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States of Matter

Year	Discipline, topic	Subject associations
5.	Natural Sciences and Geography Natural Sciences	Digital culture,

The objectives and instructional tasks of the lesson

Fifth-grade students can engage in a playful and practical exploration of the various stages of the water cycle—evaporation, condensation, precipitation, and surface runoff—through the use of the INDI car, which navigates a predetermined route.

The impact of the clock

We engagingly and interactively guide students through the stages of the water cycle, facilitating their understanding of this essential natural phenomenon both visually and practically. The color-coded controls of the INDI car enable modifications to the track, allowing children to design various routes independently. This versatile track provides opportunities for practice in diverse scenarios and through experiential learning, thereby reinforcing their knowledge.

Instruments and materials utilized

	State curriculum, local curriculum, educational resources
	INDI robot and color-coded cards
	INDI robot pathway, worksheets

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abacusan STÚDIÓ
WE TEACH ROBOTICS

Occupation strategy

5 minutes	**Introduction and Objective**	• A concise overview of the significance and components of the water cycle. • Attention, motivation, and repetition • Frontal engagement
5 minutes	**Stages of the hydrological cycle**	• Theoretical Framework • Clarification, inquiry, and response, direct engagement • Tools: Tabular Illustrations
5 minutes	**Introduction to the INDI robot and an overview of the course objectives.**	• Utilization of digital devices. • Frontal engagement. • Tools: INDI robot, tracking system.
10 minutes	**Robot path navigation**	• The course must be completed in accordance with the water cycle. • Algorithmic reasoning, experiential education. • Collaborative or small group activities, problem-solving. • Tools: INDI robot, tracking system.
15 minutes	**Utilizing an INDI vehicle to model states of matter**	• Design your own path to simulate states of matter. • experiential education, algorithmic reasoning, innovation, conceptualization • Collaborative efforts • Tools: Worksheet, INDI robot, tracking device.
5 minutes	**Summary and conclusion of the lesson**	• Systematization of knowledge, feedback • Contemplation, introspection. • Frontal engagement.

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Methodological guidance for developing a robotic track

INDI WORKSHEET – Let us explore various states of matter with INDI!

1. Explore the states of matter in greater depth!

- **Solid: The particles are closely interconnected and oscillate in a fixed position. For instance, consider ice cubes in a glass.**
- **Liquid: Create a soap bubble! - the particles stay in close proximity yet can glide over one another. For instance, water, which effortlessly shifts position within a glass.**
- **Airborne: Dispense a small amount of perfume or deodorant into the air and conduct a "smell test" to determine how far the scent has dispersed throughout the room. The particles are largely unimpeded and can travel considerable distances.**
- **Changes of state: Gather examples of melting, freezing, evaporation, and condensation.**

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2. Simulate the motion of particles using the INDI car!

- **Solid: Designate a "solid" area on the INDI board. The INDI car may only navigate within a confined space, allowing minimal movement to replicate the vibrations of closely bound particles.**
- **Liquid: Designate a larger area as a "liquid." The INDI car moves at a slow and steady pace, "flowing" freely, yet it cannot exit the designated area, illustrating the behavior of liquid particles.**
- **Air: In the "air" domain, the INDI vehicle can navigate swiftly and with total autonomy. Utilize INDI to illustrate how particles disperse freely and occupy all available space!**

1. Differentiation alternatives:

We can modify the quantity and presentation of the states of matter displayed on the track to align with the students' abilities and understanding.

We can adjust the quantity of images positioned on the track.

- We can define the task to navigate all fields representing a specific state of matter, or that the robot is permitted to traverse only those fields.
- We can restrict the quantity and variety of color code sheets that may be utilized.

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