

## ARTS IMPACT LESSON PLAN

### Dance and Science Infused Lesson

#### Sequence

Author: Debbie Gilbert



#### Enduring Understanding

Identifying key sequential steps in the solution to a problem and illustrating them through movement can show a science, technology, and/or engineering process or the development of a tool.

#### Lesson Description (Use for family communication and displaying student art)

*In this science, technology, and engineering lesson, students explore dance concepts of self and general space, shape, and repetition. They define a science, technology, and engineering problem and a three to five step solution. They create a movement for each step, repeat the movement, perform each step in a Sequence Dance that shows the solution to the problem, and add beginning and ending shapes to the dance.*

### Learning Targets and Assessment Criteria

**Target:** Identifies a science, technology, or engineering problem and a solution.

**Criteria:** Selects and notates a question that describes a challenge and lists from three to five steps that solve it.

**Target:** Choreographs a Sequence Dance to show the solution to a problem.

**Criteria:** Creates movements that sequentially show the three to five steps to solve the challenge, repeats the movements, and performs a beginning and an ending shape.

**Target:** Collaborates with others.

**Criteria:** Communicates ideas to others; makes compromises; incorporates input/feedback.

#### Vocabulary

##### Arts Infused:

Design  
Sequence

##### Science/Engineering:

Engineering Problem  
Design Solution

##### Arts:

Choreographer  
General Space  
Locomotor Movement  
Non-locomotor Movement  
Repetition  
Self-Space  
Shape

#### Materials

##### Museum Artworks or Performance

##### Seattle, WA

Pacific Northwest Ballet  
UW World Series of Dance

##### Tacoma, WA

Broadway Center for the Performing Arts

##### Materials

Drum; Music player; Computer with internet connection and projector; Chart paper and markers; dance word sign: repetition; Sequence Choreographer's Worksheets and pencils; Class Assessment Worksheet; Arts Impact sketchbook

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#### Learning Standards

##### WA Arts State Grade Level Expectations

*For the full description of each WA State Arts Grade Level Expectation, see:*

<http://www.k12.wa.us/Arts/Standards>

WA Arts State Grade Level Expectations:

- 1.1.1 Elements: Shape, Space
- 1.1.4 Principles of Choreography: Repetition
- 1.2.1 Skills and Techniques: Locomotor and Non-locomotor Movements, Sequence
- 1.4.1 Audience Skills
- 2.1.1 Creative Process
- 2.2.1 Performance Process
- 2.3.1 Responding Process
- 4.2.1 Connection between Dance and Science, Technology, and Engineering

##### National Core Arts Standards

<http://nationalartsstandards.org>

1. Generate and conceptualize artistic ideas and work.
2. Organize and develop artistic ideas and work.
3. Refine and complete artistic work.
4. Select, analyze, and interpret artistic work for presentation.
5. Develop and refine artistic techniques and work for presentation.
6. Convey meaning through the presentation of artistic work.

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**Music:**

"STEAM BrainDance" by Debbie Gilbert;  
*Music for Creative Dance, Volume I* by  
Eric Chappelle (available at CDBaby.com  
or iTunes.com)

7. Perceive and analyze artistic work.
8. Interpret intent and meaning in artistic work.
9. Apply criteria to evaluate artistic work.
10. Synthesize and relate knowledge and personal experiences to make art.
11. Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

**Early Learning Guidelines (Pre-K – Grade 3)**

*For a full description of Washington State Early Learning and Child Development Guidelines see:*

<http://www.del.wa.gov/development/guidelines/>

(Age 4-5) 3. Touching, seeing, hearing and moving around: Using the large muscles (gross motor skills): Move with purpose from one place to another using the whole body.

(Age 4-5) 6. Learning about my world: Science: Ask questions and identify ways to find answers; try out these activities and think about what to do next to learn more. Arts: Show creativity and imagination.

**Next Generation Science Standards**

<http://www.nextgenscience.org/next-generation-science-standards>

**Topic:**

Engineering Design

**Disciplinary Core Ideas:**

ETS1.A: Defining and Delimiting Engineering Problems

ETS1.B: Developing Possible Solutions

ETS1.C: Optimizing the Design Solution

**Science Kits Addressed:**

PreK: Discovering Nature

K: Fabric, Wood

1: Organisms

2: Balancing and Weighing

3: Rocks and Minerals, Plant Growth and Development

4: Circuits and Pathways, Food Chemistry

5: Land and Water, Models and Designs

**Performance Expectations:**

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

3-5-ETS1-1. Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.

**Crosscutting Concepts:**

Structure and Function

Influence of Science, Engineering, and Technology on Society and the Natural World

**Science and Engineering Practices:**

1. Asking Questions and Defining Problems

2. Developing and Using Models

6. Constructing Explanations and Defining Solutions

### ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

### Pre-Teach

Introduce movement safety, shape, self and general space. Do the STEAM BrainDance. Explore science, technology, or engineering topics to be used in the Sequence Dances.

### Lesson Steps Outline

**1.** Introduce the concept of Sequence.

**2.** Prepare students for dancing by creating agreements for appropriate dance behavior. Chart student responses.

**3.** Lead students in *STEAM BrainDance* warm-up.

 Criteria-based process assessment: Performs the BrainDance while infusing STEM.

**4.** Lead review of the dance concepts of self and general space and shape.

 Criteria-based process assessment: Moves in self and general space and freezes in a shape.

**5.** Introduce and guide exploration of the dance concept of repetition (a principle of choreography). Display dance word sign: repetition. Play a drum and/or other instrument for accompaniment. Analyze video of dancers using repetition.

 Criteria-based process assessment: Identifies and demonstrates repetition.

**6.** Demonstrate defining a problem and the three to five steps that show the solution to a problem. Create an action with repetition for each step and put them together sequentially in a Sequence Dance.

Music: "The Add-On Machine" from *Music for Creative Dance, Volume I* by Eric Chappelle or other music of your choice with a beat that is easy to hear

**7.** Guide small groups in defining their problems and the three to five steps that show the solution to the problem. Distribute Sequence Choreographer's Worksheets and pencils so students can notate their problems and solutions. Ask them to create an action with repetition for each step and put them together sequentially in a Sequence Dance.

Criteria-based teacher checklist and self-assessment: Selects and notates a question that describes a challenge and lists from three to five steps that solve the problem. Creates movements that sequentially show the three to five steps to solve the challenge, repeats the movements, and performs a beginning and an ending shape.

**8.** Describe and discuss how students can use the 21<sup>st</sup> Century Skill of collaboration when they work with their groups. Guide rehearsal.

Criteria-based teacher checklist and self-assessment: Communicates ideas to others; makes compromises; incorporates input/feedback.

**9.** Guide small group performance and response. Review performer and audience expectations.

Criteria-based teacher checklist, peer assessment: Creates movements that sequentially show the three to five steps to solve the challenge, repeats the movements, and performs a beginning and an ending shape.

**10.** Lead reflection.

Criteria-based reflection: Describes effective collaboration strategies. Makes a connection between dance and science, technology, or engineering.

## LESSON STEPS

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### 1. Introduce the concept of Sequence.

- *Dancing Scientists and Engineers, we are going to dance the concept of Sequence.*
  - *What do you know about Sequence? Turn and talk about your ideas and we will share them.*
  - *Today we will define science, technology, and engineering problems. Then we will create Sequence Dances that show three to five step solutions. Our solution dances will show each step to solve the problem in order from beginning to end.*
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### 2. Prepare students for dancing by creating agreements for appropriate dance behavior. Chart student responses.

- *How can you be creative and safe at the same time?*



Movement Safety

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### ▣ Prepare the classroom for dance.



Moving Desks/Set-up

### 3. Lead students in **STEAM BrainDance warm-up.** (BrainDance originally developed by Anne Green Gilbert, [www.creativedance.org](http://www.creativedance.org), reference: *Brain-Compatible Dance Education*, video: *BrainDance, Variations for Infants through Seniors.*) Music: "STEAM BrainDance" by Debbie Gilbert

- *Let's warm-up your brains and bodies with the BrainDance! Notice when we use science, technology, engineering, arts, and math in the BrainDance.*



STEAM BrainDance

#### **Breath**

- *STEAM Dancers, stand with good body alignment. Let your arms hang loosely at your sides, and relax your shoulders. With soft knees, stand with your knees over your toes. Your back should be tall and straight with a natural curve at the base of your spine.*
- *Inhale, taking oxygen in through your nose and filling your lungs.*
- *Exhale through your mouth.*

#### **Tactile**

- *Energize the surface of your body. Tap from the top of your head all the way to your toes. We'll count by fives to eighty: 5, 10, 15 ... 80.*
- *Brush the surface of your body from your head to your toes.*

#### **Core-Distal**

- *Expand into a huge shape in which your distal edges (fingers and toenails) reach as far from the center of your body as possible.*
- *Shrink into a small shape, pulling everything to your core.*

## Head-Tail

- *Think about your alignment, your body structure. Curl your spine forwards and backwards and from side to side. We'll count by tens: 10, 20, 30 ... 80.*

## Upper Half

- *While the lower half of your body is frozen, dance the water cycle with your upper body: precipitation, collection, evaporation, condensation. Repeat.*

## Lower Half

- *While the upper half of your body is frozen, dance the life cycle of a plant with your lower body: seed, seedling, flower, seeds are released, plant dies. Repeat.*

## Body-Half

- *With one side of your body while the other side is frozen, dance three states of matter: solid, liquid, gas.*
- *With the other side of your body while the first side is frozen, dance three states of matter: solid, liquid, gas.*

## Eye-Tracking:

- *Focus on your right thumb. Draw a 3D shape in the air.*
- *Repeat with your left thumb.*

## Cross-Lateral

- *Reach across your body up high, up high, down low, down low. We'll count to twelve: 1, 2, 3 ... 12. Let's cut that in half: 1, 2, 3 ... 6. Let's cut that in half again: 1, 2, 3.*

## Vestibular

- *Turn, then freeze, in a rainy weather shape. Turn, then freeze, in a snowy weather shape. Turn, then freeze, in a windy weather shape. Turn, then freeze, in a hot weather shape.*

## Breath:

- *STEAM Dancers, stand with good body alignment.*
- *Breath quietly and calmly, inhaling and exhaling.*

**Criteria-based process assessment:** Performs the BrainDance while infusing STEM.

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## 4. Lead review of the dance concepts of **self space** and **general space** and **shape**.

- *Before we begin to create our dances, let's review dance concepts that we will use in our dances.*
- *When you dance and **stay in one spot**, dancers call that self-space. When you move in self-space you are using **non-locomotor** movements.*
- *When you dance and travel through the empty space in the room, dancers call that general space. When you move in general space, you are using **locomotor** movements.*
- *Notice when I freeze in a shape, I am using my whole body — my arms, legs, head, and spine. My whole body is frozen. Nothing is moving, except I can breathe and blink.*



Prompting for Creativity

- *I'll play the drum and call out either self or general space for you to move in. When the drum stops, freeze in a shape.*

Criteria-based process assessment: Moves in self and general space and freezes in a shape.

**5. Introduce and guide exploration of the dance concept of repetition (a principle of choreography). Display dance word sign: repetition. Play a drum and/or other instrument for accompaniment. Analyze video of dancers using repetition.**

- *What is repetition? How do the dancers use repetition?*
- *Try a movement like a stretch. Now repeat it four times.*
- *What's another movement? How many times should we repeat it?*
- *We'll use repetition in the Sequence Dances we will create. First, let's look at a video of a dancer using repetition.*

Yo Yo Ma And Lil' Buck Do 'The Swan' in Beijing

[https://www.youtube.com/watch?v=qfEYjKWJ56E&list=PL3\\_GCuO-5Kgop5K9mf\\_Z7Sq9M32leJp5e&index=4](https://www.youtube.com/watch?v=qfEYjKWJ56E&list=PL3_GCuO-5Kgop5K9mf_Z7Sq9M32leJp5e&index=4)

▣ You could also choose to find your own videos that represent a variety of styles and cultures. Look for video that shows repetition.

- *After we have watched the video, let's take a few moments to discuss the repetition that we saw in the dance.*

▣ After viewing the video, if your students have difficulty remembering the repetition they saw, you could choose to have them call out "repetition" whenever they see it as the video is being played.

Criteria-based process assessment: Identifies and demonstrates repetition.

**6. Demonstrate defining a problem and the three to five steps that show the solution to the problem. Create an action with repetition for each step and put them together sequentially in a Sequence Dance.**

Music: "The Add-On Machine" from *Music for Creative Dance, Volume I* by Eric Chappelle or other music of your choice with a beat that is easy to hear

▣ Choose two or three students as your volunteer assistants to demonstrate this process.



Sequence Dance

- *We are going to demonstrate the creation of a Sequence Dance.*

▣ As an example for this demonstration, *How do I build a vessel for drinking?* will be used, however, feel free to choose your own problem. Other examples could be: *How do I create a closed electrical circuit? How does a magnet work? How do I create a shelter? How do I build a boat? How do I build a spacecraft? How do I make a batch of cookies?* — and more. When you choose your problem, base it on something you are studying or have studied in science, technology, or engineering.

- *First, we will choose a problem. For our demonstration, we'll choose "How do I build a vessel for drinking?" Another way to say the might be, "How do I make a glass?" Notice it is in the form of a question.*
- *Second, we will break down the solution or process into three to five steps.*

▣ Create the steps with your volunteers. They might look something like this:

1. Heat the glass.
2. Blow the glass.
3. Shape the glass into a drinking glass.
4. Let it cool.
5. Drink from your glass.

- *Third, we'll choose one movement to show each step. We can use what we have already learned about dance to give us ideas. You can use self-space and general space. You will use repetition, so we'll do each movement several times.*
  - *We'll make the movements simple so that everyone can do them.*
  - *We'll decide how many times we want to repeat each movement and start and end the dance in a shape. We'll hold our shapes for about three seconds at the beginning and three seconds at the end.*
  - *Then, we'll practice together.*
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**7. Guide small groups in defining their problems and the three to five steps that show the solution to the problem. Distribute Sequence Choreographer's Worksheets and pencils so students can notate their problems and solutions. Ask them to create an action with repetition for each step and put them together sequentially in a Sequence Dance.**

▣ For K-1 students: you can work as a whole group. You can notate the problem and solution on a chart or whiteboard. For older students: divide students into small groups of three to five students.

▣ You can choose the groups in advance to keep the momentum of the class going. You can also list their names on the checklist in the order of their groups to make assessing during the performance easier.

▣ When assessing the criteria, because any students who are not meeting criteria will be very clear to you, you may want to use a reverse checklist, putting a "0" where students have not met criteria, rather than trying to notate every single one who has met criteria. You can go back later and give those who have met criteria a "1." This information will let you know what and who needs more practice, so you can return to it in the future. You can choose to use the checklist during rehearsal or wait until the performance.

- *You will be working in small groups so you will be using the 21<sup>st</sup> Century Skill of collaboration. That means that you will need to work effectively and responsibly in your small group.*
- *How can you show collaboration? (For example: Be flexible and willing to compromise. Give everyone a chance to talk. Share the responsibility. Value individual contributions. Work towards a common goal.)*
- *I will divide you into small groups and give everyone a Sequence Choreographer's Worksheet since you all will be choreographers or inventors of dances.*
- *First, choose your science, technology, or engineering problem as a group and write it on your worksheets. Make it in the form of a question.*

▣ You may choose to ask students to choose problems inspired by the kits they are currently studying in science.

- *Second, break your solution into three to five steps as a group and write the steps on your worksheets.*
- *Third, create your dance. For each step, pick one movement and decide how many times you will repeat it. You can use self and/or general space for your movements.*
- *Next, put each step together in a sequence that solves your problem. Add shapes, held for about three seconds, at the beginning and end of the dance. Practice the whole dance.*
- *As you work, ask yourself, are you showing the steps that solve your problem? Are you using repetition? Are you making and holding shapes at the beginning and end.*

☑ Criteria-based teacher checklist and self-assessment: Selects and notates a question that describes a challenge and lists from three to five steps that solve it. Creates movements that sequentially show the three to five steps to solve the challenge, repeats the movements, and performs a beginning and an ending shape.

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## **8. Describe and discuss how students can use the 21<sup>st</sup> Century Skill of collaboration when they work with their groups. Guide rehearsal.**

- *As you are working as a group, you are using a 21<sup>st</sup> Century Skill — collaboration!*
- *What does an effective collaboration look like?*

▣ Elicit responses from students.

- *Let's incorporate some of the strategies you have suggested as you rehearse and refine your dances. Notice how you are communicating, compromising, and incorporating feedback when you are collaborating.*

☑ Criteria-based teacher checklist and self-assessment: Communicates ideas to others; makes compromises; incorporates input/feedback.

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## **9. Guide small group performance and response. Review performer and audience expectations.**

- *Let's share our Sequence Dances.*
- *What do the performers want from their audience? What does the audience want from the performers?*
- *Each group will perform its dance. Audience, I'll ask you to describe the movement repetition that you observed. When you describe a movement, be so specific that someone who didn't see the dancer do the movement would know just how to do it.*
- *Performers, tell us the problem (in the form of a question) you are trying to solve in your Sequence Dance. Audience, identify and describe the steps the group demonstrated to solve its problem.*



Audience and Performer  
Expectations

Criteria-based teacher checklist, peer assessment: Creates movements that sequentially show the three to five steps to solve the challenge, repeats the movements, and performs a beginning and an ending shape.

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## **10. Lead reflection.**

- *What strategies did you use to collaborate with your group?*
- *Dancing Scientists and Engineers, what did you discover by being choreographers who created dances that showed solutions to science, technology, or engineering problems? Turn and talk with someone close to you and then we'll share our discoveries.*

Criteria-based reflection: Describes effective collaboration strategies. Makes a connection between dance and science, technology, or engineering.

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## Sequence Choreographer's Worksheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

What is your problem? Please write it in the form of a question.

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What is your solution? Please list from three to five steps.

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

**ARTS IMPACT LESSON PLAN Arts Infusion**

*Sequence*

▣ Teachers may choose to use or adapt the following self-assessment tool.

**STUDENT SELF-ASSESSMENT WORKSHEET**

Disciplines	<b>SCIENCE/ TECHNOLOGY/ ENGINEERING</b>	<b>DANCE/ SCIENCE/TECHNOLOGY/ ENGINEERING</b>	<b>DANCE</b>	<b>DANCE</b>	<b>DANCE</b>	Total 5
Concept	<b>Sequence</b>	<b>Sequence</b>	<b>Repetition</b>	<b>Shape</b>	<b>Collaboration</b>	
Criteria	Selects and notates a question that describes a challenge and lists from three to five steps that solve it.	Creates movements that sequentially show the three to five steps to solve the challenge.	Repeats the movements.	Performs a beginning and an ending shape.	Communicates ideas to others; makes compromises; incorporates input/feedback.	
Student Name						

**ARTS IMPACT LESSON PLAN Arts Infusion**

*Sequence*

**CLASS ASSESSMENT WORKSHEET**

Disciplines	<b>SCIENCE/ TECHNOLOGY/ ENGINEERING</b>	<b>DANCE/ SCIENCE/TECHNOLOGY/ ENGINEERING</b>	<b>DANCE</b>	<b>DANCE</b>	<b>DANCE</b>	Total 5
Concept	<b>Sequence</b>	<b>Sequence</b>	<b>Repetition</b>	<b>Shape</b>	<b>Collaboration</b>	
Criteria	Selects and notates a question that describes a challenge and lists from three to five steps that solve it.	Creates movements that sequentially show the three to five steps to solve the challenge.	Repeats the movements.	Performs a beginning and an ending shape.	Communicates ideas to others; makes compromises; incorporates input/feedback.	
Student Name						
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24.						
25.						
26.						
27.						
28.						
29.						
30.						
Total						
Percentage						

*What was effective in the lesson? Why?*

*What do I want to consider for the next time I teach this lesson?*

*What were the strongest connections between dance and science, technology, or engineering?*

Teacher: \_\_\_\_\_ Date: \_\_\_\_\_

DANCE AND SCIENCE, TECHNOLOGY, ENGINEERING LESSON: *Sequence*

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Dear Family:

Today your child participated in an **Arts and Science, Technology, Engineering** lesson. We talked about defining a problem and creating the sequential steps that show the solution.

- We reviewed the dance concepts of self and general space and shape.
- We discovered the dance concept of repetition.
- We defined problems in the form of a question.
- We danced the solution to our problems in three to five steps in sequential order.
- We created a movement for each step, repeated the movements, and added beginning and ending shapes.
- We collaborated to create our dance by communicating our ideas to others, making compromises, and incorporating input or feedback.

At home, you could ask your child to show you what repetition looks like. Define a problem together and come up with a sequence of steps to solve the problem. For example, the problem could be, "How do I send an email?" The solution could be: 1) Plan the words to use in the email. 2) Push *send*. 3) Wait for a reply. Then you can dance the solution together.

**Enduring Understanding**

Identifying key sequential steps in the solution to a problem and illustrating them through movement can show a science, technology, and/or engineering process or the development of a tool.