

3.3.3 Scientific concepts in motion

Brief description, and rules of the implementation of the learning activity

Turning scientific concepts into movement involves children experiencing abstract principles (such as states of matter) through movement. Children depict these concepts physically with their bodies, exploring how a concept works, how to represent it, and how to improve it. It can be done indoors or outdoors. This learning activity focuses on problem-solving by students are given a scientific concept, such as states of matter, and the challenge is to represent it through movement.

Skill focus

- **Primary Skill Focus**
 - Problem-solving
- **Complementary/Secondary Skill Focus**
 - Critical thinking
 - Creativity

Age group	Student number	Duration
6-10 years old	Individual and whole class working in pairs or small groups	30-50 minutes

Proposed step by step implementation of the learning activity

1. **Exploration through Movement:** Pupils practice the different movement criteria with their bodies, for example moving smoothly or following a specific pattern. Encourage open exploration and trying out ideas.
2. **Applying the Concept:** Pupils work in groups to present the concept through movement with their bodies. They experiment, exchange ideas, and try out solutions.
3. **Presentation:** Present this to the class: one group performs while the other observes, focusing on how the concept and movement criteria are applied.
4. **Reflection:** Reflect together: discuss what was discovered, which movement criteria and concepts were visible, and what could be done differently or improved.

Indoor/Outdoor Classroom layout notes

It can be done indoors or outdoors.

If you do it indoors, make sure the (classroom) is spacious and allows the class and individual student to move freely. But also, that you can make it quiet enough for them to concentrate on your explanations and instruction.

If you do it outside, choose a quiet but spacious place on the playground where pupils can stay focused and not be disturbed by other activities.

How does this learning activity develop this particular skill?

This learning activity focuses on problem-solving. Pupils are given a scientific concept, such as states of matter, and the challenge is to represent it through movement. They test different ways to express it.

Working individually or in small groups, pupils generate ideas, try out solutions, and refine their approach until they find an effective way to depict the concept through movement. Finally, they reflect on their choices and how their representation could be improved.

What do we want to achieve regarding primary skill development (student understanding and/or behaviour)?

As a result of this activity, students will:

- able to experiment with their ideas, evaluating them, and refining them through improvement.
- understand that multiple solutions are possible for a single problem.
- able to critically reflect on their learning process by asking what worked, why a particular solution was chosen, and what could be done differently next time.

Suggested use, and practical subject-related examples

A clear example is that pupils represent the states of matter and their transitions through movement. For instance, a block of chocolate that melts: they first move as a solid object and gradually “melt” into a liquid phase. They use the particle model to guide their movement: initially, the pupils stand close together in a structured way (solid) and then gradually spread out (melting).

Materials and tools needed for implementation

Here is an overview of possible tools and materials depending on your concept:

- Instruction cards
- Photo camera or tablet to record things
- Post-its for initial ideas or comments
- Large sheets of paper or whiteboards
- inspiration photos

Guiding questions

These are example questions applied to states of matter.

Observing the Concept

- How does a solid object actually move?
- What changes when something starts to melt?
- Can you feel how the particles behave differently?

Experimenting with Movement

- What happens if you move faster or slower?
- Can you show the difference between a solid, liquid, and gas?
- How can you show that the particles gradually move further apart?

Problem-Solving Thinking

- Which movement best shows the melting process?
- Can you think of another way to represent the same concept?
- Does your strategy work for the whole group? If not, what can you change?

Tips and Tricks for dealing with challenges

- **Challenge:** The students are unsure how to start
Tip 1: Suggest they focus on the basic characteristics first (e.g., “Are the particles close together or far apart?”).
Tip 2: Encourage small experiments: try one simple movement and adjust.
- **Challenge:** The students move too quickly or chaotically
Tip 1: Ask them to slow down and exaggerate the differences between states.
Tip 2: Use counts or beats to coordinate group movement.
- **Challenge:** The concept seems very abstract for the students
Tip 1: Give a concrete example, like melting chocolate or ice.
Tip 2: Ask them to think about the particle model: how would the particles move?
- **Challenge:** The group has difficulty coordinating
Tip 1: Break the movement into stages: first show the solid, then the liquid, then the gas.
Tip 2: Use visual cues (markers or zones) to guide spacing and formation.

Difficulty level tailoring

When exploring scientific concepts through movement, you can differentiate on three levels:

- **Beginner learners (6-7 years old):** Children perform simple, guided movements and discover mainly through imitation and feeling. They receive visual support and clear instructions. Think of jumping, falling or balancing with help.
- **Advanced learners (8-9 years old):** Children combine movements and think about cause and effect. They work in groups on short movement sequences and reflect on their choices. They are already able to experiment and vary within an assignment.
- **Expert learners (9-10 years old):** Children design creative movement solutions, plan independently and reflect deeply on their process. They can physically represent abstract concepts such as stability or state of aggregation and evaluate their approach.

At each level, problem-solving thinking is stimulated by open assignments, targeted questions and room for experimentation. This allows you to connect with each child's development and make science tangible and active.

Debriefing and Reflection questions

1. Understanding the concept
 - What did you discover about [gravity/force/balance]?
 - Why do you think this happened when you [jumped/pushed/rolled]?
 - Can you explain what would happen if we changed something?

2. Problem-solving process

- What ideas did you try first?
- What worked well? What didn't work? Why do you think that is?
- How did you decide which solution to use?

3. Collaboration and communication

- How did you work together to solve the problem?
- What did someone in your group do that helped you?
- How did you listen to each other's ideas?

4. Reflection on learning

- What did you learn today that you didn't know before?
- How did it feel to try something new?
- How did the way you moved help to clearly show the concept.