Computational Thinking & Artificial Intelligence

Part 2 AI

7

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

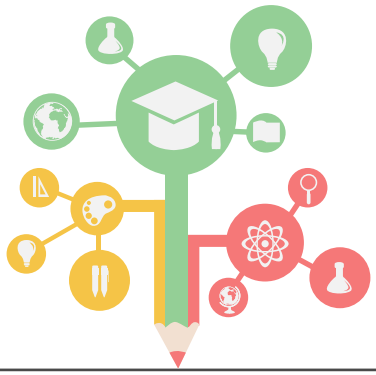
Age 11 - 20 Years

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.

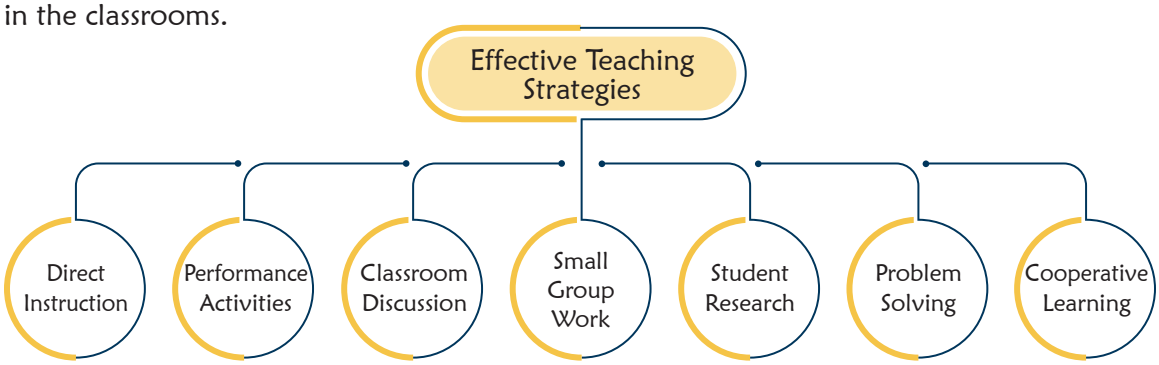
After the class

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

"Knowing yourself is the beginning of all wisdom."

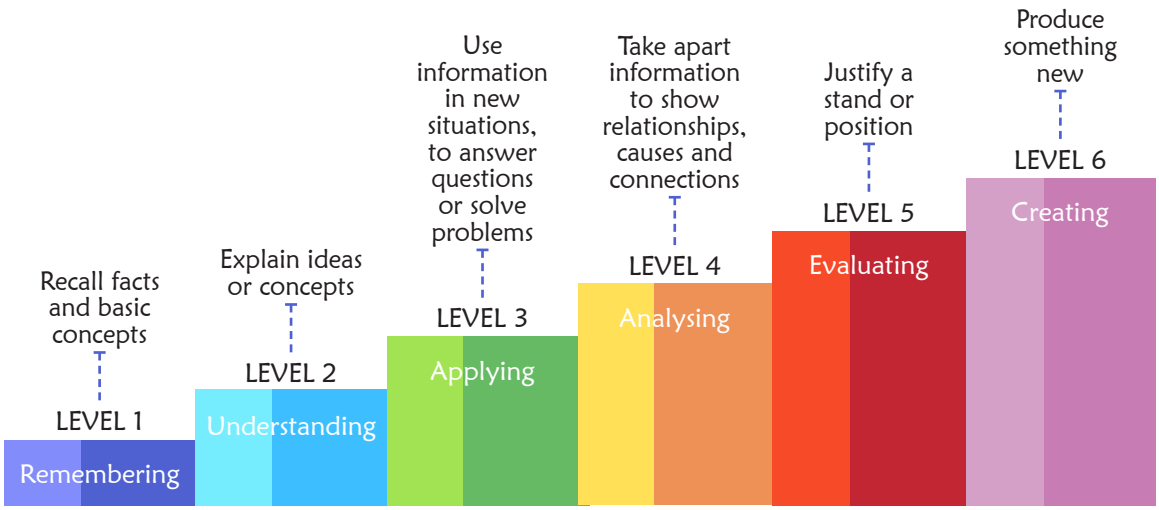
Teaching Strategies

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 7

LESSON PLAN

1 AI Domains and Applications

Teaching Objectives

Students will learn about:

- Introduction to Artificial Intelligence and AI Domains
- Data Science as an AI Domain
- Computer Vision as an AI Domain
- Natural Language Processing (NLP) as an AI Domain
- Predictive Techniques in AI
- Classification
- Regression
- Clustering
- Datasets and Types of Datasets
- Dividing a Dataset
- Applications of AI Domains

Number of Sessions	
Theory	Practical
5	1

Teaching Plan

Begin the chapter by discussing examples of AI applications students use in daily life, such as voice assistants, face recognition, online recommendations and smart devices.

Explain AI domains and how different areas of Artificial Intelligence help machines perform specific tasks such as analysing data, recognising images and understanding human language.

Explain Data Science and how it helps AI systems collect, analyse and interpret data to identify patterns and make predictions. Discuss applications such as healthcare, banking, shopping and weather forecasting.

Introduce Computer Vision and explain how machines understand and process images and videos. Discuss examples such as face recognition, medical image analysis and self-driving vehicles.

Explain Natural Language Processing (NLP) and how computers understand, interpret and respond to human language. Discuss applications such as chatbots, voice assistants, translation tools and sentiment analysis.

Explain predictive techniques used in AI:

- Classification: Categorising data into predefined groups.
- Regression: Predicting numerical values based on previous data.
- Clustering: Grouping similar data without predefined categories.

Discuss datasets and explain their importance in training AI models. Explain different types of datasets such as numerical, text, image and multimedia datasets.

Explain how AI systems use training data, validation data and testing data to improve their accuracy.

Discuss real-life applications of AI domains and encourage students to identify AI technologies around them.

Extension

Ask the students some oral questions based on this chapter.

Q. What are AI domains?

Q. Name the three major AI domains.

Q. What is Data Science?

Q. Explain Computer Vision with examples.

Q. What is Natural Language Processing?

Q. What is classification in AI?

Q. Explain regression with an example.

Q. What is clustering?

Q. What are datasets?

Q. Name any three applications of AI domains.

Evaluation

Encourage students to solve the **THINK TANK** activity given on page **8**.

Students will complete the **ART INTEGRATION ACTIVITY** given on page **11**.

Students will attempt the **ASK AI AGENT** activity given on page **14**.

Ask students to do the **PROJECT-BASED LEARNING** activity given on page **15**.

Let students complete the **CONCEPT CAPSULE** activity given on page **17**.

Guide students to complete the **AI IN ACTION** activity given on page **18**.

Help students complete activities like **CHECKPOINT** given on page **21**.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages **22 to 24** in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page 24. This will improve their skills and promote **creativity**.

Suggested Activity

Students will create a poster or presentation titled "AI Domains Around Us".

They will include:

- Different AI domains
- Examples of each domain
- Real-life uses of AI

Students will present their work and explain how AI domains help solve everyday problems.

2 AI in Industries

Teaching Objectives

Students will learn about:

- Understanding Industries and their types
- Evolution of AI in Industries
- AI Applications in Different Industries:
  - Healthcare
  - Education
  - Agriculture
  - Entertainment
  - Transport
  - Communication
- Advantages of Using AI in Industries

Number of Sessions	
Theory	Practical
5	1

Teaching Plan

Begin the chapter by discussing different industries students see around them, such as hospitals, schools, farms, transport services and entertainment platforms. Explain how AI is helping these industries become faster, safer and more efficient.

Explain the meaning of industries and their role in producing goods, providing services and creating employment. Discuss the three main types of industries:

- Primary Industry: Involves extracting natural resources such as farming, fishing and mining.
- Secondary Industry: Converts raw materials into finished products through manufacturing and production.
- Tertiary Industry: Provides services such as healthcare, education, banking and transportation.

Explain the evolution of AI in industries and how AI has developed from simple automation to advanced technologies such as Machine Learning, Deep Learning, NLP and Computer Vision.

Discuss AI in healthcare and explain how AI helps doctors analyse medical images, detect diseases, monitor health through smart devices and support drug discovery.

Explain AI in education and discuss how AI-powered learning apps, virtual tutors and adaptive learning platforms provide personalised learning experiences for students.

Explain AI in agriculture and discuss smart farming, crop monitoring, weather prediction, pest detection, automated machines and soil analysis. Explain how AI helps farmers improve productivity and use resources efficiently.

Discuss AI in entertainment and explain applications such as content recommendations, video games, music creation and animation.

Explain AI in transport and discuss how AI helps in traffic management, navigation, self-driving vehicles and improving road safety.

Explain AI in communication and discuss applications such as translation tools, chatbots, voice assistants, spam detection and improving online communication.

Discuss the advantages of AI in industries:

- Saves time and increases work speed
- Reduces costs
- Improves quality
- Helps in better decision-making
- Provides better customer service
- Improves safety

Extension

Ask the students some oral questions based on this chapter.

Q. What are industries?

q. Name the three types of industries.

Q. Explain the role of AI in industries.

Q. How does AI help in healthcare?

q. What are AI-powered learning apps?

Q. How does AI support smart farming?

Q. Explain any two uses of AI in entertainment.

Q. How does AI improve transportation systems?

Q. How is AI used in communication?

Q. State any three advantages of using AI in industries.

Evaluation

Students will attempt the **ASK AI AGENT** activity given on page **30**.

Guide students to complete the **AI IN ACTION** activity given on page **32**.

Ask students to do the **PROJECT-BASED LEARNING** activity given on page **33**.

Help students complete activities like **CHECKPOINT** given on page **34**.

Students will complete the **EXPERIENTIAL LEARNING ACTIVITY** given on page **34**.

Encourage students to solve the **THINK TANK** activity given on page **35**.

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

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages **38 to 40** in the main course book.

Suggested Activity

Students will work in groups and choose one industry such as healthcare, education, agriculture, entertainment or transport.

They will prepare a poster or presentation showing:

- How AI is used in that industry
- Benefits of using AI
- Real-life examples

Students will present their findings and explain how AI is transforming industries.

3 Data Visualisation and Analysis

Teaching Objectives

Students will learn about:

- Understanding Data
- Data Collection Methods and Sources
- Digital Data and Data Formats
- Organising and Storing Data
- Data Visualisation

- Interpreting Data
- Data Analysis

Number of Sessions	
Theory	Practical
4	2

Teaching Plan

Before starting the chapter, ask the students to solve the introductory activity and discuss the cricket match example given at the beginning of the chapter.

Encourage them to think about how information collected during a match can help improve future performance.

Introduce the chapter by discussing examples of data from daily life and explain how organised data helps in understanding information and making better decisions.

Explain the meaning of data and discuss structured and unstructured data with suitable examples.

Explain different methods of data collection, including observation, surveys, measurements and automatic devices. Discuss various data sources such as sensors, websites and social media platforms.

Explain digital data and how computers store and process different types of information such as text, images, videos and sounds. Discuss different data formats and storage methods, including databases, text files, spreadsheets, web files and media files.

Explain the importance of organising data before analysis. Discuss how tables and data cleaning help in identifying patterns and preparing data for visualisation.

Explain data visualisation and how charts, graphs and maps make complex data easier to understand. Discuss different types of visualisations such as bar charts, line graphs, pie charts, area charts and bubble maps.

Explain how to interpret data by analysing titles, labels, values and patterns in charts. Discuss identifying trends, drawing conclusions and using data analysis for better decision-making.

Extension

Ask the students some oral questions based on this chapter.

Q. What is data? Give any two examples from daily life.

Q. What is the difference between structured and unstructured data?

Q. Explain any four methods of data collection.

Q. What are data sources? Give suitable examples.

Q. What is digital data? Why is it important?

Q. What are databases? Explain the terms table, row and column.

Q. Why is data cleaning important before creating charts?

Q. Name and explain any four types of data visualisation.

Q. Differentiate between precision, accuracy and valid data.

Q. Explain the steps involved in thinking like a data analyst.

Evaluation

Students will complete the **INTERDISCIPLINARY ACTIVITY** given on page **48**.

Let students complete the **CONCEPT CAPSULE** activity given on page **49**.

Ask students to do the **PROJECT-BASED LEARNING** activity given on page **55**.

Encourage students to solve the **THINK TANK** activity given on page **57**.

Help students complete activities like **CHECKPOINT** given on page **57**.

Students will attempt the **ASK AI AGENT** activity given on page **58**.

Guide students to complete the **AI IN ACTION** activity given on page **59**.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages **59 to 61** in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page 61. This will improve their skills and promote **creativity**.

Suggested Activity

Divide students into groups and conduct a simple classroom survey on topics like favourite sports, subjects or study hours. Ask them to organise, clean and analyse the data using spreadsheets and charts, then present their findings to the class. This activity will help students understand data collection, visualisation and analysis.

4 Ethics and AI Bias Awareness

Teaching Objectives

Students will learn about:

- Understanding Ethics in AI
- Importance of Ethical Use of AI
- Bias in AI
- Understanding the Meaning of Bias
- Case Examples of AI Bias
- Ethical Safeguards in AI
- Fairness in AI
- Digital Citizenship
- Digital User

Number of Sessions	
Theory	Practical
5	2

Teaching Plan

Begin the chapter by asking students whether they would trust Artificial Intelligence to make important decisions such as selecting students for a scholarship, approving a bank loan or diagnosing a disease.

Encourage discussion on whether machines should make every decision independently. Introduce the chapter by explaining that AI should always be fair, responsible and safe.

Introduce the chapter by discussing the use of AI in daily life and the importance of developing AI systems that are fair, safe and responsible.

Explain AI Ethics and how ethical AI helps in making fair decisions, protecting privacy and building trust among users.

Discuss AI Bias and explain how unfair or incomplete data can affect AI decisions. Explain different types of AI bias with suitable examples.

Explain ethical safeguards in AI and discuss the importance of transparency, human involvement and responsible use of AI.

Discuss fairness in AI and how bias can be reduced by using balanced data and regularly checking AI systems.

Explain Digital Citizenship and the rights and responsibilities of digital users, including safe, respectful and responsible use of technology.

Extension

Ask the students some oral questions based on this chapter.

Q. What is ethics in Artificial Intelligence?

Q. Why is ethical use of AI important?

Q. Define bias in AI with one suitable example.

Q. Differentiate between data bias and historical bias.

Q. Explain any four types of AI bias.

Q. What is Human-in-the-Loop (HITL)? Why is it important?

Q. How can fairness be achieved in AI systems?

Q. What is Digital Citizenship? Mention any four characteristics of a good digital citizen.

Q. Explain the rights and responsibilities of digital users.

Q. Suggest ways to reduce bias and promote ethical AI in society.

Evaluation

Ask students to do the **PROJECT-BASED LEARNING** activity given on pages **65 and 76**.

Guide students to complete the **AI IN ACTION** activity given on page **70**.

Let students complete the **CONCEPT CAPSULE** activity given on page **72**.

Encourage students to solve the **THINK TANK** activity given on page **73**.

Help students complete activities like **CHECKPOINT** given on page **75**.

Students will complete the **ART INTEGRATION ACTIVITY** given on page **75**.

Students will attempt the **ASK AI AGENT** activity given on page **77**.

After explaining the chapter, ask students to complete the **CODE DECODE** activity given on pages **78 to 80** in the main course book.

Take students to the computer lab to practise the activity given in the **AI LAB** section on page **80**. This will improve their skills and promote **creativity**.

Suggested Activity

Divide students into groups and assign each group a real-life AI application. Ask them to identify bias and ethical issues and suggest ways to make AI fair and responsible. Students will present their ideas to the class.