity has an associated deliverable to be recorded. The student also has to submit various assignments as part of the courses. This should facilitate a comprehensive and continuous assessment. Provision for improving upon one's performance is also built in. A summative is designed at the end of each year. This evaluation also includes an exhibition and peer review of the

work done throughout the year. An e-portfolio to capture all learning and complements the periodic summative assessment through the course.

The curriculum expects an allocation of three sessions per week and thirty weeks per year for the course work. The course spans three years. This course will be the foundation courses for the vocational courses that may be delivered for class 9 to 12 or for further learning into core computer science. This course can also be expanded as 5 year course or delivered to different range of class like class 8 to 10 according to the need of the school boards.

## **Objectives**

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

1. Develop digital literacy skills that will enable them to function as discerning students in an increasingly digital society
2. Access various tools and applications for learning and skill development
3. Operate a variety of hardware and software independently and troubleshoot common problems
4. Use the ICT facility with care, ensuring the safety of themselves, others and the equipment
5. Create a variety of digital products using appropriate tools and applications and saving, storing and managing digital resources
6. Practise safe, legal and ethical means of using ICT

## **Course Structure**

The session wise break up of topics to be covered in the three year course:

## YEAR 01

Week	Theme	Course Title	Description
01	Internet and the ICT Environment 01	Playing with ICT	Orienting to the ICT environment by playing interactive games
02 - 04	Programming 01	Creating images with logo programming - Basic	Learning to give instructions logically through LOGO programming and getting an image as output using basic commands
05 - 06	Graphics 01	Creating digital art - Basic	Learning to create digital art (raster images)
07 - 09	Internet and the ICT Environment 02	Navigating the Web for accessing information	Learning to access textual information from web
10 - 12	Data Representation and Processing 01	Working with Spreadsheet - Basic	Learning to work in spreadsheet to collect, organise, read and manipulate data
13 - 15	Audio Visual Communication 01	Creating audio communication	Learning to create audio based communications by integrating audio and music

16 - 19	Programming 02	Creating images with logo programming - Advanced	Learning to give instructions logically through LOGO programming and getting image as output using advanced commands
20- 24	Data Representation and Processing 02	Creating Textual communication - Basic	Learning to create mind maps and text document by inputting text and doing the necessary formatting
25 - 28	Audio Visual Communication 02	Creating Audio-Visuals for Communication	Learning to create digital stories by combining text, image, audio and video
29	Project -1	Creating digital story	Developing a digital story based on the curricular subject by applying all the skills developed in year 01
30	Exhibition of portfolios and evaluation	Assessment 1	Output created for assignments will be evaluated based on the rubric. Best works will be showcased

## YEAR 02

Week	Theme	Course Title	Description
01 - 04	Graphics 02	Creating digital art - Advanced	Learning to create digital art (vector images)

05 - 07	Programming 03	Creating Audio-Visuals Communication with LOGO programming	Learning to give instructions logically through LOGO programming and getting simple animation as output
08 - 09	Internet and the ICT Environment 03	Mining the web for educational resources	Learning to search for educational resources like image, audio and video
10 - 13	Data Representation and Processing 03	Working with Spreadsheet - Advanced	Learning to work in spreadsheet to organise and represent data graphically
14 - 17	Audio Visual Communication 03	Creating 2D animation	Learning to create 2D animations by using basic tools
18- 20	Programming 04	Creating animations using LOGO programming	Learning to create 3D animations with audio and visuals using multiple characters
21 - 22	Software application 01	Working with interacts - Basic	Learning to create mathematical images using interactive tools like geogebra
23- 26	Data Representation and Processing 04	Creating textual communication - Advanced	Learning to create textual communication by combining text, image, table, media etc
27-28	Software application 02	Creating Infographics	Learning to create subject based infographics combining image and text

29	Project 2	Creating 2D animation	Developing a 2D animation based on the curricular subject by applying all the skills developed in year 01 & 02
30	Exhibition of portfolio and evaluation	Assessment 2	Output created for assignments will be evaluated based on the rubric. Best works will be showcased

### Year 03

Week	Theme	Course Title	Description
01 - 04	Graphics 03	Working with graphics editor	Editing images using basic tools
05 - 07	Software Applications 03	Working digital Maps and Globes	Learning to use digital maps and globes for mapping and understanding locations
08 - 11	Software application 04	Working with interacts - Advanced	Learning mathematics by construction and manipulation using interactive tools like geogebra
12 - 14	Software application 05	Working with simulations	Learning Science using simulations tools like Stellarium
15 - 17	Internet and the ICT Environment 04	Connecting with each other	Learning to connect with each other through mails and forums

18 - 20	Graphics 04	Creating with graphics editor	Editing images to create a piece of communication
21- 23	Software application 06	Working with web based applications	Working with online tools like PhET, games, apps etc.
24-25	Programming 05	Creating interactive games with LOGO programming	Learning to create interactive games using multiple characters
26-28	Internet and the ICT Environment 05	Creating and learning online	Learning to share information online through blogs and learns through MOOCs
29	Project 03	Creating interactive games	Developing an interactive game based on the curricular subject by applying all the skills developed in year 01 to 02
30	Exhibition of portfolio and evaluation	Assessment 3	Output created for assignments will be evaluated based on the rubric. Best works will be showcased

## **Assessment**

Each session of the course involves a teacher led session followed by a hands on session, during which the student undertakes a number of activities. Each activity has an associated deliverable to be recorded. The student also has to submit various assignments as part of the courses. This should facilitate a comprehensive and continuous assessment. Provision for improving upon one's performance is also built in. A summative evaluation is designed at the end of each year. This evaluation also includes an exhibition and peer review of the work done through the year. An e-portfolio attempts to capture all learning and complements the periodic summative assessment through the course.

## **Certification**

As the course may not be immediately available across all schools, owing to the ICT infrastructure not being in place, the State Board of Secondary Education may evolve a mechanism of a separate examination, following which a Certificate can be awarded. Once all schools are equipped, this could form a part of the School Leaving Certificate.

## **Class IX to XII**

As vocational education is part of class 9 to 12, this ICT course will be extended as vocational course which will follow the rules and norms of vocational education courses with respect to time allocation, certification, and methodology etc. 11 courses has been identified which is mapped to minimum of 15 job roles prescribed by NSQF. This course will be offered as Level 1 to 4 as per NSQF recommendations.

## Objectives

ICT based vocational course are offered with the following objectives:

1. Enabling the students to identify their skills in the specific for choosing their higher education.
2. Providing an opportunity to have a job oriented certification for making their livelihood.
3. Developing a skillful youth community to address the needs of the digital society.
4. Creating awareness on social, ethical and legal use of ICT.

## Courses

Course	Job Roles
Graphic designing	Graphic designer/ Graphic artist/ Graphic designer Multimedia
User interface and user experience design (UI & UX design)	Web designer
DTP	DTP operator
2D and 3D animation	Animator
Web application development	Junior software developer
Software and Hardware system administration	Junior software administrator
Graphic designing and DTP	Graphic designer and DTP operator
Web development	Web developer
Audio video production	Multimedia content developer

Data analysis and data visualisation	Data analytics
Mobile application development	Junior software developer

If a student or school is not opting for vocational education, even then ICT should be integral part of class 9 to 12 curriculum. Hence ICT based projects will be identified for each subject which will enable the students to use ICT for learning the core subject in a better way. These projects can be used by teachers for formative assessment of the core subjects and also by ICT teachers to assess the ICT skills. These projects will be designed based on the subject specific tools appropriate for the level of the students

## **ICT integration across Class I to XII**

Every teacher is expected to integrate ICT with content and pedagogy from class 1 to 12. For this teachers will be trained on ICT in Education and this will enable the integration of ICT in classroom. Students of class 1 to 12 will learn to use ICT for searching, collecting, collating, creating, saving, manipulating, sending and receiving digital information. This will enable the student to use ICT for learning in better way. ICT could be integrated across classes by use of econtent (images, audio, video, text, animations, simulations, interactive games, mobile apps etc), Learning Management System (MOODLE, Google classroom etc), and devices (interactive board) for teaching, learning and assessment.