To
The Headmaster / Headmistress
All Govt./Aided Upper Pry. & Secondary Schools of Goa

<u>Sub: Revised Computer Awareness/ICT curriculum for class V to VIII</u>

Sir/Madam

The National Educational Policy 2020 announced by the Ministry of Education, Govt. of India, recommends various skills that students should acquire right at a young age so that they can nurture these skills and knowledge in the higher classes effectively.

The Directorate of Technical Education Goa has conceptualized a scheme called "Chief Minister's Coding And Robotics Education in Schools". The vision of this scheme is "To develop computational and design thinking skills along with programming, integrated into school education for the state of Goa to prepare students to meet the demands of 21st century digital world."

In tune with NEP-2020 and CM-CARES Scheme, the State Council of Educational Research and Training (SCERT) initiated the process of upgrading the present computer education subject into **Information Communication Technology (ICT)** in schools. Keeping in view of the present requirement, a curriculum is prepared for classes V to VIII which will be implemented from **A.Y. 2021-22** onwards in all Govt. and Govt. Aided Schools in the State. The curriculum includes topics like programming by using SCRATCH, usage of LINUX Operating System and computing device, HACKATHON etc. This will definitely tinker the young minds in acquiring computational and mathematical thinking.

P.T.O

The following points are to be noted:

- From 2021-2022 onwards the present Computer Awareness subject is renamed named as **Information Communication Technology (ICT).**
- This new curriculum has got two levels, (a) Regular (b) Elective.
- Regular curriculum/syllabus is for all students and elective curriculum/syllabus is for interested selected students.
- This curriculum is to be taught by the existing computer teachers in the schools and they should go through the curriculum completely including evaluation/testing rubrics.
- SCERT will conduct some training programme to transact the new ICT curriculum. However, teachers can start exploring the contents from various open secured sources which are available freely and also update their skills which is required for implementation of this new ICT curriculum.

The suggestions feedbacks from the teachers to SCERT are most welcome.

Yours faithfully,

(Nagaraj G. Honnekeri)
Director – SCERT

Copy to:
1) Director of Education, Porvorim.
2) Director of Technical Education, Porvorim.
3) SPD, Goa Samagra Shiksha, Porvorim, Goa.
4) Dy. Director of Education, NEZ/CEZ /SEZ, Mapusa/Panaji/Margao
5) Dy. Directors of Planning/Academic, DoE
6) Dy. Directors of Education, Goa Samagra Shiksha, Porvorim
7) ADEIs of all 12 Talukas
8) Concerned file
9) Guard file

State Council of Educational Research and Training (SCERT), Goa

Information & Communication Technology

Revised Syllabus 2021

Class
V to VIII

FOREWORD

The National Educational Policy 2020 announced by the Ministry of Education, Govt. of India, recommends various skills that students should acquire right at a young age so that they can nurture these skills and knowledge in the higher classes effectively. Mathematical and computational thinking has been given more emphasis, which is recognized as the key 21st century skill that involves understanding a problem, designing a solution and expressing it in a form that a human or a machine can execute.

The Directorate of Technical Education has conceptualized a scheme called "Chief Minister's Coding And Robotics Education in Schools". The vision of this scheme is "To develop computational and design thinking skills along with programming integrated into school education for the state of Goa to prepare students for the demands of 21st century digital world." We are grateful to Hon'ble CM for the same for announcing this scheme at the right time.

In tune with NEP-2020 and CM-CARES Scheme, the State Council of Educational Research and Training (SCERT) initiated the process of upgrading the present computer education subject into **Information Communication Technology (ICT)** in schools. For this the council constituted a committee of experts from ICT and Computer division of technical colleges, industry, teachers of Higher Secondary and Secondary schools. After detailed deliberation & discussion, keeping in view of the present requirement, a curriculum was prepared for classes V to VIII which will be implemented from 2021-22 onwards in all Govt. and Govt. Aided Schools in the State.

The new curriculum includes regular course curriculum and elective course curriculum which has been explained in the syllabus clearly. The curriculum also includes topics like programming by using SCRATCH, usage of LINUX Operating System and computing device, HACKATHON etc. This will definitely tinker the young minds in acquiring computational and mathematical thinking.

The teaching community will definitely upgrade their knowledge in line with the new syllabus which will be introduced and SCERT will extend its full support to the teachers by way of conducting training programs to transact the new curriculum with the help of Directorate of Technical Education – Goa and other experts from the society.

I express my sincere gratitude on behalf of SCERT-Goa to Shri. Sanjay Kumar IAS, Secretary (Education), Govt. of Goa, Dr. Vivek Kamat - Director of Technical Education, Shri. Dilip Bhagat - Director of Education and other experts for their timely guidance and Dr. Vijay Borges – HOD, Computer Eng. Dept. of Fr. Agnel Polytechnic Goa the Convener and the members of the curriculum framing committee for their inputs in conceptualizing & bringing out this new curriculum in the shortest period of time. The suggestions and feedback are most welcome.

Nagaraj G. Honnekeri
Director of SCERT - Goa

Preface

"The function of education is to teach one to think intensively and to think critically. Intelligence plus character – that is the goal of true education" – *Martin Luther King*

The National Education Policy -2020 (NEP-2020), aims at building a holistic learning culture by taking learning beyond the classroom towards 'learning how to learn' by encouraging learners to imbibe from the real-world. It not only encourages developing cognitive learning in learners but goes towards 'higher-order' cognitive learning skills like critical thinking, design thinking, computational thinking.

Computing is ubiquitous in the world today, and is a skill just like Mathematics, Science and Social studies in forming the core of school curriculum worldwide. Towards the same the Government of Goa conveyed to revise and revamp the syllabus of Computer Education at elementary schools in the state from classes Vth to VIIIth. The aim of this activity has been in putting a significant thrust on learning about how to think critically and solve problems, how to be creative and multidisciplinary, and how to innovate, adapt, and absorb new material in novel and changing fields.

The curriculum - *"Information and Communication Technology (ICT) Education"* detailed herein moves towards realising the greater goals envisioned in NEP-2020, whereby learners would be better prepared to adapt to rapid paradigm changes worldwide by leveraging improved teaching-learning-evaluating-tracking through needed information resources. The "*ICT Education"* curriculum outlined here is towards making learning enjoyable for the learners.

Prof. (Dr.) Vijay Borges
Syllabus Committee - Coordinator
Computer Awareness/Computer Education in Elementary Schools

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Introduction

Information and communications technology (**ICT**), an extensional term for information technology (IT); is the infrastructure and components that enable modern computing.

ICT through the proper blend of policies, technologies and capacities has continuously contributed to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development as well as improving education management, governance and administration. ICT's role in building connected communities that can promote innovation, increase productivity and enrich quality of life, is an established fact.

Computational Thinking is recognised as one of the key 21st century skills involving problem understanding, solution designing and expressing it in a form that a human or a machine can execute. National Education Policy (NEP) 2020 recommends that computational thinking would be given increased emphasis. The vision envisaged in the National Policy on ICT in School Education, ICT@School Scheme, Digital India Scheme and the NEP 2020, has been the guiding force for evolving this curriculum framework, *Information and Communication Technology (ICT) Education*, for the stakeholders of Goa State.

The *ICT Education* curriculum for students attempts to introduce them to a dynamic, exciting field, exposing them to a wide range of information and resources, motivating them to explore, participate and challenge their intellect and imagination.

The *ICT Education* curriculum is organized into four learning strands as per Curricula for ICT in Education for School System v1.02, developed by Central Institute of Educational Technology (NCERT):

- Connecting with the World
- Connecting with each other
- Creating with ICT
- Interacting with ICT

These learning strands seek to build capacities to handle current and futuristic technologies appropriate use in education. Keeping in view the above four strands, learning will be organized under the following six thematic areas:

- Programming
- Graphics and animations
- Internet and the ICT environment
- Data representation and processing
- Audio visual communication
- Software applications

This curriculum takes care of the requirements of a learner with the following special features:

- Development of Life Skills like creative thinking, critical thinking, problem solving, interpersonal relationships, communication skills, collaboration
- Using real life scenarios
- Integration with other academic subjects (interdisciplinary approach)
- Inculcation of Values & Ethics
- Inclusivity: Gender   Sensitization

Curriculum Objectives

The following are the Objectives for the curriculum of ICT Education:

- To develop discerning skills in students needed in an increasingly digital society.
- To provide access to various tools and applications for learning and skill development opportunities.
- To operate a variety of hardware and software ICT facilities independently with care, while ensuring the safety of self, others and the equipment.
- To create a variety of digital products using appropriate tools and applications and saving, storing and managing digital resources.
- To practice safe, legal and ethical means of using ICT.
- To build a team culture that does not discriminate on gender.
- To support and encourage entrepreneurship skills of students.

Scheme

TYPES OF COURSE CURRICULUM:

- "Regular" Course Curriculum: The curriculum/syllabus defined herein would replace the existing Computer Awareness/Computer Education schools curriculum and would need to be implemented during normal school schedule
- "Elective" Course Curriculum: The curriculum/syllabus defined herein would be undertaken after school timing for interested, motivated and selected bonafide students of school.

DURATION OF THE COURSE:

- "Regular" Course Sessions: 2 periods per week (one period=35 minutes), at least 35 weeks of engagement per year.
- "Elective" Course Sessions: 1 session per week (1 session = 120 minutes), at least 35 weeks of engagement per year.

METHODOLOGY
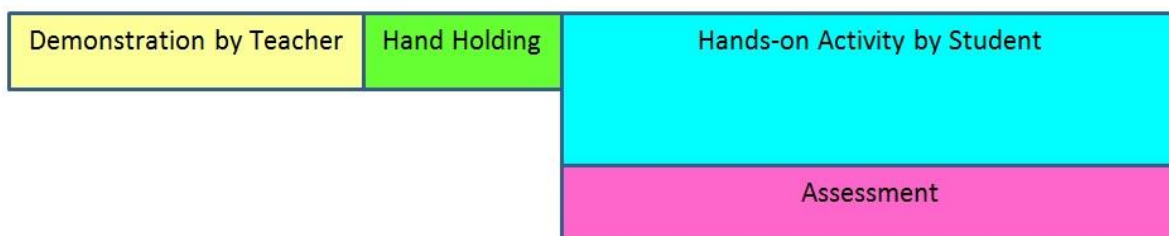
The strategy will be as follows:

Step 1: Demonstration by the Teacher:
At this step, the teacher will demonstrate the activities to the students using the teacher's manual. Handholding of the student will be facilitated.

Step 2: Hands on Activity
Based on the demonstration given by the teacher, the students will do hands-on activity. Teachers will facilitate the session. If any students like to explore further then teachers support them through extended activities.

NOTE: Assuming that there are 30 students in a class, and the lab facility having 15 computing devices in the computer laboratory, the same shall be shared on a twin sharing basis. If there are more than 30 students in a class then the class could be divided into groups of 30 students for the hands on session.

- ❏ One group will attend the ICT Laboratory for doing Hands on activity.

- ❏ Rest of the group could go for the other subject classes / laboratory work.

Step 3: Assessments:
E-portfolio: During the hands-on activities the student is continuously evaluated using rubric based methodology. The student will be encouraged to maintain an e-portfolio of his activities.
Showcase: At regular intervals students would showcase their e-portfolios towards envisaged events for assessment.

The entire assessment/evaluation would be rubrics based.

Bridging Process For Implementation

ICT Education Curriculum will be implemented by adopting the following bridging process for initial 3 years:

Year	Respective Class	Curriculum to be followed
1	V	V (Regular)
	VI (Regular)	VI (Regular)
	VI (Elective)	VI (Elective)
	VII (Regular)	VI (Regular)
	VII (Elective)	VI (Elective)
	VIII (Regular)	VI (Regular)
	VIII (Elective)	VI (Elective)
2	V (Regular)	V (Regular)
	VI (Regular)	VI (Regular)
	VI (Elective)	VI (Elective)
	VII (Regular)	VII (Regular)
	VII (Elective)	VII (Elective)
	VIII (Regular)	VII (Regular)
	VIII (Elective)	VII (Elective)
3	V (Regular)	V (Regular)
	VI (Regular)	VI (Regular)
	VI (Elective)	VI (Elective)
	VII (Regular)	VII (Regular)
	VII (Elective)	VII (Elective)
	VIII (Regular)	VIII (Regular)
	VIII (Elective)	VIII (Elective)

By the 3rd year, all Classes from V to VIII, would have their own curriculum which will be delivered. The syllabus would need to be re-visited for needed updates at appropriate times.

Course Coverage

Course Coverage: 5th Standard Regular Curriculum

Sr. No	Themes	Objectives	Title	Suggested Tools	Sessions		
					Demo session	Exploration	Total
1	Exploration	· Introduction to Keyboard & Mouse. · Learning spelling activity. · Experiencing musical notes. · Understanding digital and analog circuits. · Solving puzzles. · Performing experiments to understand various concepts.	Self-Learning	GCompris & System	15	22	37
2	Problem Solving	· Understanding rules of the educational game and controls. · Solving problems to build the house. · Solving problems to build swimming pools. · Learning from teamwork.	Learning through educational games.	MineTest	2	8	10
3	Graphics	· Color a color sheet using fills and brush. · Free art. · Applying various effects on a photograph. · Compositing using a mix of photos and free art. · Creating a greeting card.	Introduction to digital painting.	Pinta	5	12	17
4	Security and Ethics	· Setting proper account password · References and acknowledgements to team members and external resources used	Being a good digital citizen	System	1	2	3
5	Hackathon	· Working in a team to tell a story using concepts learnt	Project and team work	System, Pinta, GCompris and Minetest	0	3	3

Course Coverage: 6th Standard Regular Curriculum

Sr No	Themes	Objective	Title	Suggested Tools	Sessions		
					Demo session	Exploration	Total
1	Introduction & Fundamentals	· Understanding the hardware · Introduction to the OS · Introduction to commands	Using the system	Linux & Computing device.	2	4	6
2	Programming	· Introduction to Scratch and motion/sensor controls · Introduction to keyboard sensors · Introduction to mouse sensors · Introduction to sprite control · Introduction to sounds in Scratch · Using loops to reduce code · Using functions to reuse code · Using parameterised functions · Drawing polygon of n sides · Drawing circles · Practice with complex shapes · Animating the shape colour · Introduction to random · Square based pattern · Circle based pattern · Arc based pattern · Solar orbits · Lunar orbits · Simulating Gravity · Directional Force · Moon Lander through keyboard · Project - Practice	Introduction to problem solving through programming	Scratch/ Snap!	14	30	44
3	Internet and ICT Environment.	· Searching for information · Working in collaboration · Presentations in collaboration · Backup and content sharing · Email	Collaboration and learning using internet	Internet or Local network/ Google Office/OnlyOffice/LibreOffice/Slack/Disco	2	5	7

		· Threaded/Channel communication · Do's and Don'ts		rd			
4	Graphics	· Introduction To Gimp · Introduction to · Masking · Introduction to keying concepts · Introduction to Matte layer · Introduction to layers and effects · Creating Logo	Complex art through simple effects	GIMP	2	6	8
5	Hackathon	· Project Planning · Project Execution · Presentation	Project	Required tools	1	4	5

Course Coverage: 6th Standard Elective Curriculum

Sr No	Themes	Objective	Title	Suggested Tools	Sessions		
					Demo session	Exploration	Total
1	Introduction & Fundamentals	· Introduction to the course · Exploring the operating system	Using the system	Linux & Computing device.	1	1	2
2	Programming	· Creating animations · Understanding coordinate system · Creating sounds and music · Using visual signals to control pitch of sound · Controlling sound through other input sources · Understanding Events Animations to give social message · Building game · Building clock · Building reminder application · AI/ML to recognise face · AI/ML to classify images · AI/ML to identify hand motion	Understanding AI/ML	Scratch/ Pictoblox	12	18	30
3	Hackathon	· Project Planning · Project Execution · Presentation	Project	Required tools	0	3	3

Course Coverage: 7th Standard Regular Curriculum

Sr No	Themes	Objective	Title	Suggested Tools	Sessions		
					Demo session	Explor ation	Total
1	Programming	· Introduction to Kojo · Turtle graphics fundamentals · Creating colourful shapes · Tracing and debugging · Non rectangular shapes · Reusing code through loops · Programming a desktop wallpaper graphics · Creating shapes with curves · Creating city like graphics using Random function · Abstraction through user defined commands · Programming chaotic shapes with counter · Using variables to play with colours · Using custom functions · Recursions · Programming puzzles · Generative Art	Learning coding by creating art	Kojo	10	24	34
2	Graphics	· Introduction to 3d tool · Moving, resizing and rotating in 3d space · Building low poly 3d models · Animation & rendering	Problem solving using simple 3d shapes and operations	Appropri ate 3d modellin g tools like Blender	7	11	18
3	Data Processing	· Using Pivot Tables · Data visualisation using graphs	Using spreadsheet to organise data	Spreads heet applicati on like Google sheets or OnlyOffi ce	2	4	6

4	Internet	· Writing Letter · Creating Invoice	Introduction to HTML	Text Editor & Browser	2	5	7
5	Hackathon	· Project Planning · Project Execution · Presentation	Project	Required tools	0	5	5

Course Coverage: 7th Standard Elective Curriculum

Sr No	Themes	Objective	Title	Suggested Tools	Sessions		
					Demo session	Exploration	Total
1	Sensors and Controllers	· Resistors and colour coding · Circuit to power LED · Experiencing effects of Voltage and Current · Introduction to controller programming · Programming circuit to control LED · Building traffic light · Reaction timing game · Burglar alarm · Coding music · Using proximity sensors · Using DC Motors · Using Servo motors	Programming the controller	Electronic components/sensors, microcontroller	6	9	15
2	Robotics	· Building toy robot · Controlling the direction · Interfacing with Kojo · Obstacle Prevention · Controlling robot through visual signals · Tracking camera · Tracking robot	Building robot and interfacing with computer	Robot kit/Sensor kit/Kojo	9	7	16
3	Hackathon	· Project Planning · Project Execution · Presentation	Project	Required tools	0	4	4

Course Coverage: 8th Standard Regular Curriculum

Sr No	Themes	Objective	Title	Suggested Tools	Sessions		
					Demo session	Exploration	Total
1	Programming	· Create simple sequential music · Create orchestra using threads · Using variables to make code readable · Using loops to reduce the code · Using loops to have continuous music · Using functions to give meaning to musical notes and use it out of order	Learning coding by creating music	SonicPi	8	20	28
2	Graphics	· Adding effects to video through keying · Adding effects through blend modes · Editing and sequencing the footage to tell the whole story	Video Compositing & Editing	Appropriate compositing tools like Blender	4	10	14
3	Internet	· Using CSS to style the document · Using CSS to layout the document · Using CSS to achieve animations · Using CSS to achieve graphic effects	Styling and graphics with CSS	Text Editors	8	15	23
5	Hackathon	· Project Planning · Project Execution · Presentation	Project	Required tools	0	5	5

Course Coverage: 8th Standard Elective Curriculum

Sr No	Themes	Objective	Title	Suggested Tools	Sessions		
					Demo session	Exploration	Total
1	App development	· Exporting app to device · Understanding App · · User Interface · Building simple apps like quiz · Build simple games like TicTacToe · Using local or offline storage	Programming for mobile	Kojo/AppInventor	5	10	15
2	Robotics	· Controlling Robot from mobile	API interfacing	Robot kit/Sensor kit/Kojo/AppInventor	5	10	15
3	Hackathon	· Project Planning · Project Execution · Presentation	Project	Required tools	0	5	5

References

1. https://projects.raspberrypi.org/en/projects
2. https://github.com/raspberrypilearning/sonic-pi-lessons
3. https://www.kogics.net/kojo-ebooks
4. https://cbseportal.com/ebook/ict-in-education-curriculum-for-class-6-to-10-scert-delhi

Annexure 1

Sample Lesson Plan

This is a suggestive lesson plan that the teachers/trainers could use as a generic guideline while developing their individual lesson plans during the implementation of the syllabus for various standards.

Cat Bounce – Scratch Programing Demo Lesson Plan

Connect – (2 minute)

Raj and Ria are quite excited to apply the knowledge of some of the basic programming blocks that they just learnt in scratch. They wish to build a cat bounce game. Let us help them!

Learning Objective:
1. Learning the behavior of each block through self exploration
2. Learning the importance of order in execution
3. Experiencing problem solving through composition of simple blocks
4. Saving the work for future use

Expected outcome – (Video link or QR) (3 minutes)
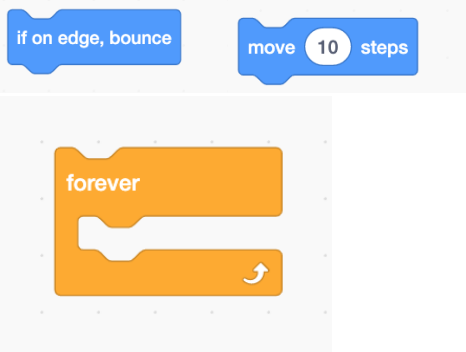
Design – (4 minutes)
Try to draw a layout of your imagination in the space given below, for this game. Also list down the following –

1. Sprites needed in this game -

2. Background (s) needed in this game - Any
3. Major programming blocks to use in this game -

Code – (50 minutes)
Task 1 – Write a program to achieve the objective described in the video or in the presentation by teacher

Task 2 – Add background music while the cat bounces in on.

Task 3 - Change the background to your favourite image

Task 4 - Use any other sprite that you like

Task 5 - Play with the direction value for the sprite and observe the outcome

Observations to be done by the teachers - (simultaneous)

1. Is the student finding the blocks from the pallet and moving them to the code window?
2. How did the student finish the objective? (Struggling, finished with help, finished without help)
3. Did the student explore any other blocks in the pallet?
4. Interest of the student in performing the activity? (lack of interest, interested, excited)

Evaluation - (10 minutes / simultaneous)
1. Understanding of the problem
   a. Understood clearly and can explain
   b. Understood given task and also other tasks
   c. Partly understood the problem and requires help
   d. Did not understand the required outcome
2. Execution
   a. Did not complete the program
   b. Completed only the first task
   c. Completed other tasks
   d. Completed and also explored other components
3. Understanding of the coding blocks (tick all that applies)
   a. Can explain the behaviour of each block used
   b. Can explain behaviour of some of the blocks
   c. Did not understand the behaviour of all the blocks used
   d. Was able to find the blocks from the pallet and move them to code window
4. Using the computer (tick all that applies)
   a. Was able to start scratch himself
   b. Was comfortable with the keyboard and the mouse
   c. Was able to save the file properly

Notes:
1. Activities to be done in pair
2. Pair needs to be rotated for every session
3. Evaluation to be done individually
4. Competitions at multiple levels will be used to evaluate the students
5. Time limits are to be strictly observed

Annexure 2

Sample Evaluation Rubrics

This is a suggestive evaluation rubrics that the teachers/trainers could use as generic guideline while developing their individual evaluation rubrics during the implementation of the syllabus for various standards. For each student, depending on the objectives of each activity, rubrics can be prepared with around 5 to 8 assessment skills.

Cat Bounce – Scratch Programing Demo Evaluation Rubrics.

Assessment skill	Beginner (25%)	Needs Improvement (50%)	Comfortable (75%)	Skilled (100%)
Discovery	It was a challenge for the student to find the blocks in the pallete.	The student was able to find some blocks, however required help for discovering others.	The student found all the required blocks without any difficulty.	The student was not only able to discover all the blocks in the palette but also explored other blocks in the palette.
Problem Solving	The student found it a challenge to understand the task.	The student partially understood the task.	The student could understand and partially explain the task.	The student was quick to understand the task and could explain the same with clarity.
Completion of tasks	The student could not get a running solution within the given time.	The student struggled to get a running solution for the first task.	The student got a running solution for the first task but struggled a bit with further tasks.	The student could get the running solution for most of the tasks easily and also tried some tasks of his own
Interest/ Motivation	The student showed very little interest in the activity.	The student displayed a fair bit of interest in the activity.	The student participated in the activity with interest.	The student was excited about performing the activity.
Understanding	The student found it a challange to understand the behavior of the blocks.	The student could explain the behavior of a few blocks.	The student understood and could explain the behavior of the blocks.	The student can explain the behavior of the blocks and also explain its use.
Team work	The student was passive member in the team	The student was doing all the work in the team	The student focussed only on his work and completed it	The student completed his work and also helped others in the team to complete their work.

Annexure 3

Curriculum Drafting Committee

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