

Computational Thinking & Artificial Intelligence

Part 2 AI

6

TEACHER'S MANUAL

Extended Support for Teachers



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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



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.

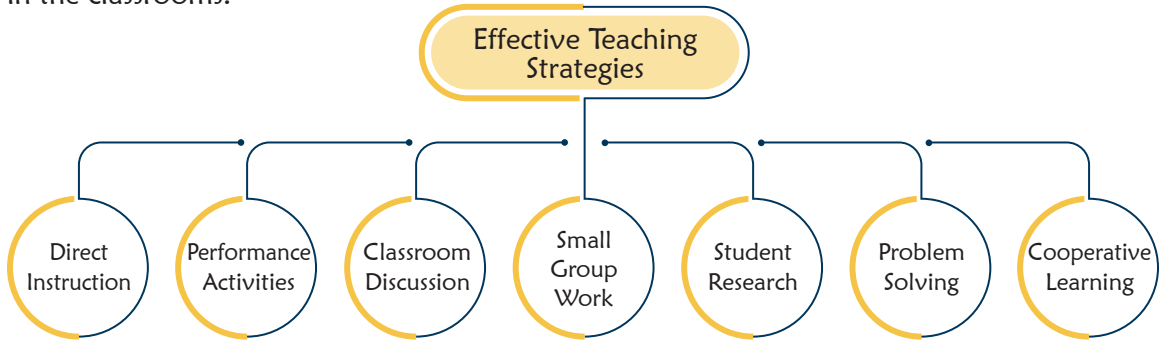
After the class

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

“Knowing yourself is the beginning of all wisdom.”

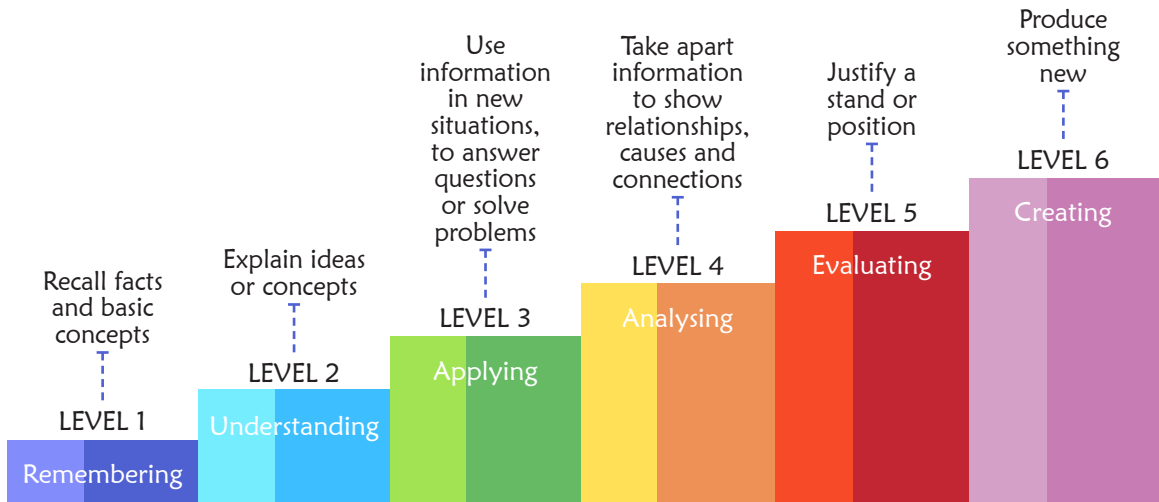
Teaching Strategies

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. ”

Introduction to AI & Everyday

Teaching Objectives

Students will learn about:

- ✦ Understanding Intelligence and different types of intelligence
- ✦ Understanding Artificial Intelligence (AI)
- ✦ History and evolution of Artificial Intelligence
- ✦ Founding fathers of Artificial Intelligence
- ✦ AI in our daily lives
- ✦ Identifying AI and non-AI technologies
- ✦ Difference between Automation and Artificial Intelligence
- ✦ Human Intelligence and Machine Intelligence
- ✦ How Artificial Intelligence learns
- ✦ Introduction to Machine Learning
- ✦ Types of Machine Learning:
 - Supervised Learning
 - Unsupervised Learning
 - Reinforcement Learning

Teaching Plan

Number of Sessions	
Theory	Practical
3	2

Before starting the chapter, ask students to observe the smart devices they use in their daily lives and discuss which devices they think use Artificial Intelligence.

Encourage students to share examples such as voice assistants, face recognition, recommendation systems and smart devices.

Discuss the meaning of intelligence and explain how humans use their ability to learn, think, solve problems and adapt to different situations. Explain that intelligence helps humans make decisions based on experiences.

Introduce the different types of intelligence given by Howard Gardner. Discuss examples of visual-spatial, verbal-linguistic, logical-mathematical, bodily-kinesthetic, musical, interpersonal, intrapersonal and naturalistic intelligence. Encourage students to identify their own strengths and intelligence types.

Explain the concept of Artificial Intelligence and how it enables machines to perform tasks that usually require human intelligence, such as learning, problem-solving and decision-making.

Discuss the relationship between computing and intelligence. Explain how combining computer systems with the ability to learn and make decisions helps create AI-based systems.

Explain the history of Artificial Intelligence. Discuss early ideas of intelligent machines, ancient automatons and the contribution of Alan Turing through the Turing Test.

Introduce the birth of AI as a field of study and explain the contributions of pioneers such as John McCarthy, Marvin Minsky, Claude Shannon and other AI researchers.

Discuss the development of modern AI and how improvements in computing power and data availability have helped AI systems become more advanced.

Explain different examples of AI used in everyday life, including:

- Smart home devices
- Smartphones and voice assistants
- Banking and finance
- Healthcare
- E-commerce
- Security and monitoring systems
- Video games
- Drones and smart cars
- Search engines

Discuss how AI makes daily activities easier and improves decision-making in different fields.

Explain the difference between Artificial Intelligence and automation. Discuss that automation follows predefined instructions, while AI can learn from data, recognise patterns and make decisions.

Show examples of non-AI technologies such as automatic washing machines, fixed-time traffic lights and simple robots. Help students understand why these systems are considered automation rather than AI.

Discuss the differences between human intelligence and machine intelligence. Explain that humans learn through experiences and emotions, whereas machines learn through data, instructions and training.

Explain how AI learns by collecting data, identifying patterns, making decisions and improving through feedback.

Introduce labelled and unlabelled data. Explain how labelled data contains correct categories or answers, while unlabelled data allows AI systems to find patterns independently.

Explain the steps involved in AI learning:

- Data collection
- Learning from data
- Decision-making
- Improvement through feedback

Introduce Machine Learning as a part of AI that allows computers to learn from data without being directly programmed.

Explain the three types of Machine Learning:

- Supervised Learning: Learning using labelled data and making predictions based on examples.
- Unsupervised Learning: Finding hidden patterns and grouping similar data without labels.
- Reinforcement Learning: Learning through trial and error using rewards and penalties.

Demonstrate simple examples of each type of learning and encourage students to relate them to real-life applications such as recommendations, image recognition and game-playing AI.

Extension

Ask the students some oral questions based on this chapter.

- Q. What is intelligence?
- Q. Name any four types of intelligence according to Howard Gardner.
- Q. What is Artificial Intelligence?
- Q. Who introduced the Turing Test?
- Q. Name any two founders or pioneers of Artificial Intelligence.
- Q. How is AI used in smartphones?
- Q. What is the difference between automation and Artificial Intelligence?
- Q. How is human intelligence different from machine intelligence?
- Q. What is Machine Learning?
- Q. Explain the three types of Machine Learning.

Evaluation

Ask students to do the **PROJECT-BASED LEARNING** activity given on page **9**.

Let students complete the **CONCEPT CAPSULE** activity given on page **10**.

Students will complete the **ART INTEGRATION ACTIVITY** given on page **15**.

Guide students to complete the **AI IN ACTION** activity given on page **16**.

Students will attempt the **ASK AI AGENT** activity given on page **17**.

Encourage students to solve the **THINK TANK** activity given on page **18**.



Help students complete activities like **CHECKPOINT** given on page 22.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages 23 to 25 in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page 25. This will improve their skills and promote technology literacy.

Suggested Activity

Create a creative poster or comic strip titled “AI Around Me” by including examples of AI used in daily life and explaining how each example works.

2

Basic Data Concepts

Teaching Objectives

Students will learn about:

- ★ Meaning and importance of Data
- ★ Types of Data:
- ★ Data Collection methods
- ★ Organising Data
- ★ Data Representation using Tables, Charts and Pictograms
- ★ Real-world applications of Data

Teaching Plan

Number of Sessions	
Theory	Practical
3	1

Begin the chapter by discussing examples of data students see in daily life, such as marks, photographs, messages and weather information.

Explain the meaning of data and how it helps in decision-making, learning, healthcare, business and other areas.

Discuss different types of data with suitable examples:

- Numerical Data: Numbers and measurements
- Text Data: Words and sentences
- Image Data: Pictures and graphics
- Sound Data: Audio and voice recordings
- Video Data: Moving images with sound

Explain data collection and its methods, including surveys, interviews, observations, experiments, internet sources and devices.

Discuss organising data and explain its steps:

- Classification
- Structuring
- Labelling
- Storage

Explain data representation using tables, charts and pictograms. Discuss how visual representation makes data easier to understand.

Introduce different types of charts:

- Bar Chart
- Column Chart
- Pie Chart
- Line Chart
- Scatter Plot
- Area Chart

Explain the basic parts of tables and charts and their uses.

Discuss real-life applications of data in fields such as healthcare, finance, retail and manufacturing.

Extension

Ask the students some oral questions based on this chapter.

- Q. What is data?
- Q. Why is data important?
- Q. Name the different types of data.
- Q. Differentiate between discrete and continuous data.
- Q. Name any three methods of data collection.
- Q. What are the steps of organising data?
- Q. What is data representation?
- Q. Name any three types of charts.

Evaluation

Encourage students to solve the **THINK TANK** activity given on page **32**.

Guide students to complete the **AI IN ACTION** activity given on page **33**.

Let students complete the **CONCEPT CAPSULE** activity given on page **36**.

Ask students to do the **PROJECT-BASED LEARNING** activity given on page **42**.

Students will complete the **INTERDISCIPLINARY ACTIVITY** given on page **42**.

Students will attempt the **ASK AI AGENT** activity given on page 43.

Help students complete activities like **CHECKPOINT** given on page 43.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages 44 to 46 in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page 46. This will improve their skills and promote **technology literacy**.

Suggested Activity

Students will collect information about their classmates' favourite activities, organise it in a table and represent it using a chart or pictogram. They will present their findings in class.

3

Simple Pattern Recognition & Decision Making

Teaching Objectives

Students will learn about:

- ★ Meaning of Patterns
- ★ Importance of Patterns
- ★ Identifying Patterns
- ★ Recognising Repeated Actions or Events
- ★ Finding Similarities in Data
- ★ Observations and Conclusions
- ★ Decision Making based on Data

Teaching Plan

Begin the chapter by asking students to identify patterns they see in their daily lives, such as school schedules, number sequences, routines and patterns in nature.

Explain the meaning of patterns and how patterns repeat in a regular way through numbers, shapes, sounds or actions.

Discuss the importance of patterns in:

- Finding similarities
- Predicting future events
- Understanding behaviours
- Making better decisions

Number of Sessions	
Theory	Practical
4	1

Explain different examples of patterns found in daily life, including routines, schedules, hobbies, travel, language and nature.

Explain the process of identifying patterns by analysing data and finding repeated sequences, similarities or trends.

Discuss recognising repeated actions or events and explain methods used to identify them:

- Observation
- Time series analysis
- Data visualisation

Explain finding similarities in data and how grouping similar information helps in understanding data better.

Discuss methods of finding similarities:

- Sorting and filtering
- Data visualisation
- Statistical analysis
- Machine Learning

Explain the difference between observation and conclusion with suitable examples. Discuss how observations help us understand patterns and make conclusions based on data.

Explain decision-making and how analysing observations and patterns helps in selecting better choices.

Discuss examples of daily-life decisions based on patterns, such as improving study methods, choosing faster routes and managing screen time.

Extension

Ask the students some oral questions based on this chapter.

- Q. What is a pattern?
- Q. Give two examples of patterns from daily life.
- Q. Why are patterns important?
- Q. What is predictability in patterns?
- Q. Name any two methods of recognising repeated actions.
- Q. What is the difference between observation and conclusion?
- Q. How does sorting and filtering help in finding similarities?
- Q. How do patterns help in decision-making?

Evaluation

Ask students to do the **PROJECT-BASED LEARNING** activity given on page 51.

Students will attempt the **ASK AI AGENT** activity given on page 52.



Encourage students to solve the **THINK TANK** activity given on page 52.

Guide students to complete the **AI IN ACTION** activity given on page 55.

Students will complete the **ART INTEGRATION ACTIVITY** given on page 55.

Let students complete the **CONCEPT CAPSULE** activity given on page 56.

Help students complete activities like **CHECKPOINT** given on page 56.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages 57 to 59 in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page 59. This will improve their skills and promote **technology literacy**.

Suggested Activity

Students will observe patterns around them and create a poster showing examples of patterns found in nature, daily routines or technology. They will explain how recognising these patterns helps in understanding situations and making decisions.

4

Ethics and Digital Responsibility

Teaching Objectives

Students will learn about:

- ✦ Responsible Use of Technology
- ✦ Meaning and importance of Ethics
- ✦ Ethical Use of Technology
- ✦ Unethical Practices on the Internet:
- ✦ Individual Rights to Privacy
- ✦ Intellectual Property Rights (IPR)
- ✦ Digital Footprint
- ✦ Importance of Good Digital Behaviour

Teaching Plan

Begin the chapter by discussing how students use technology in their daily lives and why responsible behaviour is important while using digital tools.

Explain Digital Responsibility and how being respectful, mindful and honest while using technology helps create a safe digital environment.

Explain the meaning of ethics and discuss how ethical use of technology includes respecting privacy, being honest, maintaining online safety and using digital tools responsibly.

Number of Sessions	
Theory	Practical
3	2

Discuss unethical practices related to the Internet and explain:

- **Plagiarism:** Copying someone's work without giving proper credit.
- **Hacking:** Unauthorised access to computer systems.
- **Phishing:** Online scams used to steal personal information.
- **Spamming:** Sending unwanted messages or harmful links.
- **Software Piracy:** Illegal copying and distribution of software.

Explain the steps to stay safe online, such as using strong passwords, enabling two-factor authentication, avoiding suspicious links and protecting personal information.

Discuss privacy and explain why personal details such as passwords, addresses and phone numbers should be kept secure.

Explain Intellectual Property Rights (IPR) and how they protect creations such as books, music, software and inventions.

Introduce the concept of Digital Footprint and explain active and passive digital footprints with examples.

Discuss ways to maintain a positive digital footprint:

- Think before posting online
- Use privacy settings
- Avoid sharing personal information
- Respect others' content and privacy

Explain the importance of good digital behaviour and encourage students to use technology safely, respectfully and responsibly.

Extension

Ask the students some oral questions based on this chapter.

- Q. What is Digital Responsibility?
- Q. What is ethics?
- Q. Name any three unethical practices on the Internet.
- Q. What is plagiarism?
- Q. Differentiate between ethical and malicious hacking.
- Q. What is phishing?
- Q. What are Intellectual Property Rights?
- Q. What is a digital footprint?
- Q. Differentiate between active and passive digital footprints.
- Q. How can we maintain good digital behaviour?



Evaluation

Guide students to complete the **AI IN ACTION** activity given on page **65**.

Ask students to do the **PROJECT-BASED LEARNING** activity given on pages **66 and 70**.

Encourage students to solve the **THINK TANK** activity given on page **67**.

Let students complete the **CONCEPT CAPSULE** activity given on page **67**.

Students will complete the **EXPERIENTIAL LEARNING ACTIVITY** given on page **69**.

Students will attempt the **ASK AI AGENT** activity given on page **69**.

Help students complete activities like **CHECKPOINT** given on page **69**.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages **71 to 73** in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page 73. This will improve their skills and promote **creativity**.

Suggested Activity

Students will create a poster or presentation on “My Positive Digital Footprint”.

They will include:

- Safe online practices
- Responsible technology use
- Ways to protect personal information
- Examples of good digital behaviour

Students will present their work and explain how responsible digital habits help create a safer online world.