AI RoboGenius

5

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

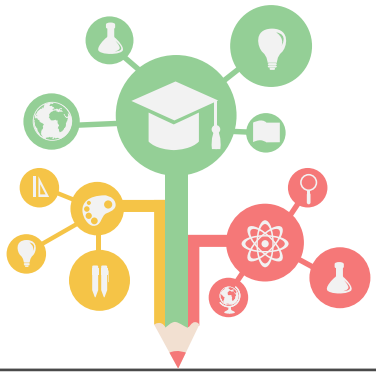
Age 11 - 20 Years

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.

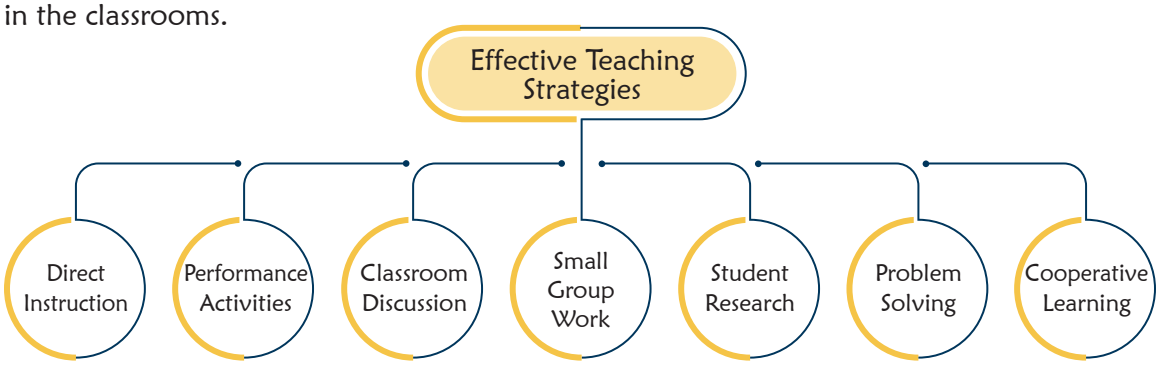
After the class

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

"Knowing yourself is the beginning of all wisdom."

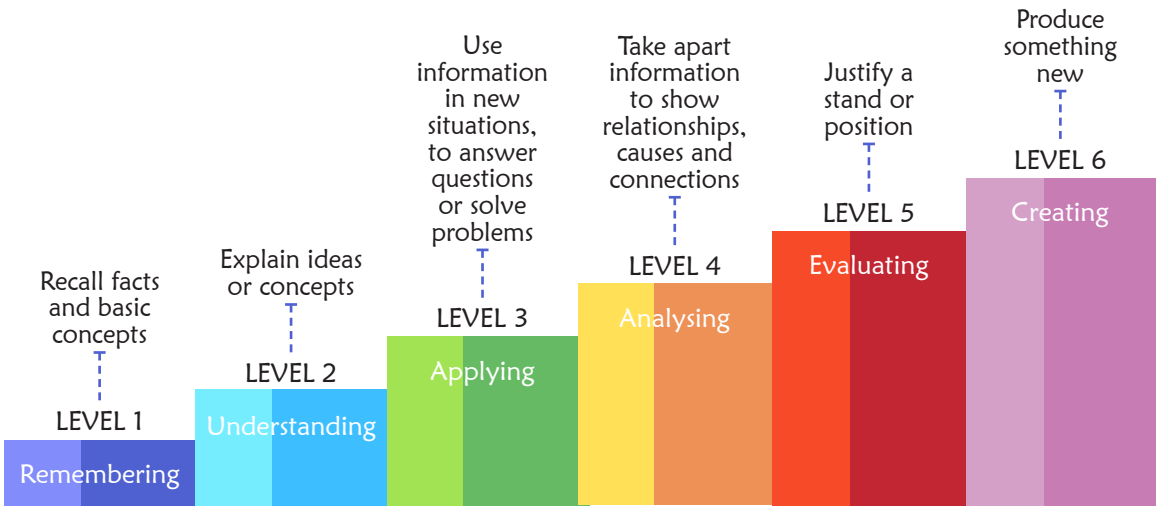
Teaching Strategies

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 5

LESSON PLAN

1 AI in Popular Apps

Teaching Objectives

Students will learn about:

- Popular AI applications such as Siri, Meta AI, Google Assistant, Alexa, Practo, Google Maps, Swiggy, YouTube and Netflix
- AI-powered apps work and their practical uses
- Impact of AI on daily life

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Ask students how they use AI-powered apps like Siri, Google Assistant and YouTube.

Explain the concept of AI, such as how it powers voice assistants, recommendation systems and learning from data.

Discuss how Siri helps users on iPhones with tasks like setting reminders, sending texts and providing information through voice commands.

Introduce Meta AI, explaining how it helps users on platforms like Facebook, Instagram and WhatsApp by making recommendations, helping with conversations and planning events.

Explain how Google Assistant works across mobile and smart home devices to assist with tasks such as answering questions, controlling devices and providing directions.

Discuss Alexa's capabilities, such as controlling smart home devices (e.g., lights, TVs), playing music and providing weather updates.

Explain how Practo uses AI to help with minor health problems, analyse patient data and improve healthcare services.

Discuss how Google Maps uses AI to provide real-time traffic updates, directions and estimated travel times to millions of users.

Explain how Swiggy uses AI to optimise delivery routes and improve order accuracy, ensuring a better user experience.

Discuss how YouTube uses AI to remove offensive content and recommend videos based on users' previous search history and preferences.

Explain how Netflix uses AI to suggest movies and TV shows based on user viewing habits and preferences.

Extension

Ask the students some questions based on this chapter.

Q. How does Siri help in completing daily tasks?

Q. How does AI in Practo help with healthcare?

Q. Which AI-powered app do you use most often and why?

Q. How does AI help YouTube recommend videos?

Q. How can AI improve services for older adults?

Q. Can you think of other areas where AI could be applied?

Evaluation

Complete the **AI GAME** task on page **13** and **15** answering questions related to the activity.

Guide the students to complete the sections, such as **AI TASK** provided on page **14**.

Ask the students to complete the **AI IN LIFE** activity provided on page **18**.

Take the students to the computer lab and let them practice the activity given in the **AI LAB** section on page **18** in the main course book. This will enhance their skills in creativity and technology literacy.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **16**, **17** and **18** in the main course book.

Suggested Activity

Ask students to design an app layout they would create using AI. This could be a simple drawing or mock-up using tools like Paint 3D or MS Word.

2 AI Industry 5.0: Smart Robots

Teaching Objectives

Students will learn about:

- AI Industry 5.0
- Need for AI Industry 5.0
- Basic components of robots

- Future possibilities of AI and robotics in various industries

Number of Sessions	
Theory	Practical
3	1

Teaching Plan

Introduce AI Industry 5.0 as the next evolution of AI, focusing on human-robot collaboration, creativity, sustainability and improving life through teamwork.

Discuss how Industry 5.0 combines artificial intelligence and human skills, unlike Industry 4.0, which focused on automation and machines.

Discuss how robots are used in various fields, such as healthcare, farming, space exploration and defence.

Explain how robots enhance efficiency, safety and productivity by automating tasks, analysing data and interacting safely with people.

Highlight the growing importance of AI robots in industries like healthcare, manufacturing and education.

Explain how robots are used in factories to automate repetitive tasks such as welding, assembly and packing.

Describe how robots are used in homes to perform tasks like cleaning, vacuuming and assistance with household chores.

Discuss the use of drones for reconnaissance and armed robots like MAARS and DOGO.

Discuss how robots are used in healthcare to perform precise surgeries, provide prosthetics and support rehabilitation.

Talk about how robots are used in agriculture to automate tasks like harvesting and weed control, making farming more sustainable.

Explain how delivery robots use GPS and sensors to deliver food, parcels and medicines in urban areas.

Introduce the role of robots in space exploration, such as NASA's Mars Rover, which studies the surface of Mars and sends data back to Earth.

Discuss how robots are used in entertainment, such as managing cameras, creating effects and performing stunts.

Explain how travel robots assist with luggage, navigation and support at airports, hotels and tourist spots.

Discuss how robots use sensors to detect motion, pressure, temperature, light and distance, providing data for decision-making.

Explain how actuators convert electrical signals into movement, allowing robots to perform tasks.

Discuss how motors drive a robot's joints, wheels or limbs and the different types of motors (e.g., DC, servo and stepper).

Explain how controllers process sensor data and send commands to actuators, effectively acting as the robot's brain.

Discuss the future of AI Industry 5.0, focusing on human-robot collaboration.

Highlight possibilities such as personalised product creation, eco-friendly methods and enhanced safety in various sectors.

Extension

Ask the students some questions based on this chapter.

Q. How do robots help in reducing human effort and increasing productivity in factories?

Q. How could farming robots help your uncle if he's struggling with manual farm work?

Q. Can robots help in medical fields? Give examples of medical robots.

Q. How do robots improve safety in dangerous environments?

Q. What are the key components that make a robot work?

Q. What are the possibilities for robots in the future? How do you think they will change society?

Evaluation

Complete the **AI GAME** task on page **23** answering questions related to the activity.

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

Suggested Activity

Ask students to design a robot that can assist in a specific task, such as cleaning, farming or healthcare. They should explain the functions and components of their robot.

3 Introduction to Robotics and AI

Teaching Objectives

Students will learn about:

- Robotics
- Introduction to Artificial Intelligence (AI)
- Robotics and AI Together
- AI Enhancing Robotics

Number of Sessions	
Theory	Practical
4	1

Teaching Plan

Introduce the idea that machines today can perform many tasks that humans usually do.

Explain that robotics and artificial intelligence are technologies that help machines work more efficiently and intelligently.

Explain the meaning of Robotics as a field that focuses on designing and building machines called robots.

Discuss how robotics combines science, engineering and computer skills to create machines that can perform different tasks.

Discuss the key aspects of robotics, such as designing and building robots using components like motors sensors and wheels.

Explain that robots also need programming so that they can understand instructions and perform specific tasks.

Explain the concept of Robot as a smart machine that can perform tasks automatically by following instructions.

Discuss how robots are controlled using built-in computers or external devices.

Explain the applications of robots in different areas such as homes factories hospitals space exploration and military operations. Give simple examples like robotic vacuum cleaners industrial robots on assembly lines surgical robots and Mars rovers.

Discuss the advantages of robots, such as completing tasks quickly working continuously with high accuracy reducing risks in dangerous jobs and improving efficiency in industries.

Discuss the disadvantages of robots, such as high installation cost job displacement lack of creativity dependence on technology maintenance requirements and security risks like cyber-attacks.

Introduce Artificial Intelligence (AI) as the technology that makes robots smarter.

Explain that AI allows machines to think learn analyse information and make decisions based on data.

Explain how AI-powered robots can understand their surroundings recognise patterns and learn from experience unlike simple robots that only follow fixed instructions.

Discuss the technologies used in AI, such as machine, learning natural language processing, neural networks, edge computing and speech recognition that help robots learn communicate and make decisions.

Explain how Robotics and AI work together, where robotics focuses on building machines and AI acts like the brain that allows robots to learn adapt and make decisions.

Discuss examples of AI in robotics, such as self-driving cars, voice assistants like Siri, Alexa and Google Assistant and robotic vacuum cleaners that can move around and clean homes automatically.

Explain how AI enhances robotics by helping robots learn from experience make decisions improve sensing and vision respond quickly and work safely with human.

Extension

Ask the students some questions based on this chapter.

Q. How do robotics and artificial intelligence help machines perform tasks more efficiently?

Q. How do robots help people in daily life at home and in workplaces?

Q. Can robots be useful in hospitals and healthcare? Give examples of how they assist doctors and patients.

Q. How do robots help humans perform dangerous tasks safely?

Q. What are the advantages of using robots in industries and factories?

Q. How does artificial intelligence make robots smarter and more capable?

Q. How do you think robots and AI will change the way people live and work in the future?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **30**.

Encourage the students to complete the activity like **ETHICS EDGE** given on page **29**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **33** and **34** in the main course book.

Encourage the students to complete the activity like **CASE STUDY** given on page **35**.

Suggested Activity

Ask students to list five robots or smart machines they see in daily life such as robotic vacuum cleaners, voice assistants, smart cars or factory robots and explain how these machines help people.

4 Exploring Real vs Simulated Components

Teaching Objectives

Students will learn about:

- Robotics Components
- Hardware Components
- Virtual Components
- Simulation Benefits and Limitations

Number of Sessions	
Theory	Practical
3	1

Teaching Plan

Introduce the concept of real and simulated components and explain that some parts of a robot are physical while others exist in software.

Explain the meaning of robotics components as the parts that help a robot move sense and think.

Discuss the two types of robotics components, hardware components which are physical parts and virtual components which exist inside a computer system.

Explain hardware components as the real parts of a robot that can be seen and touched and help the robot interact with the environment.

Discuss the body of a robot as the structure that holds all the parts together and provides stability and support.

Explain the role of motors in robots and how they convert electrical energy into movement for wheels arms and other parts.

Discuss sensors and explain how they help robots detect changes in their surroundings using examples like light temperature and touch sensors.

Explain the function of wheels and how they help robots move smoothly in different directions.

Discuss the controller as the brain of the robot that processes information from sensors and sends instructions to other parts.

Explain the role of the power source which provides the energy needed for the robot to operate.

Discuss end effectors as the parts that allow robots to interact with objects such as lifting moving or gripping.

Introduce virtual components and explain that they are software based parts that help robots think process information and follow instructions.

Explain the control system as the virtual brain that processes signals and controls the robot's actions.

Discuss software and programming and explain how coding and algorithms tell robots how to perform specific tasks.

Explain artificial intelligence and how it allows robots to learn from experience and make smarter decisions.

Discuss simulation tools and explain how they help designers test and improve robots in a virtual environment before building them.

Explain the communication system and how it allows robots to send and receive information.

Discuss virtual sensors and explain how software processes data from cameras or other inputs.

Explain the difference between hardware and virtual components in terms of their nature functions testing and ability to change.

Introduce the concept of simulation in robotics and explain how it helps test robot designs in a virtual environment.

Discuss the benefits of simulation such as reducing risk, saving cost, saving time, improving safety and helping in problem solving.

Explain the limitations of simulation including the reality gap complexity, missing features, inconsistent results and the need for powerful computers.

Extension

Ask the students some questions based on this chapter.

Q. What are robotics components and why are they important in a robot?

Q. How do hardware components help a robot interact with the real world?

Q. What is the difference between hardware components and virtual components?

Q. Why are sensors important for a robot's functioning?

Q. How do simulation tools help engineers design and test robots?

Q. What are some benefits of using simulation before building a real robot?

Q. Why is it important to test robots in the real world even after simulation?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **41**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **42** and **43** in the main course book.

Encourage the students to complete the activity like **CASE STUDY** given on page **44**.

Suggested Activity

Divide the students into small groups and ask them to list examples of hardware components and virtual components used in robots. Each group will present how these components work together to help a robot perform tasks.

5 Micro:Bit and the World Around Us

Teaching Objectives

Students will learn about:

- Input and Output Components
- Using Pins for Connections
- Buzzer
- Create Your Own Melody

✦ Simple Digital Thermometer

Number of Sessions	
Theory	Practical
2	4

Teaching Plan

Introduce the concept of input process and output and explain how the Micro:bit takes input processes information and produces output.

Explain the input and output components of Micro:bit and how they allow the device to interact with users and the environment.

Discuss the buttons A and B as programmable input devices that allow the Micro:bit to perform actions when pressed.

Explain the microphone sensor and how it allows the Micro:bit to detect sounds such as clapping.

Discuss the accelerometer and explain how it detects movement tilt shaking and free fall.

Explain the compass sensor and how it detects direction using the Earth's magnetic field.

Discuss the touch sensor on the Micro:bit logo and explain how touching it can trigger programmed actions.

Explain the light sensor and how it measures the level of light in the environment.

Discuss the temperature sensor and explain how the Micro:bit estimates surrounding temperature and displays it.

Explain the LED display as an output device with a 5×5 LED matrix used to show numbers symbols and messages.

Discuss the radio feature of Micro:bit and explain how it allows wireless communication between devices.

Explain the edge connector and how it allows the Micro:bit to connect to external devices such as LEDs motors buzzers and sensors.

Discuss the sound output and explain how the built-in speaker allows the Micro:bit to play tones and music.

Explain the steps for connecting Micro:bit to a computer and starting Microsoft MakeCode to create programs.

Demonstarte how to connect your Micro:bit and starting with MakeCode.

Explain how to connect the Micro:bit to the computer using a USB cable and download the program to run it on the device.

Discuss the Micro:bit simulator in MakeCode and explain how it can be used to test programs without a physical device.

Explain the pins of Micro:bit and how they are used to connect external components.

Discuss the large pins (0 1 2 3V GND) and explain their role as input and output power and ground connections.

Explain the small pins (3 to 22) and how they are used for advanced projects requiring more connections.

Introduce the buzzer as an output device that produces sound when connected to the Micro:bit.

Explain the connection of the buzzer with Pin 0 and GND and how it produces sound using electrical signals.

Demonstrate the buzzer project in MakeCode and explain how blocks are used to play melody and display icons.

Discuss how simulated output in MakeCode and real hardware output on Micro:bit produce similar results.

Demonstarte how to create your own melody using the melody block in MakeCode.

Discuss how to create a simple digital thermometer using the Micro:bit temperature sensor and LED display.

Extension

Ask the students some questions based on this chapter.

Q. How does the Micro:bit use input and output devices to interact with the environment?

Q. How do sensors like temperature light and motion help the Micro:bit collect information?

Q. Why are pins important for connecting external devices to the Micro:bit?

Q. How can a buzzer be used to create sound based projects with Micro:bit?

Q. How does the Micro:bit simulator help students test their programs?

Q. How does the digital thermometer project show the use of sensors in Micro:bit?

Q. How can Micro:bit be used to create real world interactive projects?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **52**.

Encourage the students to complete the activity like **ETHICS EDGE** given on page **47**.

Encourage the students to solve the question in the **VISUAL VAULT** section on page **57**.

Ask the students to answer the question in **CHALLENGE CHAIN** section on page **55**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **62** and **63** 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 **64** in the main course book.

Suggested Activity

Ask students to create a simple Micro:bit project such as a buzzer sound project or a digital thermometer using the MakeCode simulator and explain how the input sensors and output devices work together.

6 Creative Projects with Micro:Bit

Teaching Objectives

Students will learn about:

- Micro:bit in Real-life
- Step Counter (Pedometer)
- Rock–Paper–Scissors
- Smile-o-Meter (using Buttons & LEDs)

Number of Sessions	
Theory	Practical
2	4

Teaching Plan

Introduce Micro:bit as a small computer designed to teach programming and electronics and discuss how it helps solve real-life problems.

Explain that the Micro:bit is used to create interactive projects that include sensors buttons and LEDs.

Discuss the role of logical thinking in Micro:bit projects, where students break down problems into smaller parts and solve them step by step.

Explain how testing and improving ideas with Micro:bit encourages experimentation and quick problem-solving.

Discuss how real-world feedback from the Micro:bit's sensors allows students to test their projects and see if they work as expected.

Explain that teamwork is encouraged in Micro:bit projects, as students share ideas and collaborate, similar to real engineers and inventors.

Introduce real-life uses of Micro:bit such as environmental projects, health and wellbeing projects, assistive tools, fun games and safety applications.

Discuss creating an environmental project like a mini weather station or a smart streetlight using sensors.

Explain the concept of creating a health and wellbeing project such as a pedometer (step counter) or a happy watch using the motion sensor.

Introduce assistive tools and explain how a Micro:bit can help people communicate, for example, by pressing buttons to show happy or sad faces.

Discuss how students can make games and fun tools like a digital dice or multiplayer games using radio signals.

Explain how Micro:bit can be used in safety and security applications, such as making a simple alarm using the motion sensor.

Explain step counters (pedometers) and how they track steps using the accelerometer sensor in Micro:bit.

Discuss how to build a simple step counter using the accelerometer sensor in Micro:bit and show the step count on the LED display.

Introduce Rock–Paper–Scissors as a fun game where Micro:bit uses the accelerometer to select and display rock, paper or scissors randomly.

Guide students to build a Rock-Paper-Scissors game using Micro:bit and explain the coding process to make it interactive.

Explain how to create a Smile-o-Meter project using buttons and the LED display to show emotions like happiness or sadness.

Guide students through the steps to create a Smile-o-Meter with Micro:bit by programming buttons to display happy or sad faces.

Extension

Ask the students some questions based on this chapter.

Q. How can the Micro:bit be used to solve real-life problems?

Q. What is the role of logical thinking when creating projects with Micro:bit?

Q. How does the step counter project help in tracking physical activity?

Q. How does the Rock-Paper-Scissors game work on Micro:bit?

Q. How can the Smile-o-Meter project help people express emotions?

Q. What are some other creative projects you think could be made using the Micro:bit?

Q. How can Micro:bit projects be used in environmental or health-related solutions?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **67**.

Encourage the students to complete the activity like **ETHICS EDGE** given on page **72**.

Ask the students to answer the question in **CHALLENGE CHAIN** section on page **72**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **81** and **82** 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 **83** in the main course book.

Suggested Activity

Ask students to use the light sensor and temperature sensor of the Micro:bit to create an environmental monitoring system that measures the light level and temperature of a room. The system could trigger a message on the LED display when the light or temperature is above or below a certain threshold.