STEAM &Sports

Lesson 6 - The Art of Movement and Matter

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The Art of Movement and Matter

Concept

This lesson plan explores the intersection of physical movement, scientific concepts, and artistic expression. By using dance to represent states of matter and phase changes, students engage in a holistic learning experience that combines physical education, chemistry, and arts.

Learning objectives and Outcomes

Upon completion of this lesson, students will:

- Identify and describe the three main states of matter: solid, liquid, and gas.
- Explain how energy affects the transition between the different phases of matter (e.g., melting, freezing, evaporation, condensation).
- Explain scientific concepts through movement, enhancing their understanding of molecular behavior.
- Integrate creativity and scientific accuracy in producing artistic representations that reflect an understanding of scientific principles.

Students will be able to:

- Develop coordination and rhythm through dance.
- Understand and explain states of matter and phase changes.
- Create artistic representations of scientific concepts.

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Educational standards in connection with sports

This lesson plan integrates physical education (coordination, rhythm), chemistry (states of matter, phase changes), and arts (choreography, painting). It follows the 5E instructional model, engaging students in active learning and cross-disciplinary connections through creative movement and visual arts.

1. Physical Education:

- Symbolic movements: representation of objects, animals, or scenes through the body
- Teamwork: Coordination and cooperation in group dynamics

2. Chemistry:

- Understand states of matter and their transitions.

3. Arts:

- Create visual representations of scientific concepts through choreography and painting.

This lesson includes elements of these school subjects

1. Physical Education
2. Chemistry
3. Arts

Timeframe

The expected total duration of the lesson is 90 minutes

Students Age

10-12 years

Material needed

1. watercolors
2. drawing papers
3. brushes

Short description of the content

This lesson plan integrates Physical Education, Chemistry, and Arts to explore states of matter and their transitions. Students engage in dance movements representing different states of matter and phase changes, while also creating visual art pieces to illustrate these scientific concepts. The lesson aims to develop coordination, rhythm, and artistic expression while enhancing understanding of chemical principles through creative movement and visual representation

Sequence of Lesson

1. Engage (10 minutes)

Activity: "States of Matter Movement"

- Students move around the room as different states of matter:
- Solids: Stiff movements, maintaining shape. For example, students can stand in a line and move as a rigid unit.
- Liquids: Flowing movements, changing shape. Students can move in waves or flow around each other.
- Gases: Light, airy movements, spreading out. Students can jump and spread across the room.

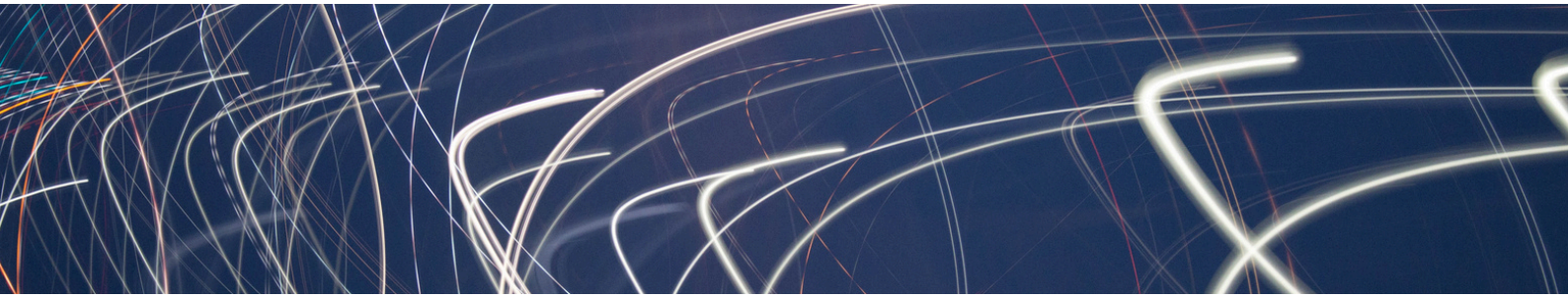
Discuss how their movements represent the characteristics of each state.

2. Explore (25 minutes)

Activity: "Dance of Phase Changes"

- Divide students into groups representing different phase changes:
- Melting (Solid to Liquid): Students start in a frozen position (solid) and gradually move into flowing movements (liquid).
- Freezing (Liquid to Solid): Students begin with fluid movements (liquid) and slowly stiffen into a solid shape.
- Evaporation (Liquid to Gas): Students start in a flowing state (liquid) and jump or leap to represent molecules spreading out (gas).
- Condensation (Gas to Liquid): Students move rapidly around the room (gas) and then come together in a flowing motion (liquid).

Each group practices and refines their dance routine to clearly depict the phase change.



3. Elaborate (20 minutes)

Explain the properties of solids, liquids, and gases at the molecular level:

- Solids: Particles are closely packed and vibrate in place.
- Liquids: Particles are close but can move past each other.
- Gases: Particles are far apart and move freely.

Activity: "Collaborative Dance Routine"

- Students create a collaborative dance routine that demonstrates a complete cycle of phase changes (e.g., ice melting into water, then evaporating into steam, and finally condensing back into water).
- In pairs, students use watercolors to paint abstract representations of their dance movements, focusing on how colors and brush strokes can represent different states of matter.
- Solids: thick, bold strokes or geometric shapes.
- Liquids: flowing, wavy lines, or blended colors.
- Gases: light, airy brushstrokes or scattered dots.
- Discussion: "States of Matter and Phase Changes"

4. Evaluate (15 minutes)

Performance and Presentation:

Groups perform their phase change dance routines.

- Students present their watercolor paintings, explaining how their artistic choices represent the scientific concepts of states of matter and phase changes.
- Class discussion on how movement and art can help understand and remember scientific concepts.

5. Extend (20 minutes)

Discuss how energy affects the movement of particles and state transitions:

- Melting and Freezing: Energy added or removed changes the state.
- Evaporation and Condensation: Energy changes cause phase transitions.
- Investigate the concept of phase changes (melting, freezing, evaporation, condensation) and their relevance to everyday life.

Lesson Developer

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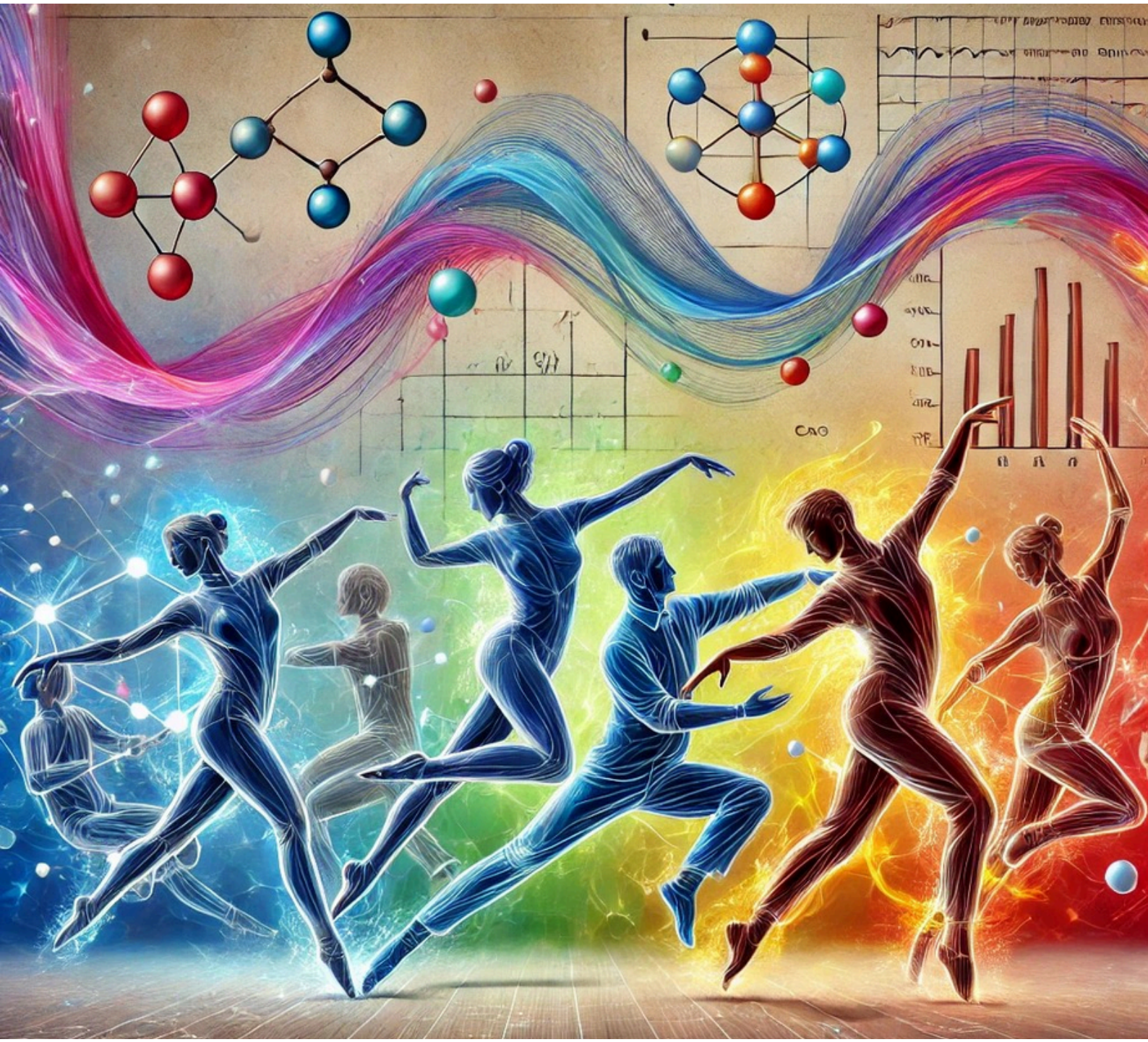

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Tips for age group differentation (for older/younger kids than indicated in the lesson)

Younger students:
States of Matter Movement. Movement : Use guided, simple movements (e.g., “stand like a statue,” “wave arms like water,” “float like a cloud”).
Dance of Phase Changes: Provide step-by-step instructions and visual aids; use peer helpers or adult support for students needing assistance.
Performance and Presentation: Allow verbal, gestural, or simple visual presentations.
Discussion and Investigation: Use hands-on examples (e.g., melting ice, boiling water) and simple questions.

Older students:
States of Matter Movement. Movement: Encourage creative interpretation — students design their own sequences or add elements like rhythm or music.
Dance of Phase Changes. Challenge students to choreograph more complex routines, perhaps incorporating transitions, tempo changes, or props.
Performance and Presentation: Encourage multimedia, digital portfolios, or written reflections
Discussion and Investigation. Explore advanced topics (e.g., sublimation, energy transfer, real-world applications).

To which SDG(s) does the lesson relate most

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

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SDG 5: objective of achieving gender equality and empowering all women and girls, particularly in education

What Inclusivity and Accessibility measures can or should the teacher take for this lesson

For the activities described in the lesson planthe teacher should ensure inclusivity and accessibility by providing adapted materials and equipment, offering instructions in multiple formats (visual, verbal, written), arranging accessible spaces for all physical abilities, allowing flexible group roles and task modifications, using assistive technology as needed, and supporting diverse learning styles with sensory-friendly options and varied assessment methods, so every student can participate and succeed regardless of their individual needs or background

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