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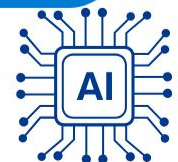
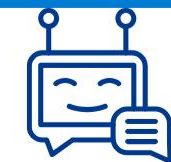


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FROM CHALK TO CODE: WHY ROBOTICS & ARTIFICIAL INTELLIGENCE MATTER IN SCHOOL EDUCATION

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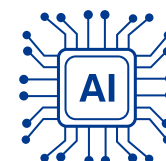
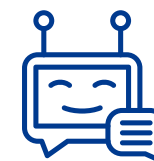
This session deepens our understanding of Robotics and AI by examining their classroom relevance.





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PART I: ROBOTICS IN SCHOOL EDUCATION



From Explanation to Experience

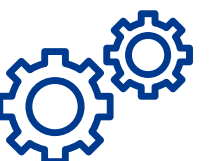
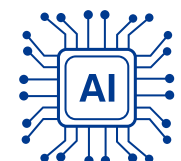
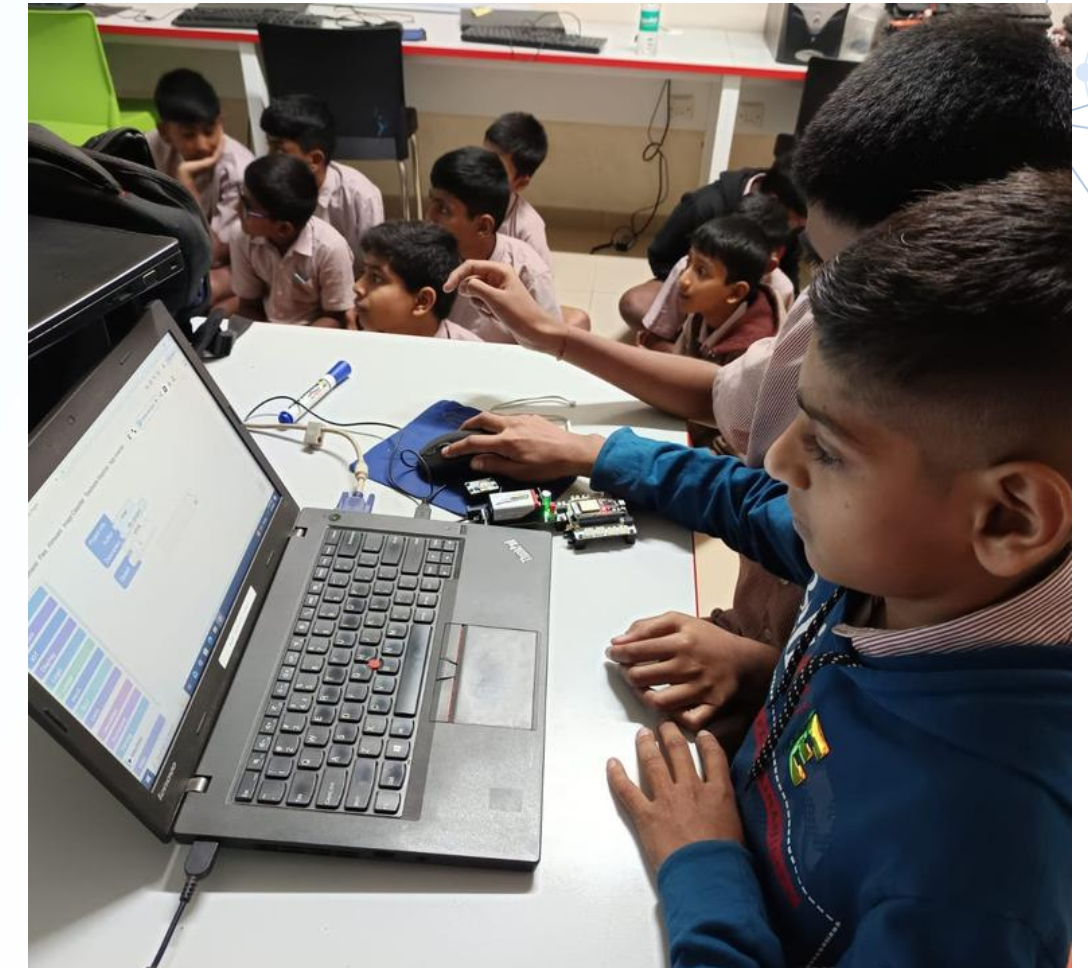
Traditional teaching relies largely on explanation and board demonstration.

Robotics introduces visible action into conceptual learning.

Robotics allows:

- **Concepts to become visible** – students see motion instead of only hearing about it.
- **Instructions to produce measurable outcomes** – one change in instruction changes the result.
- **Errors to become learning opportunities** – mistakes show gaps in reasoning immediately.

This supports experiential learning where understanding grows through guided action.



Robotics Strengthens Logical Sequencing

Every robotic action follows a structured sequence.
If the sequence changes, the outcome changes.

Robotics reinforces:

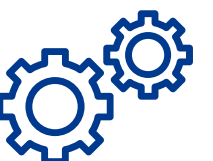
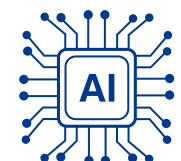
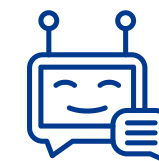
- **Structured thinking** – students plan steps before giving instructions.
- **Planning before action** – learners predict what will happen before execution.
- **Predicting consequences** – they anticipate how each instruction affects movement.



Example:

If a student forgets one command, the robot stops midway.

This visibly demonstrates the importance of sequence and precision.

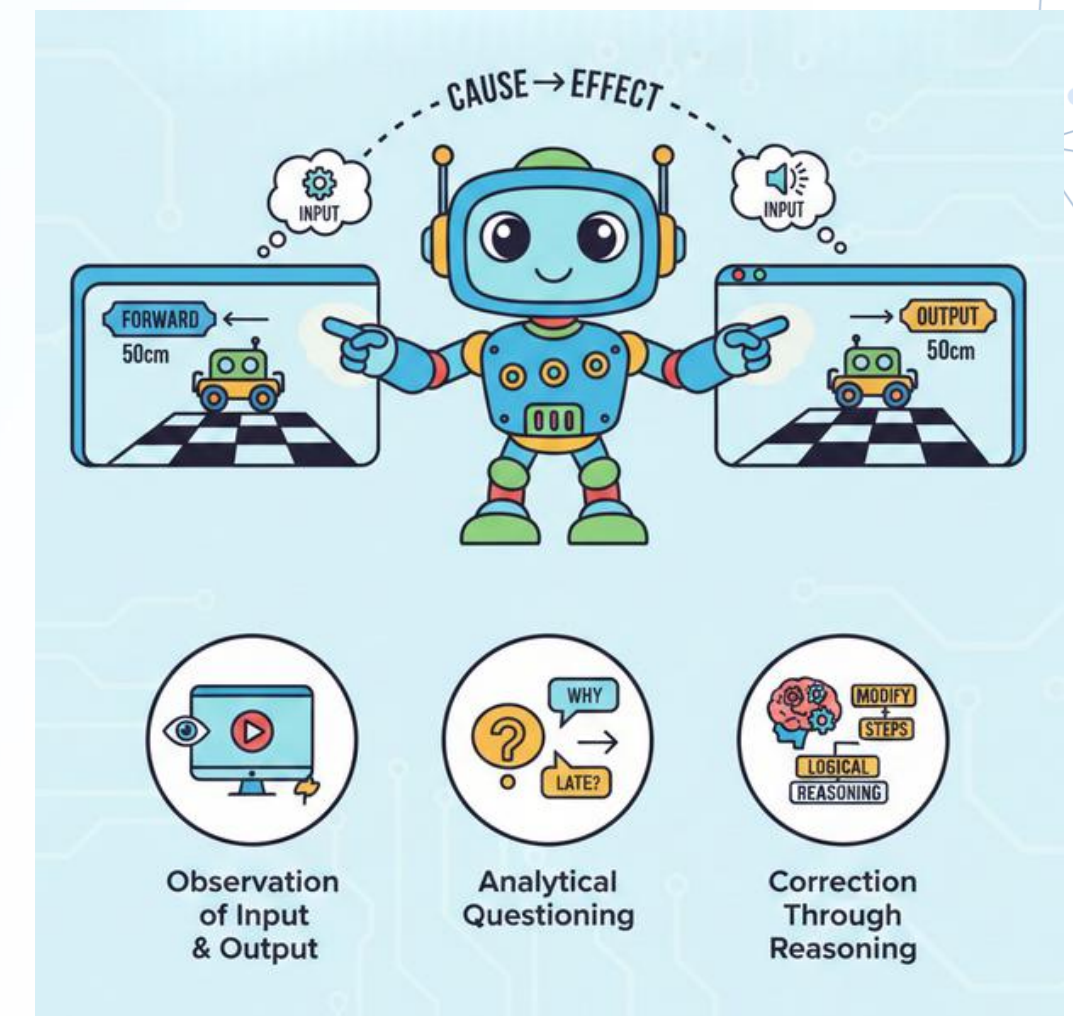


Robotics and Cause–Effect Understanding

Robotics makes cause–effect relationships observable.

It encourages:

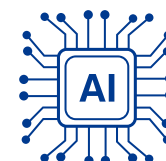
- **Observation of input and output** – students connect command with response.
- **Analytical questioning** – “Why did it move faster?” “Why did it turn late?”
- **Correction through reasoning** – learners modify steps logically instead of guessing.



Example:

Increasing the time value makes the robot move further.

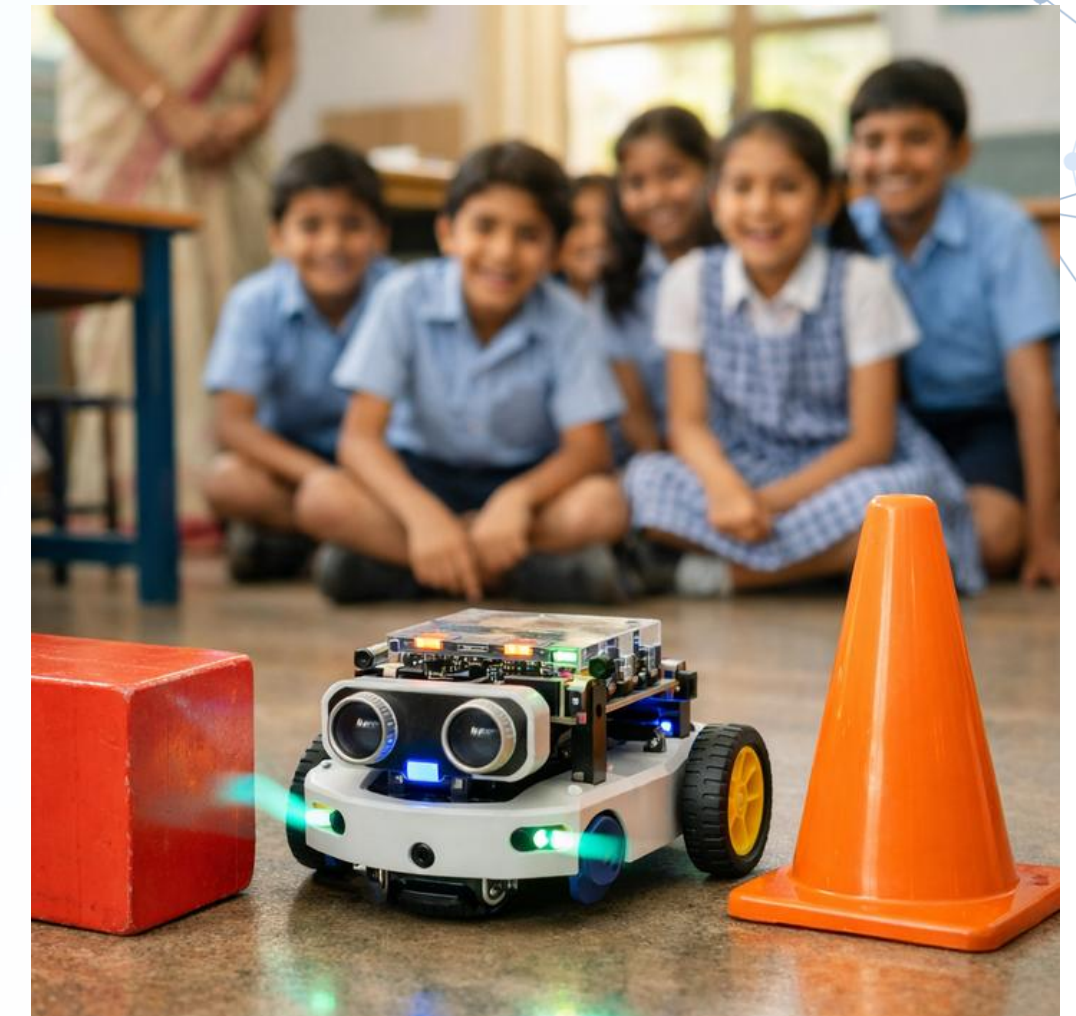
This strengthens measurable understanding of cause and result.



Robotics in Primary Classrooms

In early grades, robotics supports foundational learning.

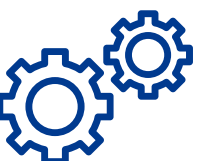
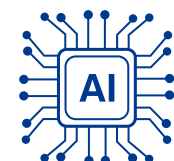
- **Directional clarity** – left and right become practical, not abstract.
- **Counting and sequencing** – students count steps to guide movement.
- **Spatial awareness** – learners visualise position and distance physically



Example:

Students guide a small robot along a grid and count blocks.

Mathematics becomes experiential rather than symbolic only.



Robotics in Middle School

In middle grades, robotics strengthens subject linkage.

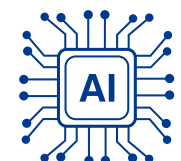
- **Geometry application** – students test angle values through movement.
- **Measurement understanding** – they calculate distance travelled.
- **Time and speed concepts** – learners compare duration and outcome.



Example:

Programming a robot to draw a square requires correct angle and equal sides.

Students observe if geometric accuracy is maintained.



Robotics in Secondary Grades

At higher levels, robotics supports structured investigation.

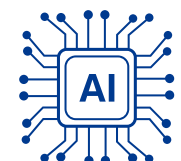
- **Scientific experimentation** – students test variables like surface texture.
- **Data recording** – learners measure outcomes systematically.
- **Collaborative reasoning** – groups discuss why variations occur.



Example:

Comparing robot speed on tile and carpet surfaces strengthens experimental thinking.

The teacher ensures scientific interpretation, not mere activity.



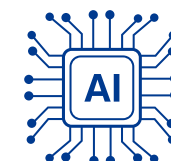
Teacher's Role in Robotics Integration

Robotics remains academically meaningful only when guided.

The teacher:

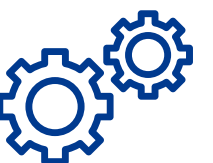
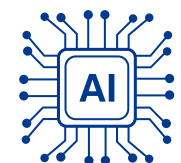
- **Introduces the concept clearly** – robotics follows subject clarity, not replaces it.
- **Links activity with syllabus goals** – each task aligns with learning outcomes.
- **Encourages structured reflection** – students explain what changed and why.
- **Ensures inclusive participation** – all learners engage, not only a few.

Meaningful integration ensures robotics supports competency development.





TRANSITION

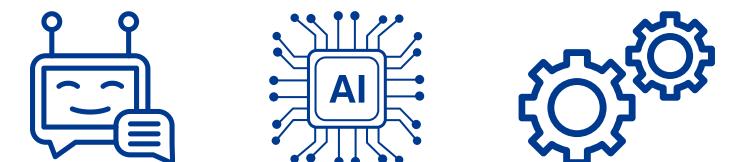
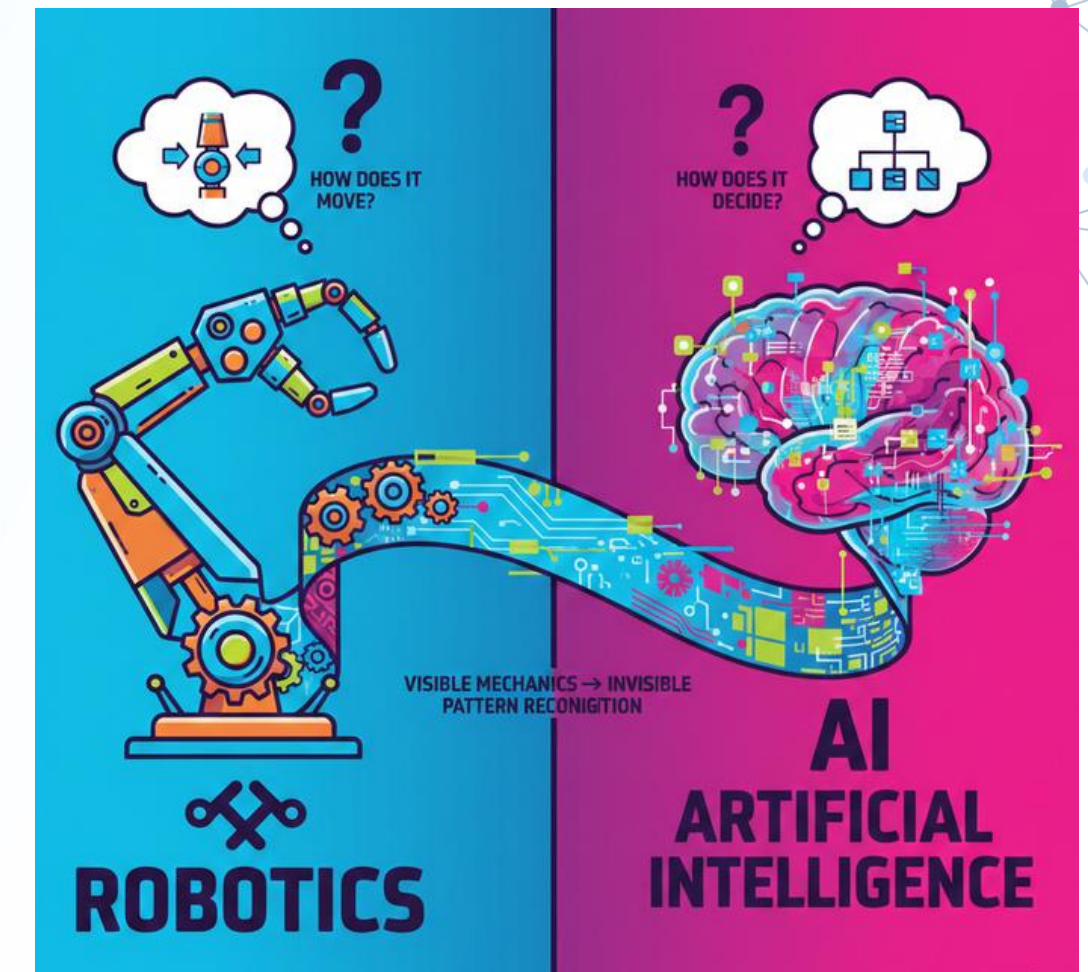


From Physical Action to Analytical Systems

Robotics focuses on physical response.
Artificial Intelligence focuses on analytical response.

If robotics answers “*How does it move?*”
AI answers “*How does it decide?*”

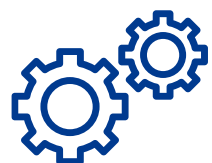
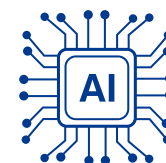
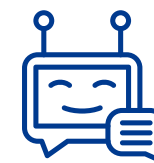
This shift moves from visible mechanics to invisible pattern recognition.





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PART II: ARTIFICIAL INTELLIGENCE IN SCHOOL EDUCATION



AI as an Educational Support Tool

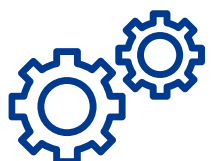
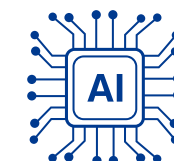
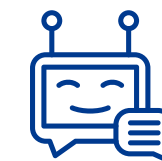
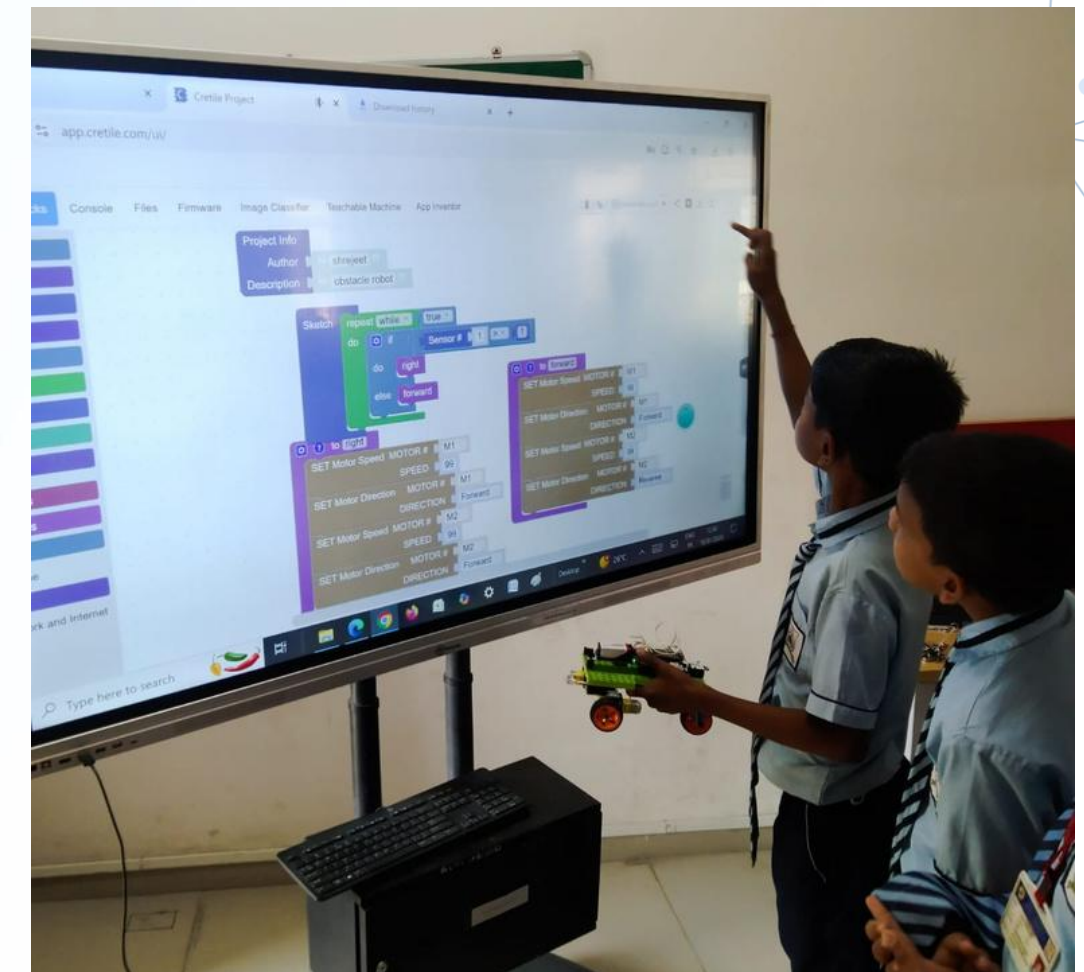
AI assists teachers in observing learning patterns.

AI can:

- **Analyse responses quickly** – it identifies repeated errors across answers.
- **Suggest corrections** – grammar or structure improvements are proposed.
- **Identify learning gaps** – weak areas become visible through data trends.

AI processes large information sets using logical rules.

Teachers interpret the meaning behind those patterns.



AI and Personalised Learning Support

Classrooms include varied learning levels.

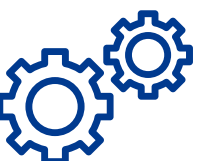
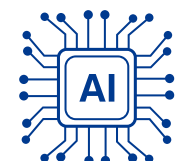
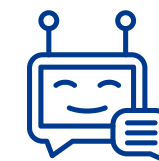
AI may:

- **Adjust difficulty level** – easier or advanced questions are generated.
- **Provide additional practice** – targeted exercises appear automatically.
- **Offer quick feedback** – immediate response helps faster correction.



Example:

If multiple students struggle with fractions, AI can suggest more fraction-based practice tasks.
However, conceptual clarification remains teacher-led.



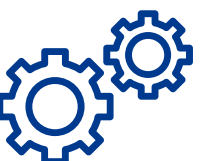
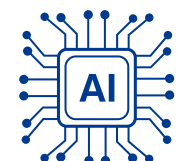
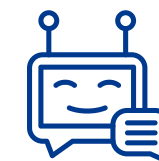
AI and Critical Thinking

AI output must be examined carefully.

Teachers can encourage:

- **Verification of information** – students cross-check answers with textbooks.
- **Discussion of accuracy** – learners analyse if responses are complete.
- **Comparison of sources** – AI answers are compared with reference material.

This strengthens critical thinking rather than dependence.



AI in Language and Writing

AI tools assist in language improvement.

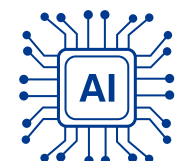
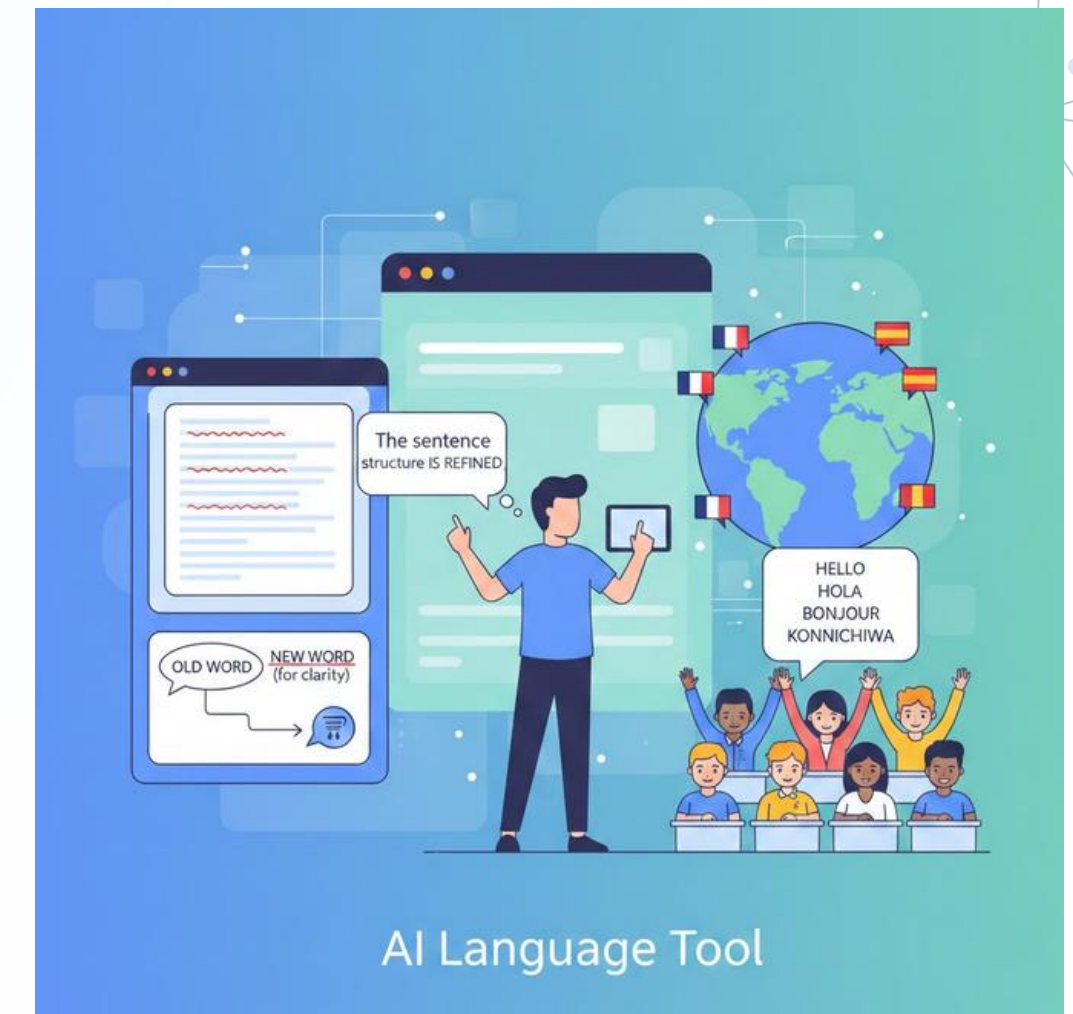
They may:

- **Suggest grammar corrections** – sentence structure is refined.
- **Recommend vocabulary alternatives** – words may be replaced for clarity.
- **Support translation** – multilingual classrooms receive assistance.

Example:

Students compare original writing with AI suggestions and decide which is clearer.

The teacher guides reasoning behind changes.



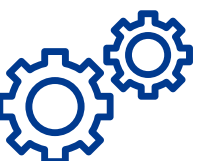
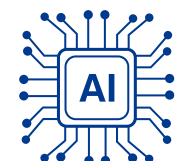
Responsible and Reflective Use

AI works through:

- **Logic** – following rule-based reasoning.
- **Patterns** – identifying repeated similarities in data.
- **Algorithms** – step-by-step procedures that guide decisions.

AI does not think emotionally or ethically.
It processes instructions and data only.

Teachers must guide learners to understand these limitations.



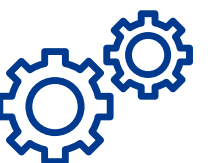
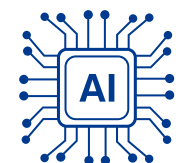
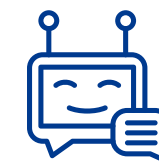
Robotics and AI Together

Together they strengthen learning.

- **Robotics provides action** – visible movement and experimentation.
- **AI provides analysis** – interpretation and suggestion generation.
- **Robotics strengthens sequencing** – planning and structured execution.
- **AI strengthens evaluation** – reviewing and improving responses.

Example:

A robot may move physically (robotics), but adjusting its behaviour based on data requires AI logic.



Avoiding Superficial Use

Technology must remain purpose-driven.

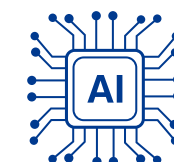
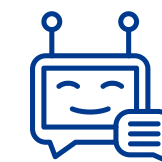
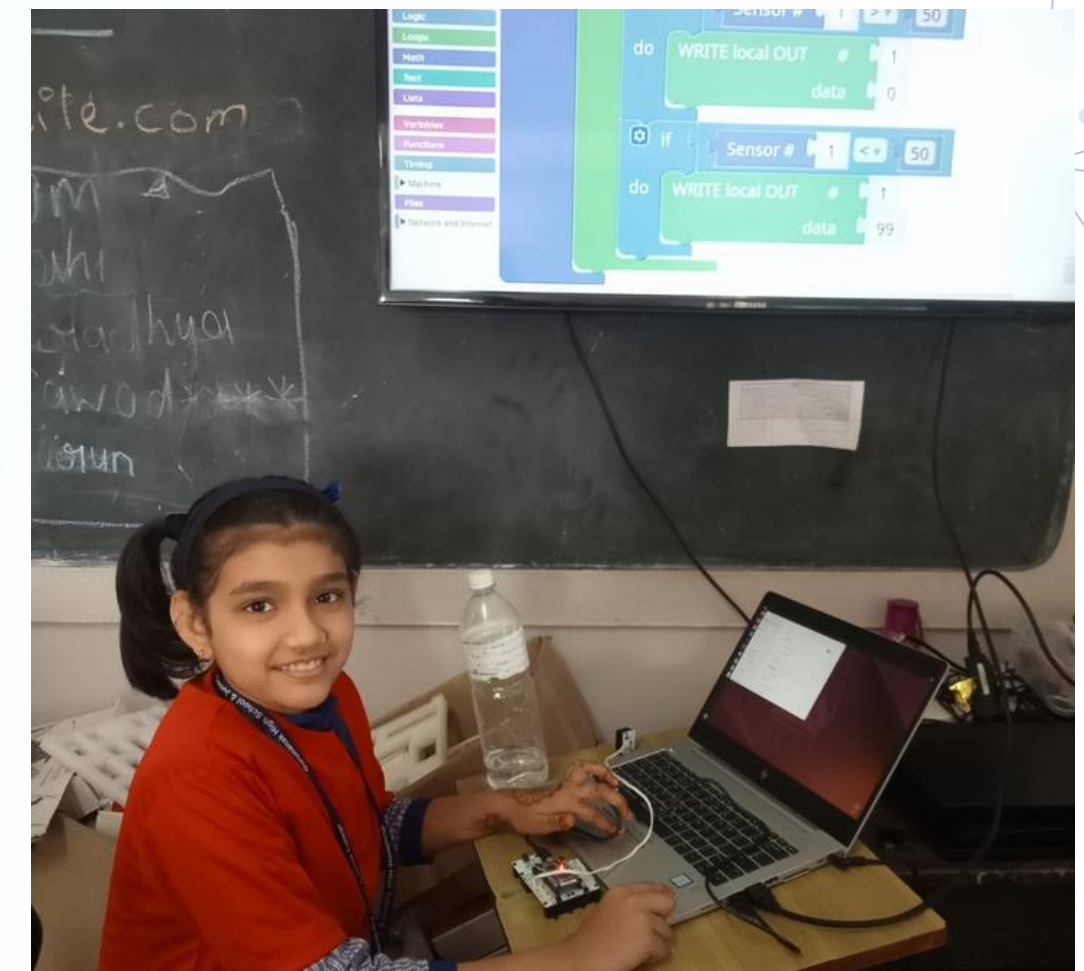
Avoid:

- **Activity without learning goal** – entertainment without academic focus.
- **Replacement without reflection** – tools used without discussion.

Ensure:

- **Clear objective** – define what concept is strengthened.
- **Structured discussion** – learners explain outcomes.
- **Assessment linkage** – outcomes connect to evaluation.

Teacher judgement ensures depth.



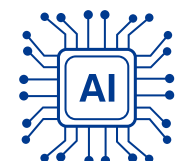
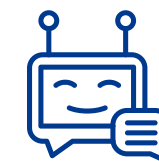
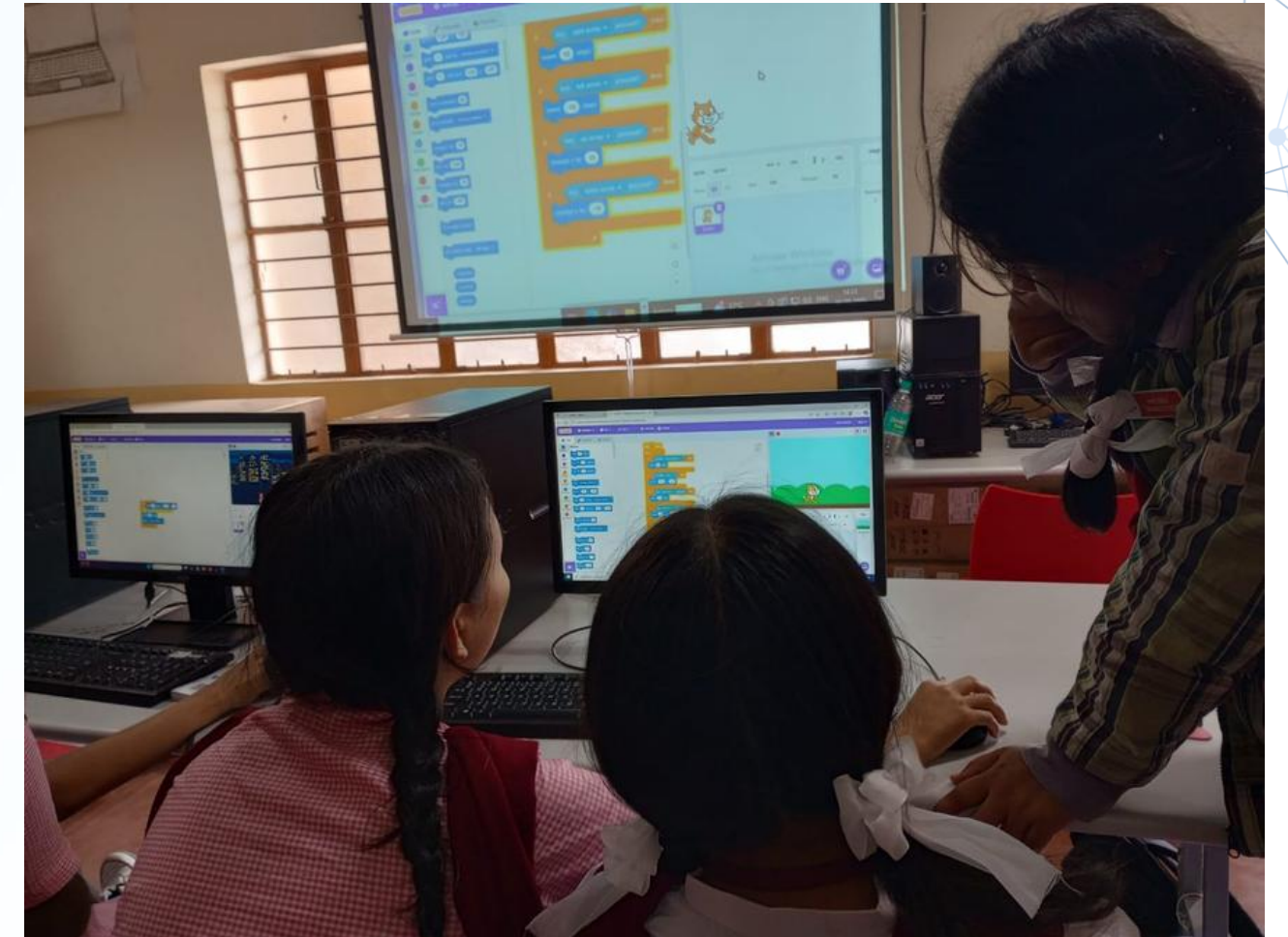
Empowering Learners

When learners:

- **Design instructions** – they practice logical planning.
- **Analyse results** – they evaluate performance critically.
- **Review AI outputs** – they judge correctness and relevance.

They move from passive listening to active reasoning.

This strengthens confidence and academic independence.



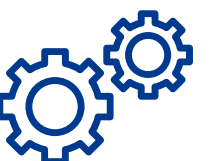
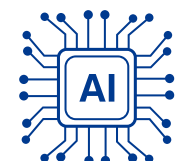
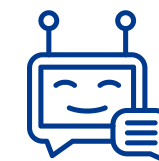
From Chalk to Code: Educational Meaning

Chalk remains foundational.
Code extends interaction.

The classroom becomes a space where:

- **Explanation builds clarity** – conceptual base is strong.
- **Experimentation strengthens understanding** – practice reinforces theory.
- **Analysis deepens insight** – reflection completes learning.

The teacher remains central to this balance.



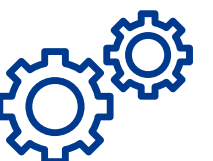
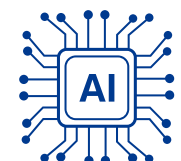
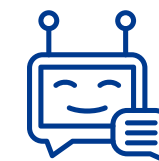
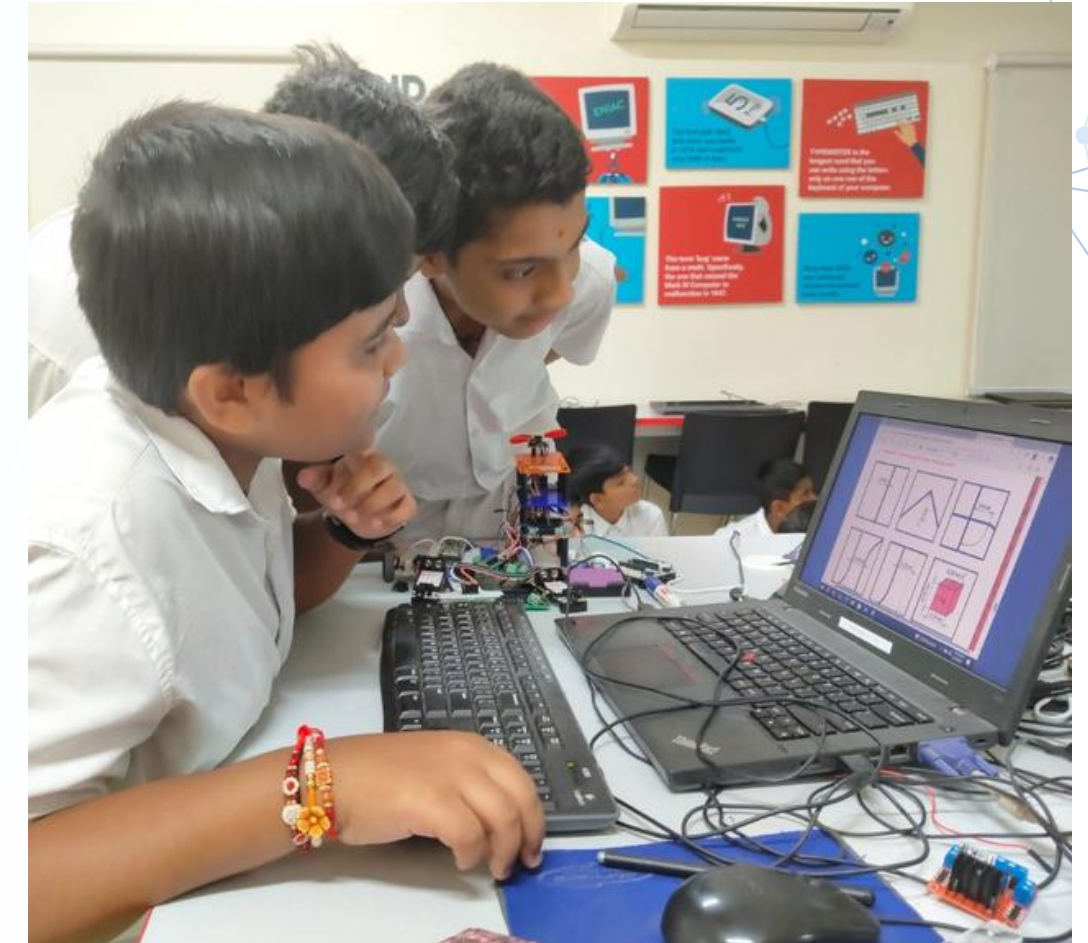
Closing Synthesis

Robotics and AI matter because they:

- **Make abstract ideas visible** – movement and response clarify theory.
- **Support structured reasoning** – step-by-step thinking is reinforced.
- **Encourage inquiry-based engagement** – questioning becomes natural.
- **Assist differentiated practice** – varied levels receive attention.

From Chalk to Code represents academic expansion —

Where teaching integrates explanation, experimentation, and analysis in a balanced manner.





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