RoboGenius Pro

3

Teacher's Manual

Extended Support for Teachers

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Teacher's Time Table

Sessions / Days	0	I	II	III	IV	BREAK	V	VI	VII	VIII
Monday										
Tuesday										
Wednesday										
Thursday										
Friday										
Saturday										

Development Milestones in a Child

Development milestones are a set of functional skills or age-specific tasks that most children can do at a certain age. These milestones help the teacher identify and understand how children differ in different age groups.

Age
5 - 8 Years

Physical	• First permanent tooth erupts • Shows mature throwing and catching patterns • Writing is now smaller and more readable • Drawings are now more detailed, organised and have a sense of depth
Cognitive	• Attention continues to improve, becomes more selective and adaptable • Recall, scripted memory and auto-biographical memory improves • Counts on and counts down, engaging in simple addition and subtraction • Thoughts are now more logical
Language	• Vocabulary reaches about 10,000 words • Vocabulary increases rapidly throughout middle childhood
Emotional/ Social	• Ability to predict and interpret emotional reactions of others enhances • Relies more on language to express empathy • Self-conscious emotions of pride and guilt are governed by personal responsibility • Attends to facial and situational cues in interpreting another's feelings • Peer interaction is now more prosocial and physical aggression declines

"If you cannot do great things, do small things in a great way."

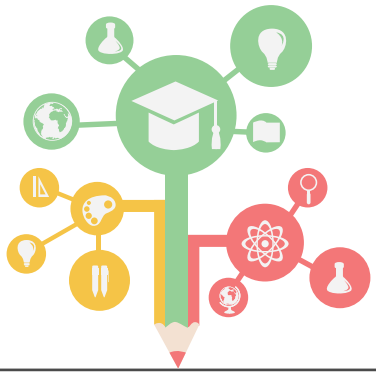
Age 9 - 11 Years	
Physical	• Motor skills develop resulting in enhanced reflexes
Cognitive	• Applies several memory strategies at once • Cognitive self-regulation is now improved
Language	• Ability to use complex grammatical constructions enhances • Conversational strategies are now more refined
Emotional/ Social	• Self-esteem tends to rise • Peer groups emerge

Age 11 - 20 Years	
Physical	• If a girl, reaches peak of growth spurt • If a girl, motor performance gradually increases and then levels off • If a boy, reaches peak and then completes growth spurt • If a boy, motor performance increases dramatically
Cognitive	• Is now more self-conscious and self-focused • Becomes a better everyday planner and decision maker
Emotional/ Social	• May show increased gender stereotyping of attitudes and behaviour • May have a conventional moral orientation

Managing the children's learning needs according to their developmental milestones is the key to a successful teaching-learning transaction in the classroom.

"Family is the most important thing in the world."

Teaching Pedagogies



Pedagogy is often described as the approach to teaching. It is the study of teaching methods including the aims of education and the ways in which such goals can be achieved.

Lesson Plans

A lesson plan is the instructor's road map which specifies what students need to learn and how it can be done effectively during the class time. A lesson plan helps teachers in the classroom by providing a detailed outline to follow in each class.

A lesson plan addresses and integrates three key components:

Learning objectives

Learning activities

Assessment to check the student's understanding

A lesson plan provides an outline of the teaching goals:

Before the class

1. Identify the learning objectives.
2. Plan the lesson in an engaging and meaningful manner.
3. Plan to assess student's understanding.
4. Plan for a lesson closure.

During the class

Present the lesson plan.

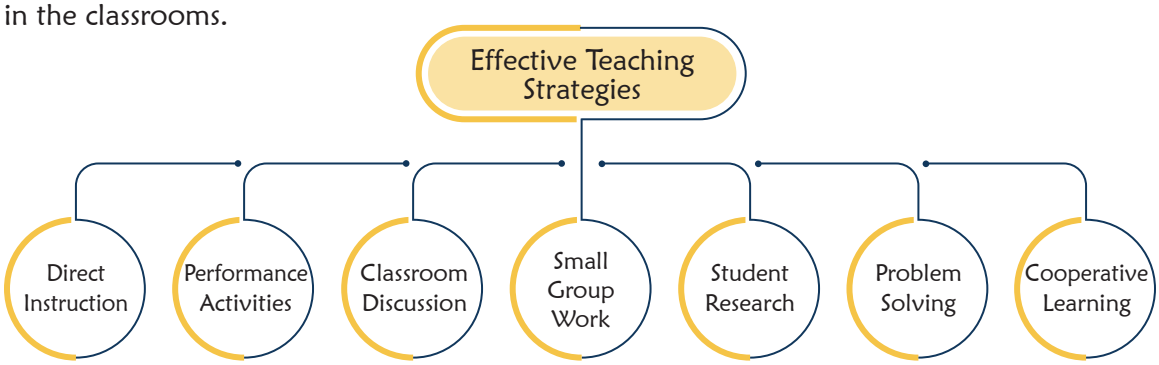
After the class

Reflect on what worked well and why. If needed, revise the lesson plan.

"Knowing yourself is the beginning of all wisdom."

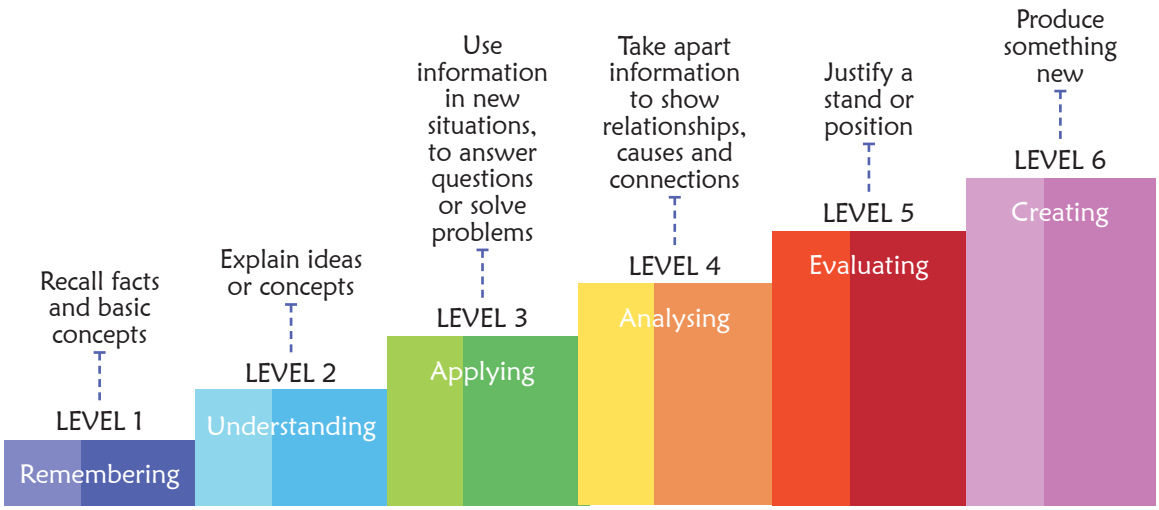
Teaching Strategies

Numerous strategies have evolved over the years to facilitate the teaching-learning process in the classrooms.



Bloom's Taxonomy

Bloom's Taxonomy was created by Dr Benjamin Bloom and several of his colleagues, to promote higher forms of thinking in education instead of rote learning. There are three domains of learning: cognitive (mental), affective (emotional) and psychomotor (physical). However, when we refer to Bloom's Taxonomy we speak of the cognitive domain. Bloom's Taxonomy is a list of cognitive skills that is used by teachers to determine the level of thinking their students have achieved. As a teacher, one should attempt to move students up the taxonomy as they progress in their knowledge.



Teachers should focus on helping students to remember information before expecting them to understand it, helping them understand it before expecting them to apply it to a new situation and so on.

> "If you have no confidence in self, you are twice defeated in the race of life."

CLASS 3

LESSON PLAN

1 Introduction to Robots and AI

Teaching Objectives

Students will learn about:

- Robots
- Robotics
- Artificial Intelligence (AI)
- Uses of Robots
- Benefits and Challenges of Robots
- Components of Robots

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Introduce the students with robots as machines designed to perform tasks like humans. They can be programmed to follow instructions and respond to their surroundings.

Introduce the students with robotics as the study of making and using robots.

Ask the students to think about the robots they have seen in movies, factories or their homes.

Discuss with the students about AI as the "brain" that makes robots smart, helping them learn, think and make decisions on their own.

Introduce to the students with STA (Sense, Think, Act) to explain how robots make decisions.

- **Sense:** Robots use sensors to detect objects or movements.
- **Think:** The robot's brain processes the information.
- **Act:** The robot performs the required task.

Tell the students about the real-world examples of Artificial Intelligence such as Smart helpers, Self-driving cars, Video game characters, Factory robots.

Discuss with the students about how the robots are used in different fields such as

- **Homes:** Cleaning floors or mowing lawns.
- **Factories:** Assembling parts or packaging products.

- **Healthcare:** Assisting doctors in surgeries or helping patients.
- **Agriculture:** Plant seeds evenly and pick fruits and vegetables carefully.
- **Space Exploration:** Exploring Mars or repairing satellites.
- **Military and Defence:** Performing dangerous tasks like bomb disposal.
- **Delivery robots:** Carry parcels in schools or buildings by using sensors to avoid people and walls.
- **Robot teachers:** Help students by answering questions or showing lessons on a screen.

Ask students to think of other places where robots might be used and share their ideas with the class.

Explain the students about the benefits of robots, such as Smart helpers, Self-driving cars, Video game characters.

- Working faster and more accurately.
- Performing dangerous tasks.
- Never getting tired.
- Doing repetitive tasks.

Discuss with students about the challenges such as high cost, lack of human creativity and the need for maintenance.

Explain the students about the key components of a robot:

- **Controller (Brain):** Helps the robot process information and decide actions.
- **Sensors:** Help the robot sense its environment, such as light or sound.
- **Actuators:** Move the robot's parts, like its arms or wheels.
- **Power Supply:** Provides energy for the robot to operate.
- **End Effector:** Performs tasks, like grabbing objects.
- **Software:** The code that tells the robot what to do.

Extension

Ask the students some questions based on this chapter.

Q. What is the main purpose of a robot?

Q. How does AI make robots smarter?

Q. What are the main components of a robot?

Q. How does a robot use sensors to interact with its environment?

Q. Can you think of a situation where robots help people in space exploration?

Q. What are the advantages of robots doing repetitive tasks?

Q. How does a robot's brain (controller) help it make decisions?

Q. Why do robots need actuators?

Q. What are some challenges robots face in industries?

Q. How do robots help in healthcare?

Evaluation

Encourage the students to solve the question in the **VISUAL VAULT** section on page **9**.

Guide the students to complete the sections, such as **Ask AIRO** provided on page **10**.

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **13**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **16** and **17** in the main course book.

Encourage the students to complete the activity like **CASE STUDY** given on page **18**.

Suggested Activity

Students will create a robot model using materials like paper, colored craft paper, scissors and glue. They will design the body, arms and legs of the robot, giving it a personality.

2 Logical Thinking and Early Algorithms

Teaching Objectives

Students will learn about:

- Understanding Sequences
- Loop
- Pseudocode

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Introduce the students with the term logical thinking as the ability to think clearly and make decisions step by step.

Discuss with the students about its importance in programming and problem-solving.

Define to the students about a sequence as doing things in the right order to achieve a goal.

Discuss with the students how robots or machines need to follow sequences to perform tasks correctly.

Explain to the students how a robot arm in a factory follows a sequence of steps like moving forward, picking up a part and placing it on a conveyor belt.

Explain to the students that a loop allows a robot to repeat certain actions multiple times without being told every time.

Explain them about an example of a robot cleaning the floor in circular motion.

Explain to the students that a pseudocode is a simple way of writing instructions using plain words. It helps us plan and organize steps before writing the actual code.

Extension

Ask the students some questions based on this chapter.

Q. What is logical thinking and why is it important in programming?

Q. What is the role of sequences in robots' tasks?

Q. How does a loop save time in programming?

Q. What is pseudocode and why do we use it before writing actual code?

Q. Can you think of a situation where a robot might use a loop in its programming?

Q. How does pseudocode help in problem-solving?

Q. What would happen if a robot skips steps in a sequence?

Q. How can sequences and loops be combined in programming?

Q. What is the advantage of using pseudocode in learning programming?

Q. How do robots follow instructions in logical sequences to complete tasks?

Evaluation

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **22**.

Encourage the students to solve the question in the **VISUAL VAULT** section on page **22**.

Guide the students to complete the sections, such as **Ask AIRO** provided on page **23**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **24** and **25** in the main course book.

Encourage the students to complete the activity like **CASE STUDY** given on pages **25** and **26**.

Suggested Activity

Have students design a simple sequence for a robot to perform a task such as picking up a toy or arranging books. They will write pseudocode for the task and share it with the class.

3 Meet the Micro:bit

Teaching Objectives

Students will learn about:

- Micro:bit
- Setup for Micro:bit
- Build Your First Micro:bit Program

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Introduce the students with Micro:bit as a small, programmable computer that can help students create projects by coding. Emphasise about its ability to display text, measure temperature and respond to inputs.

Discuss with the students about the front components of the Micro:bit which are,

- 5x5 LED Display: A grid of LEDs to display text, numbers and images.
- Programmable Buttons (A & B): Buttons used to control the micro:bit.
- Touch-Sensitive Logo: Reacts when touched.
- USB Connector: Used to connect the micro:bit to a computer for programming.
- Edge Connector Pins: For connecting other devices.

Show the students the Micro:bit and identify each of these components in real life.

Explain the students about the back components of the Micro:bit:

- Microphone: Detects sound.
- Battery Socket: Allows you to use batteries instead of a USB cable.
- Processor: The brain of the micro:bit, responsible for processing instructions.
- Speaker: Plays sounds and music.

Explain the students about the key feature of micro:bit as Easy to use, have sensors, can sense sounds and it makes learning easy and fun.

Explain the students about the various applications of micro:bit as:

- Game Making: Create fun games that you can play with friends.
- Music Projects: Make your micro:bit play different tunes.
- Smart Alarms: Build an alarm that beeps when it gets too dark or bright.
- Movement Tracker: Use the sensors to track steps or movement.
- Home Ideas: Control small lights or fans in a model smart home.

Guide the students on how to set up their Micro:bit using Microsoft MakeCode, a platform for creating programs for the micro:bit.

Explain how to create a program to display text, such as their name, on the 5x5 LED screen using block-based programming in MakeCode.

Explain the students about the interface of Microsoft Makecode Micro:bit which contains components such as Micro:bit Simulator, Toolbox, Workspace, Share, Download.

Explain the students about the toolbox that contains different types of blocks through which students can create projects.

Show the students how to create their first Micro:bit projects like displaying numbers, images or messages.

Extension

Ask the students some questions based on this chapter.

Q. What are the components of the Micro:bit?

Q. How can you display text on the Micro:bit?

Q. What is the role of the 5x5 LED display?

Q. How can you use the programmable buttons on the Micro:bit?

Q. What is the purpose of the microphone on the Micro:bit?

Q. How can the Micro:bit be connected to a computer for programming?

Q. What happens when you press the touch-sensitive logo?

Q. How do you program a micro:bit to show a number on the screen?

Q. What is Microsoft MakeCode and how does it help you program the Micro:bit?

Q. How can the Micro:bit be used in fun projects like a game or a music project?

Evaluation

Encourage the students to solve the question in the **VISUAL VAULT** section on page **31**.

Guide the students to complete the sections, such as **Ask AIRO** provided on page **36**.

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **37**.

Ask the students to answer the question in **CHALLENGE CHAIN** section on page **38**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **39** and **40** in the main course book.

Take the students to the computer lab and let them practice the activity given in the **INNOVATION LAB** section on page **41** in the main course book.

Suggested Activity

Students will create a program where the Micro:bit displays "Hello, [Name]!" when it is powered on. They can personalize the message and explore different text, numbers and images.

4 Playing with Lights and Buttons

Teaching Objectives

Students will learn about:

- Introduction to LEDs
- Making Patterns and Shapes
- Using Button A and Button B

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Introduce the students with LEDs (Light Emitting Diodes) as small electronic lights that glow when current flows through them.

Explain to the students that on the Micro:bit, LEDs are arranged in a 5x5 grid and can display images, words and patterns.

Discuss with the students how the Micro:bit has a grid of 25 tiny LEDs arranged in 5 rows and 5 columns.

Explain to the students why LEDs are important as they provide quick and clear visual feedback.

Explain to the students how you can turn LEDs ON or OFF to form patterns or images.

Show the students how to design different patterns such as arrows, hearts and letters using LED grids in MakeCode.

Introduce the students with Button A and Button B on the Micro:bit and explain how these buttons can be used to trigger actions.

Discuss with students about the different ways to use the button as:

User Input: Buttons act as input devices that allow you to control the program.

Triggering Events: Each button can trigger a specific action, like showing a message with Button A or clearing the screen with Button B.

Controlling Programs: Buttons can move between steps or select options, for example, pressing Button A for Yes and Button B for No in a quiz.

Counting and Tracking: It can count how many times each button is pressed, helping you create a counter.

Games and Fun Projects: Buttons make games interactive, such as using Button A to move a player left and Button B to move right.

Custom Actions: Both buttons can be pressed together to perform a new task.

Examples:

- **Button A:** Pressing it shows a smiley face.
- **Button B:** Pressing it shows a sad face.
- Both buttons pressed together can show a heart.

Introduce to the students how to create simple animations with the Micro:bit's LED matrix by showing one shape after another with a pause in between. Explain the students how to download their code.

Explain that students can perform the tasks in the virtual environment in Tinkercad or use the actual Micro:bit hardware for the same projects.

Extension

Ask the students some questions based on this chapter.

Q. How does the Micro:bit's LED display work?

Q. What are the functions of Button A and Button B on the Micro:bit?

Q. How do you create a pattern or image using the LEDs?

Q. What are some examples of shapes you can create using the “show leds” block?

Q. How does the forever block help in creating animations on the Micro:bit?

Q. How do you make a smiley face appear on the Micro:bit?

Q. What happens when both Button A and Button B are pressed on the Micro:bit?

Q. How does the LED grid help in displaying patterns and designs?

Q. How can you use Button A and Button B to control actions on the Micro:bit?

Q. What other applications can you think of for using buttons and LEDs together?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **45**.

Ask the students to answer the question in **CHALLENGE CHAIN** section on page **48**.

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **48**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **57** and **58** in the main course book.

Take the students to the computer lab and let them practice the activity given in the **INNOVATION LAB** section on page **59** in the main course book.

Suggested Activity

Ask students to write a program that displays their name, one letter at a time, using Button A and Button B. Each button will display a specific letter and pressing both buttons can reset the program.