4

# TOUCHPAD

## Artificial Intelligence

# Teacher's Manual

*Extended Support for Teachers*

ORANGE
www.orangeeducation.in
www.thetouchpad.com

# Teacher's Time Table

| Periods / 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<br>• Shows mature throwing and catching patterns<br>• Writing is now smaller and more readable<br>• Drawings are now more detailed, organised and have a sense of depth |
| **Cognitive** | • Attention continues to improve, becomes more selective and adaptable<br>• Recall, scripted memory, and auto-biographical memory improves<br>• Counts on and counts down, engaging in simple addition and subtraction<br>• Thoughts are now more logical |
| **Language** | • Vocabulary reaches about 10,000 words<br>• Vocabulary increases rapidly throughout middle childhood |
| **Emotional/Social** | • Ability to predict and interpret emotional reactions of others enhances<br>• Relies more on language to express empathy<br>• Self-conscious emotions of pride and guilt are governed by personal responsibility<br>• Attends to facial and situational cues in interpreting another's feelings<br>• 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<br>• Cognitive self-regulation is now improved |
| **Language** | • Ability to use complex grammatical constructions enhances<br>• Conversational strategies are now more refined |
| **Emotional/Social** | • Self-esteem tends to rise<br>• Peer groups emerge |

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

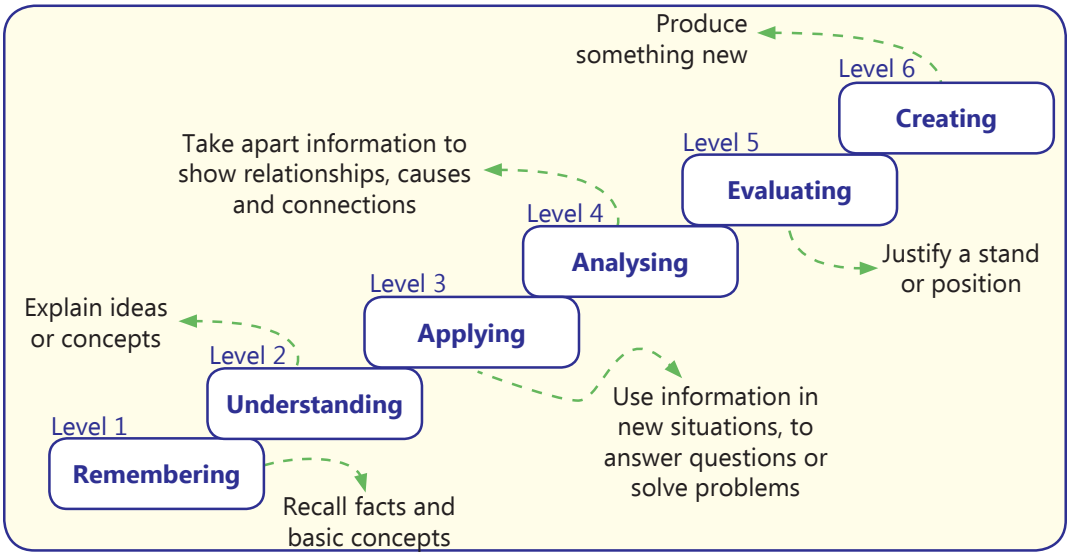
"Knowing yourself is the beginning of all wisdom."

## 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 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 4

# LESSON PLAN

## Artificial Intelligence

## 1. AI Inventions

### Teaching Objectives

Students will learn about

- LOVOT
- Embodied Moxie
- Meeting Owl
- Kuri Mobile

| Number of Periods | |
|---|---|
| Theory | Practical |
| 2 | 1 |

### Teaching Plan

Before starting the chapter, ask the students to read the conversation given on page number 7 to understand the recap of the topic.

Let the students know that Artificial Intelligence (AI) is the ability of a machine to think like a human. It is one of the most revolutionary inventions of human history.

Explain to the students that LOVOT is a new companion robot. Companion robots are used as buddies or friends for the elderly or kids to remove the feeling of loneliness.

Make the students aware of Embodied Moxie and tell them that it is a robot which was released in April 2020. Moxie can understand, process, and respond to natural conversation, eye contact, facial expressions, and other behaviours to create a child's unique and personalised learning experience.

Let the students know that Meeting Owl is a robotic owl made especially for video conferencing. It has a camera with a 360-degree view. It automatically focuses and shifts attention to different individuals in the room when they speak.

Make the students aware of Kuri by telling that it is a home robot designed to interact with you and your family and capture clips of your day with its sensor-enabled cameras.

Ask the students to solve the task given on page number 10 as **AI Task**.

Ask the students to solve the task given on page number 11 as **AI Reboot**.

### Extension

Ask the students some oral questions based on this chapter.

Q. What is Artificial Intelligence?

Q. What is LOVOT?

Q. What is Embodied Moxie?

Q. When was Embodied Moxie released?

Q. Define Meeting Owl.

Q. What is Kuri mobile?

Q. What role does Kuri play?

### Evaluation

Encourage the students to walk through the chapter and ask them to explore more information regarding the same.

After explaining the chapter, let the students do the exercises given on pages 11, 12 and 13 in the main course book as **AI Quiz** and **Exercise**. Tell them to solve the life skills & values and critical thinking skills developing exercises as **AI in Life** and **AI Deep Thinking** given on page 13.

Take the students to the computer lab and let them practise the activity given in **AI Lab** section on page 13 in the main course book. This will enhance the ability of the students and serve as an interdisciplinary activity.

### Suggested Activity

Ask the students to search about examples of more AI inventions.

## 2. Human Versus Artificial Intelligence

### Teaching Objectives

Students will learn about

- ☞ What is Intelligence?
- ☞ Human Intelligence
- ☞ Artificial Intelligence
- ☞ Are Computers Smarter?
- ☞ Similarities between Humans and Machines
- ☞ Differences between Human and Artificial Intelligence

| Number of Periods | |
|---|---|
| Theory | Practical |
| 2 | 1 |

## Teaching Plan

Before starting the chapter, ask the students to read the conversation given on page number 21 to understand the recap of the topic.

Let the students know that Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions.

Make the students understand that Artificial Intelligence is the ability to calculate, reason, perceive relationships and analogies, learn from experience, store and retrieve information from memory, solve problems, comprehend complex ideas, use natural language fluently, classify, generalise, and adapt new situations.

| S.No. | Parameter | Human Intelligence | Artificial Intelligence |
|---|---|---|---|
| 1. | Nature | It aims to adapt to new environment by utilizing combination of different cognitive processes. | It aims to mimic human behaviour and perform human like actions. |
| 2. | Functioning | Human beings use the computing power, memory and thinking power of their brain. | AI machines rely on data, specific instructions and learnings that are fed into their system. |
| 3. | Learning Power | Humans learn from various incidents and past experience.<br>Humans also learn from their mistakes made via trial and error approach. | Machine learn from data and continuous training.<br>AI does not learn from their mistakes made via trial and error approach. |
| 4. | Decision making power | Humans can make rational decisions. | AI machine make decisions based on events, the data they are trained on, how they are related to a particular event. |
| 5. | Human factor | Humans possess the unique ability to learn and apply their acquired knowledge in combination with logic, reasoning and understanding. | AI machines cannot understand the concept of "cause and effect" simply because they lack common sense. |

Explain to the students that human brain is one of the most intricate and mysterious organs of the human body.

Let the students know that human body is extremely powerful and also capable of performing the following functions:

- Learn from different experiences
- Understand complex concepts

- Apply logic and reason to solve mathematical problems
- Recognise patterns
- Make inferences and decisions
- Retain information
- Communicate with other human beings through different parts of the body

Make the students aware of the fact that Artificial Intelligence focuses on building smart machines that are capable of performing a wide range of tasks which usually requires human intelligence and cognition.

Explain to the students how computers are smarter than human beings.

Make the students understand the similarities and differences between humans and machines.

## Extension

Ask the students some oral questions based on this chapter.

Q. What is Intelligence?

Q. What is Human Intelligence?

Q. What is Artificial Intelligence?

Q. Are Computers Smarter?

Q. What are the similarities between Humans and Machines?

Q. What are the differences between Humans and Machines?

## Evaluation

Encourage the students to walk-through the chapter and ask them to explore more information regarding the same.

After explaining the chapter, let the students do the exercises given on pages 19 and 20 in the main course book as **AI Quiz** and **Exercise**. Tell them to solve the subject enrichment developing exercises as **AI Deep Thinking** given on page 20

Take the students to the computer lab and let them practise the activity given in **AI Lab** section on page 20 in the main course book. This will enhance the ability of the students and serve as a communication activity.

## Suggested Activity

Ask the students to explore the the areas where human intelligence is more useful than machines even today.

# 3. How AI Works in Different Applications

## Teaching Objectives

Students will learn about

- ☞ Optical Character Recognition
- ☞ Speech Recognition
- ☞ Face Recognition

| Number of Periods | |
|---|---|
| Theory | Practical |
| 3 | 1 |

## Teaching Plan

While teaching this chapter, tell the students that Artificial Intelligence (AI) is used in various areas in real life like character recognition, face recognition, speech recognition, and many more.

Tell the students about Optical Character Recognition (OCR) which is a technique to convert an image of text or physical document into editable form. It is also known as text recognition.

Demonstrate to the students that how does OCR work?

Explain to the students the role of AI in OCR.

Let the students know the areas where AI-Powered OCR is being used. Also, tell the benefits of AI-Powered OCR.

Teach the students about Speech recognition or speech-to-text and vice versa which means the ability of a machine or program to identify words spoken aloud and convert them into readable text.

Let the students understand the four steps involved in the working of speech recognition.

Explain to the students the role of AI in Speech Recognition.

Let the students know the areas where AI-powered Speech Recognition is being used. Also, tell the benefits of AI-powered Speech Recognition Systems

Teach the students about Face Recognition which is a technology which is to identify an individual's face. One of the most famous examples of face recognition technology is a face lock in a smartphone.

Let the students understand the four steps involved in the working of Face recognition.

Explain to the students the role of AI in Face Recognition.

Let the students know the areas where AI-powered Face Recognition is being used. Also, tell the benefits of AI-powered Face Recognition Systems.

Also, teach the students through Topic Animation.

Ask the students to solve the exercise given on page 25 as **AI Reboot**.

Ask the students to solve the task given on page 23 as **AI Task**.

Ask the students to read the **Brainy Fact** given on page 26.

### Extension

Ask the students some oral questions based on this chapter.

Q. What is the use of Speech recognition?

Q. Who first introduced the concept of face recognition in the 1960s?

Q. What are the benefits of AI-powered OCR?

Q. What is the full form of OCR?

Q. What do you mean by speech recognition?

Q. Name the technology which is to identify an individual's face?

Q. What are the areas face recognition technology is used?

### Evaluation

Encourage the students to walk through the chapter and ask them to play the game given on page 27 on their own under the name **AI Game** after learning about the rules and basics.

After explaining the chapter, let the students do the exercises given on Pages 28 to 30 of the main course book as **AI Quiz** and **Exercise**. Tell them to solve the critical and computational skill-developing exercises as **AI Deep Thinking** given on page 30.

Take the students to the computer lab and let them practice the activity given in the **AI Lab** given on Page 30 in the main course book. This will enhance the abilities of the students and serve as a Subject Enrichment Activity.

### Suggested Activity

Ask the students to try Quizzes and play games on the Kuki chatbot by using the link given below:

https://chat.kuki.ai/chat

## 4. Latest Robots

### Teaching Objectives

Students will learn about

- ☞ Definition of Robots
- ☞ Types of Robots according to their Applications
- ☞ Latest Robots

| Number of Periods | |
|---|---|
| Theory | Practical |
| 3 | 1 |

### Teaching Plan

While teaching this chapter, tell the students that robots are automatically operated machines that work in place of humans.

Introduce to the students about the concept of robotics and robots.

Let them know about the types of robots according to their applications. Those are given below:

- Medical Robots
- Security Robots
- Aerospace
- Humanoids
- Service Robots
- Domestic Robots
- Military Robots
- Disaster Response
- Industrial Robots

Introduce to the students about the latest robots. Those are given below:

- T-HR3
- Digit
- Robear
- Z-Machines
- Moley Robotic Kitchen
- Paro
- Zenbo
- Sophia
- RoboThespain
- Nao
- Leka
- Aeolus
- Root
- Dash & Dot

Also, show the topic animation of types of robots according to their applications.

Ask the students to solve the task given on page 42 as **AI Task**.

Ask the students to read the **Brainy Fact** given on pages 33 and 35.

## Extension

Ask the students some oral questions based on this chapter.

Q. Name the machines which are music-band that has a guitarist with 78 fingers and a drummer with 22 arms.

Q. Name the humanoid that mimics the movement of its human operator.

Q. Who is an actor that comes with a library of impressions, greetings, songs and gestures?

Q. What do you mean by robotics?

Q. Name the talking robot that is used for therapy.

Q. In which year Sophia became a citizen of Saudi Arabia?

Q. Which robot has become a citizen of Saudi Arabia?

Q. What is the use of disaster response robots?

Q. What are robots?

## Evaluation

Encourage the students to walk through the chapter and ask them to play the game given on page 43 on their own under the name **AI Game** after learning about the rules and basics

After explaining the chapter, let the students do the exercises given on pages 44 to 46 of the main course book as **AI Quiz** and **Exercise**. Tell them to solve the critical and computational skill-developing exercises as **AI in Life** is given on page 46.

Take the students to the computer lab and let them practice the activity given in the **AI Lab** section on page 46 in the main course book. This will enhance the abilities of the students and serve as a Subject Enrichment Activity.

### Suggested Activity

Ask the students to gather pictures of at least 10 different robots and paste them into an A3-size sheet. Also, write about where the robots are used in the field of AI.

## 5. Fields Where Robots Are Used

### Teaching Objectives

Students will learn about

- Security and Surveillance
- Manufacturing
- Military
- Customer Service
- Cooking
- Healthcare
- Space Exploration
- Entertainment
- Agriculture
- Underwater Research

| Number of Periods | |
|---|---|
| Theory | Practical |
| 2 | 1 |

### Teaching Plan

While teaching this chapter, tell the students that robots are assigned to specific tasks.

Make them understand that robots are used in different fields which are:

- Security and Surveillance
- Military
- Cooking
- Space Exploration
- Agriculture
- Manufacturing
- Customer Service
- Healthcare
- Entertainment
- Underwater Research

Also, teach the students through Topic Animation and show the video related to robots and they are used in different fields.

Ask the students to solve the task given on pages 51 and 53 as **AI Reboot**.

Ask the students to solve the task given on page 48 as **AI Task**.

Ask the students to read the **Brainy Fact** given on page 54.

## Extension

Ask the students some oral questions based on this chapter.

Q. How are robots being used as security guards?

Q. Name a robot used in space exploration and mention its mission.

Q. How are robots used in the entertainment industry?

Q. What tasks can robotic arms perform in manufacturing industries?

Q. Give an example of a humanoid robot used in customer service.

Q. How can chef robots help with cooking?

Q. What are some applications of surgical robots in healthcare?

Q. What are some tasks that agriculture robots can perform?

Q. Name a robot used for underwater research and its purpose.

## Evaluation

After explaining the chapter, let the students do the exercises given on Pages 54 to 57 of the main course book as **AI Quiz** and **Exercise**. Tell them to solve the critical and computational skill-developing exercises as **AI in Life** and **AI Deep Thinking** given on page 57

Take the students to the computer lab and let them practice the activity given in the **AI Lab** section on Pages 58 and 59 in the main course book. This will enhance the abilities of the students and serve as a Subject Enrichment Activity.

## Suggested Activity

Ask the students to explore the world of robotics and build their own robot using simple materials.

Materials Required:

- Cardboard or sturdy paper
- Craft supplies (markers, colored pencils, scissors, glue, tape)
- Optional: Additional materials for embellishments (pipe cleaners, googly eyes, buttons, etc.)
- Small motor or battery-operated toy (optional)