RoboGenius Pro

8

Teacher's Manual

Extended Support for Teachers

ORANGE
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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

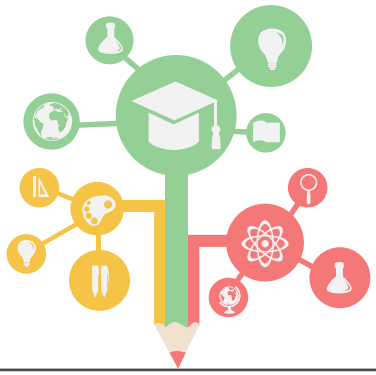
Age 11 - 20 Years

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.

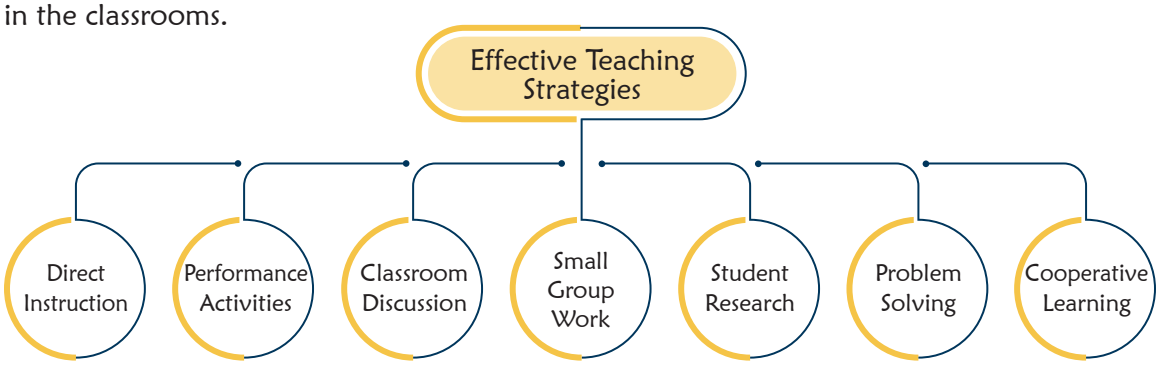
After the class

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

"Knowing yourself is the beginning of all wisdom."

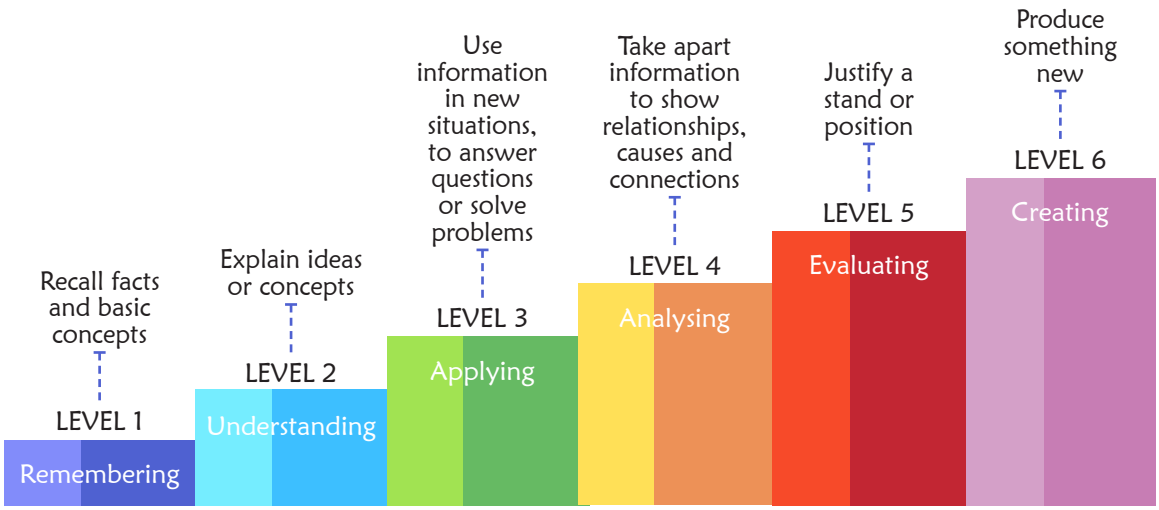
Teaching Strategies

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 8

LESSON PLAN

1 The World of Robots: Ethics, Laws and Future

Teaching Objectives

Students will learn about:

- Understanding Robots
- Ethics in Robots
- Laws of Robotics
- Generations of Robots
- Real-world Robots
- The Future of Robotics

Number of Sessions	
Theory	Practical
2	1

Teaching Plan

Start the class by asking students to share their thoughts on robots. Discuss how robots can be helpful, such as in cleaning or performing repetitive tasks and how they are not alive but can think and make decisions.

Discuss the definition of robots according to the National Robotics Association: a machine that can perform tasks autonomously. Explain the parts that make up a robot, including mechanical, electrical and sometimes electronic components.

Explain key characteristics of robots.

Discuss the advantages: high efficiency, accuracy, safety and the ability to work in hazardous environments. Also, explain the limitations: lack of creativity, high cost, dependence on programming and job displacement.

Explain the different generations of robots and their key characteristics.

Discuss the ethical concerns associated with robots, such as privacy, fairness, accountability and job displacement. Emphasise the role of roboethics in guiding robot behaviour and ensuring that they are developed and used responsibly.

Explain Isaac Asimov's Three Laws of Robotics.

Discuss the use of robots in various fields.

Discuss how robots will evolve in the future, becoming smarter, more independent and collaborative with humans. Highlight examples of future robots working in hospitals, schools and space and the challenges ahead like job displacement and safety concerns.

Extension

Ask the students some questions based on this chapter.

Q. What are the key characteristics of a robot?

Q. How do robots help in the healthcare and space exploration fields?

Q. What are some ethical concerns related to robots in society?

Q. How do the Three Laws of Robotics guide robot behaviour?

Q. What are the advantages and limitations of robots?

Q. How will robots impact jobs and work in the future?

Evaluation

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **12**.

Encourage the students to solve the question in the **VISUAL VAULT** section on page **14**.

Guide the students to complete the sections, such as **Ask AIRO** provided on page **15**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **15** to **17** in the main course book.

Encourage the students to complete the activity like **CASE STUDY** given on page **17**.

Suggested Activity

In groups, students will design a robot for a specific task (e.g., home cleaning, medical assistance, or space exploration). They will present their design and explain which generation of robots their model fits into, the ethics involved and the benefits it provides.

2 Robot as a System

Teaching Objectives

Students will learn about:

- Building Blocks of Robots
- Recognising and Understanding Robots
- Robots Based on Size and Design

Number of Sessions	
Theory	Practical
2	1

Teaching Plan

Introduce robots as systems made up of three main parts: mechanical, electronic and computational blocks.

Explain how these blocks work together to allow the robot to function.

Introduce the mechanical, electronic and computational blocks of robots and explain how each block contributes to the robot's movement, sensory abilities and decision-making process.

Explain the concept of recognising robots by observing their design, movement and the tasks they perform, such as through demonstrations, videos and technical specifications.

Introduce various types of robots based on size and design, including microbots, insectbots, snakebots and industrial robots, explaining how each type is suited for different tasks.

Introduce humanoid robots as robots designed to assist with daily tasks, interact with people and display emotions, making them suitable for roles in customer service and healthcare.

Extension

Ask the students some questions based on this chapter.

Q. What are the three main blocks of a robot and how do they work together?

Q. How does the mechanical block help a robot perform tasks?

Q. What role do sensors play in the electronic block?

Q. How does the computational block control the robot's actions?

Q. What is the difference between humanoid robots and industrial robots?

Q. Why are microbots used in fields like medicine?

Q. How do snakebots use their flexibility to navigate hard-to-reach areas?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **22**.

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section 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 page **26**.

Suggested Activity

Ask students to imagine they are humanoid robots. They will choose a task, such as helping someone with chores or interacting with a guest and demonstrate it in front of the class. This activity will help students understand the roles humanoid robots can play in customer service and healthcare.

3 Introduction to Google Teachable Machine

Teaching Objectives

Students will learn about:

- Google Teachable Machine
- Working of Google Teachable Machine
- Creating a Project using Google Teachable Machine

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Ask students to share their thoughts on AI and machine learning. Discuss how machines can learn from data and examples, like face recognition on phones or identifying songs.

Explain the importance of machine learning in daily life and how Google Teachable Machine allows users to build models without needing to code.

Explain what Google Teachable Machine is and its role in machine learning.

Discuss the types of data that can be used in the tool: images, sounds and poses.

Demonstrate the students how easy it is to create a project using Google Teachable Machine, emphasising the drag-and-drop interface and no-coding requirement.

Explain how to collecting data (images, sounds, or poses). For example, use a set of fruit images and categorise them into different classes (e.g., Apple, Banana, Orange).

Demonstrate how the tool trains the model by recognising patterns in the data and test the model with new data to see if it can accurately predict categories.

Explain how to export the model for use in different projects, either by sharing a link or downloading it for real-time predictions.

Discuss how models can be improved by adding more data and testing them.

Encourage students to think about other projects they could create using Google Teachable Machine, such as recognising animals, actions, or even different environmental conditions.

Extension

Ask the students some questions based on this chapter.

Q. How did you collect data for the model?

Q. How can this model use in real-life applications?

Q. What challenges did you face while training the model?

Q. How did the model recognise different objects?

Q. What changes did you make to improve the model?

Q. How did the data you collected help the model recognise objects?

Q. What steps did you take to improve the accuracy of your model?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **29**.

Encourage the students to solve the question in the **VISUAL VAULT** section on page **37**.

Ask the students to answer the question in **CHALLENGE CHAIN** section on page **37**.

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** 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

Take pictures of different hand gestures (e.g., thumbs up, peace sign, fist) and upload them to Google Teachable Machine. Train the model to recognise each gesture, test it with new images and present how the model works and how its accuracy was improved.

4 Building Projects with Google Teachable Machine

Teaching Objectives

Students will learn about:

- Google Teachable Machine Projects
- Image Projects
- Audio Projects
- Pose Projects

Number of Sessions	
Theory	Practical
1	3

Teaching Plan

Introduce Google Teachable Machine as a tool for creating models that can recognise patterns like images, sounds and body movements.

Discuss the three types of projects in Google Teachable Machine: Image Projects, Audio Projects and Pose Projects and how each is used to train a machine in different ways.

Explain how Google Teachable Machine can be used in real projects, such as interactive games, smart home devices, virtual assistants, etc.

Introduce Image Projects as a way to train a machine to recognise and classify images into different categories, such as animals, objects, or emotions.

Explain that students can upload images to Google Teachable Machine and teach the model to distinguish between different classes based on the examples provided.

Introduce Audio Projects as a way to train a machine to recognise different sounds or spoken words, such as claps, whistles, or commands.

Discuss how audio projects can be used in real-world applications, like controlling devices with voice commands or recognising musical instruments.

Introduce Pose Projects as a way to train a machine to recognise body movements and gestures using a webcam.

Explain that students can teach the model to identify actions like hand gestures, yoga poses, or dance moves.

Extension

Ask the students some questions based on this chapter.

Q. How does Google Teachable Machine learn from examples?

Q. What is the difference between an Image Project and an Audio Project?

Q. How can a Pose Project be used in a game?

Q. Why is it important to test the model after training it?

Q. How can you use Google Teachable Machine for smart home devices?

Q. How do confidence bars help you understand how well your model is trained?

Q. What are some real-world applications of machine learning in everyday life?

Evaluation

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **51**.

Encourage the students to solve the question in the **VISUAL VAULT** section on page **54**.

Ask the students to answer the question in **CHALLENGE CHAIN** section on page **54**.

Guide the students to complete the sections, such as **Ask AIRO** provided on page **57**.

After explaining the chapter, let the students do the **ROBO CHECK** on pages **58** and **59** 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 **60** in the main course book.

Suggested Activity

Ask students to create a project using Google Teachable Machine to recognise different animal sounds, such as a dog barking or a cat meowing, by recording audio clips, training the model and testing it with new sounds.

5 Sensors, Logic and Maze Navigation

Teaching Objectives

Students will learn about:

- VR Robot's Sensors
- Magnet in VR Programming
- Console in VR Programming
- Logic in VR Programming
- Programs using Different Playgrounds

Number of Sessions	
Theory	Practical
2	2

Teaching Plan

Explain that sensors allow robots to detect objects and measure distances, helping them react to their surroundings.

Introduce the Sensing-Bumper, Sensing-Eye, Sensing-Distance and Sensing-Location blocks in VEXcode VR.

Introduce the concept of using a magnet in VR programming, where it simulates the attraction or repulsion of objects in a virtual environment.

Explain the console in VR programming as a tool that displays messages and values during the program's execution, allowing students to track and debug the robot's actions in real-time.

Explain the role of logic blocks in decision-making: repeating actions, controlling the robot's behaviour based on conditions and defining actions based on sensor inputs.

Introduce Control blocks like repeat, forever, while, if then and if then else to create decision-making flows in programs.

Demonstrate the Operators blocks to perform calculations and comparisons in the program.

Discuss Event blocks for triggering actions based on certain conditions, such as when the program starts or when an event is received.

Encourage them to use Variables to store movement counts and add Control blocks for backward movement.

Guide students to use the Coral Reef Cleanup playground in VEXcode VR to write a program for a robot that collects trash in a simulated coral reef.

Demonstrate how to use Sensing-Distance and Sensing-Eye blocks to detect objects and navigate the robot to pick up trash.

Introduce the Number Grid Map as a tool for practicing robot navigation using coordinates.

Guide students through a step-by-step process to move the robot across the grid in a zigzag pattern, following specific coordinates to reach the goal.

Extension

Ask the students some questions based on this chapter.

Q. How do sensors help robots understand their surroundings?

Q. What is the role of logic blocks in VEXcode VR programming?

Q. How can Sensing-Distance and Sensing-Eye sensors be used together in a program?

Q. What is the difference between repeat and forever blocks in VEXcode VR?

Q. How can event blocks trigger specific actions in a program?

Q. How can you use variables to track the robot's movement through the maze?

Q. What happens when the robot's sensors detect an object or an obstacle in its path?

Evaluation

Guide the students to complete the sections, such as **Ask AIRO** provided on page **66**.

Encourage the students to solve the question in the **VISUAL VAULT** section on page **67**.

Encourage students to think ethically and answer the question given in the **ETHICS EDGE** section on page **70**.

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 **73** and **74** 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 **75** in the main course book.

Suggested Activity

Ask students to create a program using VEXcode VR where the robot moves forward and turns. Have them use the console block to display messages such as "Moving Forward" or "Turning Right" during the program's execution.