LESSON 1

Watch *Shine*

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

To gain a sense of embodied expression, students will warm up through expressing concepts and ideas through movement. Then, the class will watch the full performance of *Shine* and discuss the performance in small groups.

Concepts

1. Embodied expression is a unique and powerful form of communication (embodying concepts is beneficial to learners)
2. Performance is one form of embodied communication and can be used to consider new ideas and lessons in a way that can be shared.

Outcomes

Upon Completion of this lesson, students will be able to:

1. Identify forms of embodied expression and consider what makes embodied expression unique
2. Discuss *Shine* with peers in terms of the lessons and ideas it offers

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Lesson 1: Watch *Shine*

insidethegreenhouse.org/shine

Outline

I. Set Up (5 min.)

This lesson requires a screen, projector, and internet connection. The video of the full performance of *Shine* can be found at **https://vimeo.com/194833723**. Students will also need pencils and paper for brainstorming activities.

II. Introduction (10 min.)

Behavior Guidelines: Many of the activities in this curriculum involve movement and embodied expression. It's important to create a classroom space in which students feel allowed to represent ideas in with their bodies regardless of how it looks to others. The first few lessons of this curriculum can set the tone for the rest of the lessons. Consequently, it's important to mention before getting started that students should support rather than judge classmates and feel free to move in ways that are appropriate in a classroom and support their unique expression. This may already be established as a classroom rule and can just be extended to these activities. If not, please refer to the **Classroom Management Guidelines for Embodied Lessons** included with this curriculum before beginning lesson two. Ensure that all students are ready to participate and clear on expectations.

Learner Level Assessment: "Running Through Mud"
Activity: Ask the group to move around the room using the entire space. Give instructions to the group that will change the way they are moving every 30 seconds to one minute. Here are a few suggestions:

- Walk around the space quickly
- Walk slowly
- Walk on the heels of your feet
- Hop on one leg
- Walk as if barefoot on sharp rocks
- Move forward as though you are in the chest-deep water
- Walk as if you were moving through knee-deep mud
- Walk as though you are on slippery ice
- Move forward as if it is darkest night and you are moving through a dense forest
- Walk as if you are carefully moving forward through a room full of puppies
- Walk as though there is a deafening alarm going off
- Walk as through there is a strong bitter cold wind and you have no coat
- ???? (feel free to add to this list with your own ideas - adjust if you have students with mobility issues or other concerns)

Ask the students, "Do you think someone watching you do these different walks could guess what you were trying to express (that you were walking through mud, for example)? Can you name what you did with your body that would have helped a person guess?" Choose one specific prompt and ask students to explain in detail what they did that was expressive. (Example: rubbing my arms and pulling my shirt around me and leaning into the pretend wind would have expressed that I was walking through a bitter cold wind with no coat). This question can either be answered and discussed as a class, in small groups, or as a writing prompt.

Assessment (Outcome 1): *After students consider what and how they were communicating, ask them to describe verbally or in writing how communicating through movement is like/not like communicating with other methods. How was expressing an idea through the body different from expressing it in words, drawing, or music? To help answer this question, ask students to close their eyes and imagine what expressing one of the movement prompts through a painting could look like and what it might sound like if it was music. What is gained and what is lost or what are the advantages/disadvantages to different forms of communication?*

III. Watch the full performance of ***Shine*** (25 min.)

Before watching the play, ask students to take notes on any new ideas, questions, or favorite movements lines from the play as they watch it. Ask them to consider and note specific moments in which the physical embodied expression by the performers helped them to understand a concept or idea in a deeper or better way. Watch the performance as a class using the link provided in the introduction. Pause after each song and ask the students to take notes for one minute. Provide two to three minutes at the end of the viewing to let students make final notes.

Fossil fuel flags in performance (Credit: Steve Sutton DUOMO).

Assessment (Outcome 1): *After students have compiled their notes, ask them to write down their favorite embodied expression they noticed in the performance, their least favorite, and one thing that they learned by watching the play that they may not have learned by reading the same information (sometimes referred to as a Rose, Bud, Thorn exercise).*

IV. Concluding Discussion (10 min.)

Students can use their notes from the previous assessment for the following peer-to-peer discussion.

Split students into two groups. Have one group form a circle facing out and the second group form a circle around the first group facing in. Each student should be standing in front of and facing a partner. If there's an odd number, a teacher/classroom aide can join in. Each student will have 30 seconds to share their notes on the performance with their partner, so each pairing should take one minute. The teacher or another adult should keep time and ask the group to rotate to the next partner in the circle after one minute. Try to get through at least five rotations, but feel free to extend the activity if you time allows.

It's not necessary for students to stay within the bounds of their answers to the question as long as they are discussing the performance. Optimally, the teacher will have the opportunity to listen to the conversation of multiple students in order to see what the students thought of *Shine*. Doing so will help teachers modify future lesson plan to address the specific needs of their students.

Assessment (Outcome 2): Students communicate with peers about what they've learned from *Shine*

Lizard and Trilobite capes drawn by professional artist (Credit: Steve Sutton DUOMO).

V. Follow-Up Activities

Consider the Lorax

As a class, watch the animated film, The Lorax Stop the video after each song and ask students to take notes on their thoughts for one minute. After the film, ask students to make a list comparing the differences between animation and performance. Students can use their notes on *Shine* as a way to compare.

The Lorax full video: **https://www.youtube.com/watch?v=8V06ZOQuo0k**

Assessment (Outcome 1): *Create a class compare/contrast list to consider what is unique about embodied expression and animation.*

Embodied Reaction

Ask each student individually to identify how *Shine* made them feel. Create a list of possible emotions as a class, and discuss what each one means. Try to include at least ten options. Each student should identify one or two emotions that they associate with the performance. Have them write their emotions on a piece of paper.

Create groups of three or four students. Ask each group to compile the list of emotions their members felt, it's okay if they have two that are the same.
Next, ask the group to create one human stature for each emotion listed. Each member must be a part of the statue and the group must be connected in some way. They can make tweaks once everyone in the group has joined in but should come up with a final statue form for each emotion. If two of the same emotions are listed, students should work to come up with two different human statues.

Assessment (Outcome 2): *Each group chooses one human statue to share with the class and the class tries to guess the emotion portraited.*

VI. Additional Resources

Sources

Information on the impact of embodied learning:

Abrahamson, D. "Embodied Spatial Articulation: A Gesture Perspective on Student Negotiation between Kinesthetic Schemas and Epistemic Forms in Learning Mathematics." Proceedings of the 26th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, vol. 2, Preney, 2004, pp. 791–97.

Script of *Shine*: **http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf**

Music of *Shine*: **http://www.insidethegreenhouse.org/shine/shine_music.html**

Choreography of *Shine*: **http://www.insidethegreenhouse.org/shine/shine_choreography.html**

Osnes, B. (2017). Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Cham, Switzerland: Palgrave Macmillan.

Rohd, M. (1998). Theatre for Community Conflict and Dialogue: The Hope is Vital Training Manual. Portsmouth, NH: Heinemann.

Huge cloth being pulled over the ancient plants and animals after their death (Credit: Steve Sutton DUOMO).

Vocabulary

Embodied Expression: Using the physical body to communicate an idea or emotion

Performance: The intentional presentation of a form of entertainment or communication to an audience

Communication: The movement of ideas and/or emotion from one person to another

VII. Standards Addressed

Next Generation Science Standards Addressed

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

JeffCo Generations Skills

Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Perform

- Select, analyze, and interpret artistic work for presentation
- Convey meaning through the presentation of artistic work

Critically Respond

- Perceive and analyze artistic work
- Interpret intent and meaning in artistic work

LESSON 2

Now and Then

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

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Shine, The Musical
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Inside the Greenhouse

University of Colorado Boulder

Description

Create a Colorado timeline as a class that covers events from the Carboniferous Period to modern timestretches from the Cambrian Period to modern time. This timeline will serve as a learning tool throughout the course of the curriculum to help students connect our carbon past, carbon present, and carbon future.

Concepts

1. We can define historical periods through the plants and animals that lived during that time
2. Timelines are graphic representations of linear time

Outcomes

Upon Completion of this lesson, students will be able to:

1. Identify plants and animals from specific geologic time periods
2. Create a timeline to represent specific time periods in relation to each other

Lesson 2: Now and Then

insidethegreenhouse.org/shine

Huge cloth being pulled over the ancient plants and animals after their death (Credit: Steve Sutton DUOMO).

Connections to the Fossils in the Classroom materials will be noted in the side bars of lessons 2-4

Outline

I. Set Up (10-20 min.)

This lesson requires a screen, projector, and internet connection to display examples of plants and animals from various geologic periods. Students will also need supplies to draw, notecards, and paperclips. Teachers will need a measuring tape, a roll of string or yarn, masking tape.

WATCH:

"Geologic Time featuring Fossils from the University of Colorado Museum of Natural History"

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources

To create the timeline itself, measure and cut a piece of string or yarn that stretches 542 inches, one inch for each million years from the beginning of the Cambrian Period. Hang this string around the walls of your classroom at a height students can reach using the most appropriate tools for your walls, most commonly tape or thumbtacks. Mark each geologic period using a masking tape label on the string at the appropriate number of inches. These tape labels can serve the dual purpose of holding the string to the wall if you choose. Use the geologic timeline featured here: **https://www.colorado.edu/cumuseum/sites/default/files/attached-files/geoscale_complete.pdf**. Remember to measure one inch for every million years. Setting up the timeline can be done with students to prepare for the lesson or can be done by the teacher before the lesson begins.

Lessons 2-4 offer connections to the University of Colorado Natural History Museum Fossils in the Classroom kit. The kits are available for free to Colorado schools and provide hands-on supplemental activities to help students consider geologic time.

To get a University of Colorado Museum of Natural History Fossils in the Classroom kit, that includes 18 specimens, 5 lesson plans and support materials for your classroom or school, please contact Jim Hakala, Senior Educator, University of Colorado Museum of Natural History at 303-492-4458, or **james.hakala@colorado.edu**.

II. Introduction (15-20 min.)

Behavior Guidelines: Many of the activities in this curriculum involve movement and embodied expression. It's important to create a classroom space in which students feel allowed to represent ideas in with their bodies regardless of how it looks to others. Please refer to the **Classroom Management Guidelines for Embodied Lessons** included with this curriculum before beginning lesson two. Ensure that all students are ready to participate and clear on expectations.

Learner Level Assessment: Geologic time in action

While reading through the actions for each animal below, project the pictures of the creatures which can be found here: **https://www.colorado.edu/cumuseum/materials-and-resources/fossils-classroom-specimen-photos**. Ask students to act out the actions as you read them. Pause and give students a moment to experience the actions of each plant and animal and see what

others are doing. Note that this timeline-in-action covers eight of the sixteen organisms listed on the website. Feel free to add in others if time allows.

We begin our journey through time as a brachiopod 542 million years ago in the Cambrian Period. brachiopods are like clams. Action: They pull water into their shells, filter out the food in the water, and send the water back out. Brachiopods have lived on earth from the Cambrian Period until today!

We are still in the Cambrian Period, about 520 million years ago. There are trilobites throughout the world's oceans. Action: Some of them scuttle across the sea floor looking for things to eat, others swim in the water. All have many legs that they use to scurry and paddle. They were one of the most numerous animals on earth from 521- 252 million years ago.

About 420 million years ago, the first sharks began swimming through the sea. Action: They swished their tails and fins back and forth to swim and look for food. With mouths full of teeth, they were both hunters and scavengers. Ancient sharks looked very similar to species you'd still find in today's oceans.

Action: The first trees began to push their roots into the earth and stretch their limbs toward the sun about 385 million years ago! Around 300 million years ago, the first conifers began to grow.

Action: Not too long after trees, about 375 million years ago, ferns began to unfurl their fronds. Instead of budding from branches, fern leaves uncurl from tight bundles into large fans. Some early ferns were as big as trees, though most you can find today are much smaller.

The first synapsids emerged 323 million years ago. These animals were like a combination of mammals and reptiles. Action: Some were as small as rats and ran through the ancient forests. Some were as large as elephants and tromped across the land. These animals live on earth until 100 million years ago.

Theropods are ancient dinosaurs and first appeared about 231 million years ago. They are the ancestors of birds and include many different species. Action: Some theropods were herbivores and ate plants while others were hunters who at meat. They died out about 65 million years ago along with the rest of the dinosaurs.

Action: The first horses galloped across the earth over 50 million years ago! Early horses were much smaller than horses today and stood at about 18 inches tall.

Complete the Fossil Kit Laboratory Investigation 2 worksheet

"Using Fossils to Date Rocks"

www.colorado.edu/cumuseum/sites/default/files/attached-files/fossilkitlaboratoryinvestigation2.pdf

Action: The earliest human ancestors began to walk the earth about 3.5 million years ago.

III. Creating the timeline (30-40 min.)

Next, the class will add plants and animals to the timeline created in the setup of this lesson. Using the CU Natural History Museum website (**https://www.colorado.edu/cumuseum/materials-and-resources/fossils-classroom-specimen-photos**), assign students one of the 16 plants and animals listed. It's okay if more than one student works on each as long as all 16 are assigned. Ask students to draw their assigned organism or object based on the information provided on the website and/or further information they find on their own. Use note cards for the drawings and ask students to add a few sentences about their drawing on the back of the notecard including when it existed. If time allows, students can work on more than one plant or animal.

Assessment (Outcomes 1 and 2): After notecards are complete, ask students to pair up with someone who drew something different than they did and share their work. After sharing, ask students to use a paperclip to add their notecard to the timeline in the appropriate geologic period. If multiple students drew the same organism and it exists in multiple periods, feel free to spread out the notecards.

Use the Fossil Specimen Identification Cards and Annotated Object Lists to identify the age of different fossils in the Kit

www.colorado.edu/cumuseum/materials-and-resources/fossils-classroom-specimen-photos

This is a fossil leaf from the Age of Eocene. Credit: CU Museum of Natural History, https://www.colorado.edu/cumuseum/materials-and-resources/fossils-classroom-specimen-photos.

Place, from oldest to youngest, the fossils from the Kit on the class timeline

IV. Follow-Up Activities

a. Expend the timeline

Research geologic periods from the past and include additional plants and animals from the past 500 million years.

Assessment (Outcomes 1 and 2): *Repeat the assessment for the Creating the Timeline section.*

b. Make some noise/grow up

Ask each student to consider the sound the animal they added to the timeline would make. Lineup in timeline order and have each student make their animal sound in succession to create an audible timeline. Students can also chose plants and use their body to demonstrate how their plant grows, how it moves in the wind (or water if an ocean plant).

Assessment (Outcomes 1 and 2): *Ask students to write or discuss the benefits and drawbacks of language-based timelines, picture-based timelines, embodied timelines, and audible/movement timelines.*

V. Additional Resources

a. Resources:

National Geographic carboniferous description
https://www.nationalgeographic.com/science/prehistoric-world/carboniferous

Colorado Geological Survey Timeline
http://coloradogeologicalsurvey.org/colorado-geology/timescale

Denver Museum of Nature and Science Ancient Denvers Exhibit
http://www.dmns.org/main/minisites/ancientDenvers/landscapes.html

Tree of Life Project Synapsida information
http://tolweb.org/Synapsida

Sam Noble Museum, Gigantopterid fossil gallery
https://samnoblemuseum.ou.edu/common-fossils-of-oklahoma/gallery/permian-fossil-gallery/permian-gigantopterids-gallery

University of Colorado, Boulder- Interactive Geology Exhibit
http://igp.colorado.edu

University of Colorado, Boulder-Interactive Geology, A Brief History of Colorado Through Time
http://igp.colorado.edu/library/video/143654356

Paleontology Portal
http://paleoportal.org/index.php#

b. Vocabulary

Tableau: A representative depiction of something, most often motionless and silent, arranged in an interesting way

Timeline: A linear representation of time with a beginning and end

Geologic Period: A sub-division of geologic time that is unique due to the plants, animals, and climate that defined the period. Discernable by unique geologic layers

Ancient Plant: An ancestor to modern plants on earth, can either be extinct or still in existence.

Ancient Animal: An ancestor to modern animals on earth, can either be extinct or still in existence.

Embodied Representation: Using the body to represent ideas and scenes.

VI. Standards Addressed

a. Next Generation Science Standards Addressed

4-LS1-1 From Molecules to Organisms: Structures and Processes
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS1-1 Earth's Place in the Universe
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

5-PS3-1 Energy
Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Using the "Places to See Fossils in Colorado" map poster place the fossils from the Kit in a location on the map where they might be found, based on their age

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources/places-see-fossils-colorado

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

b. JeffCo Generations Skills
Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

Explore the CU Museum of Natural History's virtual Paleontology Hall

www.colorado.edu/cumuseum/3d-virtual-paleo-hall

Visit the Fossils in the Classroom web site

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom

for additional resources especially the online section

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources/online-resources-teachers-and

LESSON 3

Find your fate

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Lizard and Trilobite capes drawn by professional artist (Credit: Steve Sutton DUOMO).

Description

Explore the fates of plants and animals throughout time and consider the factors that result in the formation of soil, fossils, and fossil fuels.

Concepts

1. Properties (or "props") and costumes can serve as communication aids in performance and dance
2. The environment that plants and animals live and die in impacts what happens to their bodies after death

Outcomes

Upon Completion of this lesson, students will be able to:

1. Use props and costumes to communicate ideas and roles effectively
2. Describe three possible outcomes for the remains of plants and animals

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Inside the Greenhouse

University of Colorado Boulder

Lesson 3: Find your fate

insidethegreenhouse.org/shine

Connections to the Fossils in the Classroom materials will be noted in the side bars of lessons 2-4

Outline

I. Set Up (20 min.)

Materials Needed

- A hat to pull fates from in the concluding activity
- A reusable water bottle for the intro activity

We'll also be using a set of fate cards that the teacher or an assistant will need to make beforehand. Enough "small cards" should be made so that every student gets one. One "large card" should be made for each fate. Cards will determine whether students become soil, fossils, or fossil fuels after they die.

Small cards: These are small tabs or paper and only need to be big enough the fit one word. Label 1/2 2/3 of the cards "soil," 1/46 "fossil," and 1/46 "fossil fuels." So, for a class of 24 you would have 12 soil cards, 6 fossil cards, and six 6 fossil fuel cards. After cards are created, fold them in half and place them in the sorting hat for the concluding "Find Your Fate" activity.

Large cards: One large card will be given to each group (four total). They provide a description of the circumstances that created the group and should read as follows:

Soil (two soil cards because it's the largest group): Like most plants and animals of the ancient earth and today, when you died fungus, bacteria, and invertebrates (the FBI) ate your body and turned you back into soil so that new plants could grow. You became soil!

Fossils: You either got stuck in a mud pit in a coastal bog, slid down a giant sand dune and were buried, or were sucked into quicksand in a wetland depending on when and where you lived in ancient Colorado. This didn't allow fugus, bacteria, and invertebrates to eat your body, and your living cells were slowly inundated and replaced with minerals from the surrounding mud and rock as water trickled through over the eons. You became a fossil!

Fossil fuels: You fell into one of the ancient seas that bordered or covered Colorado and were swept into a thick layer of dead plankton, sank into a coastal peat bog and were covered by its vinegar-like juices and further layers of moss, or were trapped in one of one of the huge lakes of ancient northwestern Colorado and were covered with plant, fish, and animal debris over the years depending on when and where you lived in ancient Colorado. Over the eons you and the organic matter that surrounded you were encased in layers or rock and exposed to just the right amount of heat and pressure to become oil, coal, or oil shale. You became a fossil fuel!

The Fossils in the Classroom kits are available for free and provide hands-on supplemental activities to help students consider geologic time

II. Introduction (10-15 min.)

Lessons 2-4 offer connections to the University of Colorado Natural History Museum Fossils in the Classroom kit. The kits are available for free to Colorado schools and provide hands-on supplemental activities to help students consider geologic time.

To get a University of Colorado Museum of Natural History Fossils in the Classroom kit, that includes 18 specimens, 5 lesson plans and support materials for your classroom or school, please contact Jim Hakala, Senior Educator, University of Colorado Museum of Natural History at 303-492-4458, or **james.hakala@colorado.edu**.

Behavior Guidelines: This lesson involves embodied learning. Please review the **"Guidelines for Embodied Lessons in the Classroom"** included in this curriculum.

Lesson 3: Find your fate

Learner Level Assessment: "Object in the Middle "
Arrange students so that they are standing in one large circle facing in. Place a common object in the center of a circle (a reusable empty water bottle works great). Walk into the circle, pick up the bottle pretending it is something else (ex. a baseball bat, a telescope, a kitten) and interact with the object in a way the allows the rest of the group to guess what the object is. Continue to interact with the object until someone guesses. Once someone guesses correctly, replace the object in the center of the circle and rejoin the circle. In turn, have each person walk into the center of the circle and interact with the object to convey something new that the object could represent. Continue this until each person has taken a turn. Encourage students to represent a unique thing if they can. If they choose to represent something that has already been done, they must do so in a new way.

Assessment (Outcome 1): *Each student uses the object in the middle as a communication tool and offers guesses on how others are communicating with the object.*

III. Find your fate (30-45 min.)

Let students know that as each geologic era passed, the animals and plants died and were transformed. Based on the plants and animals each student created in lesson two, each student should come to the teacher and pull a "fate" card from the hat starting with the oldest plants and animals and moving to the youngest (small cards from lesson set up). Then they should go to a corner of the room or another area designated for their group. Students (representing their plants and animals) from earlier time periods who have already been transformed are encouraged to cheer on the others who share their fate as they join the group. Once everyone has found out their fate, **split the soil group into two equal soil groups for a total of four roughly equal groups**. Provide each group with the appropriate card that describes what became of them (large cards from lesson set up).

Students may wonder why there is more soil than other categories. This is because being turned into soil is by far the most common fate. Based on their group description, each group should decide on a set of three or four words that describes them. For instance, fossils might choose "strong," "old," "longevity," "steadfast." After choosing words to describe themselves, each group should choose a mascot (a plant or animal that is associated with their fate). For instance, fossils might choose the trilobite because it is a common and very interesting fossil. Oil might choose plankton, etc.

Complete the Fossil Kit Laboratory Investigation 1 worksheet

"How Fossils Form"

www.colorado.edu/cumuseum/sites/default/files/attached-files/fossilkitlaboratoryinvestigation1.pdf

and the Fossil Kit Laboratory Investigation 3 worksheet

"Fossil Trackways"

www.colorado.edu/cumuseum/sites/default/files/attached-files/fossilkitlaboratoryinvestigation3.pdf

Lesson 3: Find your fate

insidethegreenhouse.org/shine

Identify "body" fossils and "trace" fossils included in the Fossils in the Classroom kit

Next, each group should create a human sculpture or a short skit to show what happened to their mascot and how it was affected by its fate. This allows for some drama and is open to interpretation. An example might be the FBI (Fungus, Bacteria, and Invertebrates) eating a T-Rex or a trilobite being slowly compacted into a fossil. Based on their experience with the "Object in the Middle" warm-up encourage students to find and use props creatively in their skits. While this is a fun activity, it's also important to **remind students of embodied learning etiquette**. Groups can choose whether to have all members participate in the sculpture/skit or have a narrator describe what's happening. Give each group roughly ten minutes of practice time and let them know that they will only have one to two minutes per group to present.

Assessment (Outcome 2): *Ask each group to perform their fate to the class. The audience is then invited to ask clarifying questions and provide feedback. If desired, this can be made into a competition with three or four awards such as "most dramatic," most informative," or "best narration," depending on what best suits the class.*

If time allows, learn more about fossils by watching the University of Colorado Natural History Museum's Fossil Clues parts 1 and 2 found here: https://www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources

Triceratops fossil from Paleontology Hall at University of Colorado Natural History Museum.

IV. Follow-Up Activities

a. Learn more about the FBI

As a class, learn The FBI Song by the Banana Slug String Band: **https://bananaslugs.bandcamp.com/track/fbi-fungus-bacteria-and-invertebrates**

Assessment (Outcomes 1 and 2): *Invent a set of actions to do for fungus, bacteria, and invertebrates as you sing the song as a class.*

b. The symbol of your fate

Ask students to gather in their four fate groups and consider what the characteristics best describe their group. Start with the words they choose in the lesson and expand on the ideas. Ask students how these defining characteristics can be turned into a symbol, such as a flag or coat of arms, that represents them.

Assessment (Outcome 2): *Ask each group to design and create their symbol as a group. This will take coordinated team work, and each group member should agree with what's designed and contribute. After symbols have been designed, as each group to present them to the class and explain the choices they made for design and content.*

V. Additional Resources

a. Sources

National Geographic carboniferous description
https://www.nationalgeographic.com/science/prehistoric-world/carboniferous

Colorado Geological Survey Timeline
http://coloradogeologicalsurvey.org/colorado-geology/timescale

Denver Museum of Nature and Science Ancient Denvers Exhibit
http://www.dmns.org/main/minisites/ancientDenvers/landscapes.html

Tree of Life Project Synapsida information
http://tolweb.org/Synapsida

Sam Noble Museum, Gigantopterid fossil gallery
https://samnoblemuseum.ou.edu/common-fossils-of-oklahoma/gallery/permian-fossil-gallery/permian-gigantopterids-gallery

For More Fossil Resources

Explore the CU Museum of Natural History's virtual Paleontology Hall

https://www.colorado.edu/cumuseum/3d-virtual-paleo-hall

University of Colorado, Boulder- Interactive Geology Exhibit
http://igp.colorado.edu

University of Colorado, Boulder-Interactive Geology, A Brief History of Colorado Through Time
http://igp.colorado.edu/library/video/143654356

Paleontology Portal
http://paleoportal.org/index.php#

b. Vocabulary

Property (prop): An object, often used to represent something it is not, for dramatic effect by an actor.

Costume: Any cloth, object, or addition to the body that extends or enhances its expressive ability, its ability to transform or be transformed.

Fate: A destined outcome that is beyond our control

Fossil: The actual remains or the impression left by an organism. Generally made of stone.

Soil: A mixture of organic matter, rock, and minerals found on the upper layer of the earth's crust. Soil is the crust layer in which plants grow.

Fossil Fuel: A carbon-rich substance such as coal, coal shale, or oil that can be burned to release the energy it contains.

Fungus: A large group of eukaryotic organisms that reproduce through spores and feed on organic matter.

Eukaryotic: Refers to cells that contain a defined nucleus.

Bacteria: Microscopic single-celled prokaryotic organism.
Prokaryotic: Refers to cells that do not have defined organelles.

Invertebrate: The largest category of animals on earth, making up over 90% of animal species. They don't have a backbone.

Visit the Fossils in the Classroom web site

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom

for additional resources especially the online section

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources/online-resources-teachers-and

Plankton: Free-floating marine organism that don't have the ability to resist the push and pull of waves and tide. Can be small (copepods, krill) or quite large (jellyfish, Ocean Sunfish).

Eon: A very long amount of time.

Explore the CU Museum of Natural History's virtual Paleontology Hall

www.colorado.edu/cumuseum/3d-virtual-paleo-hall

VI. Standards Addressed

a. Next Generation Science Standards Addressed

4-LS1-1 From Molecules to Organisms: Structures and Processes
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS1-1 Earth's Place in the Universe
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

5-PS3-1 Energy
Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

b. JeffCo Generations Skills

Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Lesson 3: Find your fate

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

Visit the Fossils in the Classroom web site

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom

for additional resources especially the online section

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources/online-resources-teachers-and

LESSON 4
Long Time Coming

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Long Time Comin' Choreography: https://vimeo.com/217015607

Description

Students will rehearse and perform the song "Long Time Coming" from *Shine* as a class and discuss the ideas, concepts and challenges of the performance.

Concepts

1. Photosynthesis enables plants to create their own food and serve as the base of the terrestrial food chain
2. Both leaders and followers are needed for groups to use embodied communication together
3. The sun's energy drives life on earth

Outcomes

Upon Completion of this lesson, students will be able to:

1. Identify autotrophs and heterotrophs in Colorado
2. Use embodied communication as a group including both leaders and followers
3. Use embodied communication to show how the sun's energy drives life on earth

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Lesson 4: Long Time Coming

Connections to the Fossils in the Classroom materials will be noted in the side bars of lessons 2-4

Outline

I. Set Up (20 min.)

For this lesson, we'll be setting up and performing the first few minutes of *Shine*. As a teacher, start by watching the "Inside the studio" video (**https://vimeo.com/216902188**) and the "Long Time Coming" video (**https://vimeo.com/217015607**) in the choreography section of the *Shine* website: **http://www.insidethegreenhouse.org/shine/shine_choreography.html**. The first video should be helpful for considering how to work with students and prepare for the first song of *Shine*. The second video is an example of the choreography you'll be teaching for this song.

Read through pages 2 and 3 three of the script, which will be performed as part of this lesson.

You'll need a screen, projector, and an internet connection for this lesson.

Materials Needed

- Large sheet, preferably brown, to cover students and represent them being buried in the earth

The Fossils in the Classroom kits are available for free and provide hands-on supplemental activities to help students consider geologic time

II. Introduction (10 min.)

Lessons 2-4 offer connections to the University of Colorado Natural History Museum Fossils in the Classroom kit. The kits are available for free to Colorado schools and provide hands-on supplemental activities to help students consider geologic time.

To get a University of Colorado Museum of Natural History Fossils in the Classroom kit, that includes 18 specimens, 5 lesson plans and support materials for your classroom or school, please contact Jim Hakala, Senior Educator, University of Colorado Museum of Natural History at 303-492-4458, or **james.hakala@colorado.edu**.

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment: "Scattergories"
Divide students into groups of two to five. Explain the game: They will be given a category and their goal is to create a list of five items that they don't think any other group will think of in that category. They will only be given points for unique answers. Each round, they will only have two minutes to brainstorm. At the end of the round, have one representative come up and write the group's answers on the board.

Example: (This will also be the category you use for the first round)

Organisms in Colorado that make their own food (Autotrophs):

Group 1:	Group 2:	Group 3:
~~Ponderosa pine~~	~~Maple tree~~	Asparagus
~~Grass~~	Apple tree	~~Ponderosa pine~~
~~Mice~~	Cattails	Lilac
Blue Columbine	Lilly pad	Cherry tree
Algae	~~Grass~~	Blue Spruce
Points: 2	Points: 3	Points: 3

In this round, group three wins because they have the most unique answers. You can keep track of scores through the rounds or start over each round. Some answers may spark some debate though in this round, there's a clear line between autotrophs and heterotrophs. If there is a debatable answer, the teacher should ask the group that provided the answer to specify what they meant and based on their answer decide if they get the point.

In the next round, ask students to brainstorm animals that get their food from outside their bodies (heterotrophs). If time allows and you'd like to play a third round, ask students to form a list of autotrophs that regularly serve as food for heterotrophs.

Assessment (Outcome 1): *Students identify Colorado autotrophs and heterotrophs through playing scattergories*

III. Embodied warm up activities (30 min.)

"1 by 2 by Bradford"

Objective: Fostering concentration and working together

Relevance of Activity to lesson: Helps students begin to think about replacing verbal communication with movement & sounds.

Activity: Have everyone partner up. Start by telling each pair to count to three, but by alternating numbers (person A says 1, person B says 2, A says 3, B says 1, A says 2 and so on). After a minute of that, tell the groups to continue doing this, but replace 3 with a sound (the sound each group creates should remain consistent throughout the activity). Let all the groups practice that for a minute, and then tell them they now need to replace 1 with a movement (the movement each group creates should remain consistent throughout the activity). After a minute or so of practicing that, tell each group that they now have to replace 2 with a movement and sound (that too should remain consistent throughout the activity). Let the pairs continue for another minute, and encourage them to experiment with changing the tempo, volume, and energy levels. You can ask if any groups would like to demonstrate what they came up with for the entire group one at a time.

"Rhythm Repeater"

Objective: Help students to consider leading and following in an activity

Relevance of activity to lesson: This activity will help prepare students to create movements and work together in the next part of the lesson

Complete the Fossil Kit Laboratory Investigation 4 worksheet

"How Fossils Form"

www.colorado.edu/cumuseum/sites/default/files/attached-files/fossilkitlaboratoryinvestigation4.pdf

Lesson 4: Long Time Coming

insidethegreenhouse.org/shine

Activity: Gather students is a large circle and send one student out of the room. This student will come back in once they hear the rhythm has begun and they will try to guess who is leading. Ask a student in the circle to start a rhythm that everyone can follow. They can create this rhythm by clapping, stomping, snapping, etc., but shouldn't use language. Let the rhythm leader know that they should change rhythms every 20 to 30 seconds. When they do, everyone should follow as quickly as possible. When the guessing student comes back in the room, they will have three chances to guess who is leading the rhythm. If they don't guess right, the leader reveals themselves. Pick a new student to go outside and a new rhythm leader and repeat for two to three rounds.

Assessment (Outcome 2): *Students work together as a group including leaders and followers while using embodied communication*

Classroom Activities

Identify the plant fossils and the animal fossils included in the Fossil Kit

www.colorado.edu/cumuseum/materials-and-resources/fossil-specimen-photos

Fossilized wood from the Age range of Triassic to Pleistocene. Credit: University of Colorado Natural History Museum.

IV. Rehearse and choose movements (20 min.)

As a class, watch the first 7 minutes of the "Inside the Studio" feature with composer Tom Wasinger: **https://vimeo.com/217016473**. This should help give students a feel for how the song was composed and which instruments were used.

Choose either the music with vocals or the music without vocals, or start with vocals and move to just music, and practice the first song from *Shine*. Both music options are available here: **http://www.insidethegreenhouse.org/shine/shine_music.html**. To begin, all students should decide on what motions the plants will perform as they go through the act of photosynthesis described in the script below (even if they made animal capes). Then, all students should practice as animals instead of plants and decide on a set of movements together. Sections that necessitate movement choices have been highlighted below. After all movements have been chosen and the song has been practiced, you'll be ready to put on costumes and act out the first two pages of the script:

SOUND CUE: Long Time Comin' (Primordial sounds, then 2 counts of 8 introductory instrumental music for entrance of ancient plants and animals. After the introductory 2 counts of 8, all students enter slowly during the following lyrics. Ancient plants grow, stretch, creep forward, and reach moving around–taking up the space, filling it in with their movement/growth. Ancient animals emerge into the space as well, they are along the sides exploring and moving as their animal would move, looking at the plants hungrily.)

Long time comin', a long time a comin' comin', long time comin' along
Long time comin', a long time a comin' comin', long time comin' along
Long time comin', a long time a comin' comin', long time comin' along
Long time comin', a long time a comin' comin', long time comin' along

(7 counts of 8 rhythmic music continues low underneath to maintain the mood, then a bit more of just primordial sounds, fades out–Directly after the lyrics are done, Sol should enter and speak)

In the following lines from the script, the teacher should perform the part of Sol (the sun):

Sol: The weirdest thing happened about 300 million years ago. I was just

Classroom Activities

Use the Fossil Specimen Identification Cards and Annotated Object Lists to identify the age of the plant fossils and the age of the animal fossils in the kit

www.colorado.edu/cumuseum/materials-and-resources/fossil-specimen-photos

shining down on this planet like I do on all my planets—I have eight—and then these ancient plants and animals start doing this musical number. Yes, a musical number. Weird, right? I think, yeah, I'm down with this. Life is getting more and more animated on this planet. I can adjust.

(Sol watches as the ancient plants continue to grow, stretch, creep forward, and reach moving around.)

Ancient animals continue moving as their animal would move, now circling around the plants looking at them hungrily.) This dance number is kind of interpretive, but it looks like the ancient plants are taking in CO2 from the atmosphere to photosynthesize my energy to store it up as carbon. I think they are dancing the different parts of photosynthesis.

(Ancient plants reach towards the Sun for her energy.) They need my energy from the Sun. (Ancient plants enact taking up water from their roots.) They take up water through their roots. (Ancient plants enact having excited cells.) That excites their cells. (Ancient plants enact breathing.) They breathe in CO2 from the atmosphere. (Ancient plants grow.) They grow. (Ancient animals move in and begin feasting on the ancient plants.) They get eaten by ancient animals; so now the animals have my energy in them too. (All die slowly and dramatically, landing together in a clump so the brown cloth can completely cover everyone.) And then they all die, both the plants and the animals. And this keeps happening over and over again.

Assessment (Outcomes 1-3): *Take a moment and ask everyone to move around the room like the plant or animal they drew in lesson two. Then, sing long-time-coming and read through the script as students act out their cape-specific roles. If time allows, also work as a class to create movements for long-time-coming (you can use those provided in the video, or come up with your own).*

V. Follow-Up Activities

a. Switch roles

Ask students to switch roles from plant to animal.

Assessment (Outcomes 1-3): *Once everyone has switched, go through pages two and three of the scripted again in the new roles. Students are also welcome to come up with new moves for their new roles.*

Explore the CU Museum of Natural History's virtual Paleontology Hall

www.colorado.edu/cumuseum/3d-virtual-paleo-hall

Visit the Fossils in the Classroom web site

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom

b. Spruce it up!

Now that you've had some practice in both plant and animal roles, ask students to create an embodied expression for the lifecycle of Colorado's state tree, the blue spruce. This may require a little research and could include many stages, but the basic stages should be:
Assessment (Outcome 2): *Ask each group to design and create their symbol as a group. This will take coordinated team work, and each group member should agree with what's designed and contribute. After symbols have been designed, as each group to present them to the class and explain the choices they made for design and content.*

1. Seed is pollinated and escapes the cone
2. The seed germinates and begins to grow
3. Baby tree
4. Young tree
5. Adult tree (what all will these trees have to go through? Fire, weather, drought, etc.?)
6. Dying, and becoming a home to animals
7. Rotting and becoming soil

Assessment (Outcomes 1-3): *Ask each student choreograph movements for each stage of the trees life and act them out as you narrate.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

b. Vocabulary

Autotroph: An organism that can make its own food

Heterotroph: An organism that must find food from other sources besides itself

Photosynthesis: The process through which a plant combines carbon

dioxide and water to create sugar using the energy of the sun

Choreography: The use of physical movements with the body in set sequence that intentionally communicates an idea, emotion, or concept

Dramatic action: the conflict, tension, uncertainty in a scene that moves the action of a story forward—the physical action being taken on stage, but also the motivations for those actions over the course of a story

VII. Standards Addressed

a. Next Generation Science Standards Addressed

4-PS3-2 Energy
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-LS1-1 From Molecules to Organisms: Structures and Processes
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS1-1 Earth's Place in the Universe
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

5-PS3-1 Energy
Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

b. JeffCo Generations Skills

Self-Direction & Personal Responsibility: Students take initiative, are

For additional resources especially the online section

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom/materials-and-resources/online-resources-teachers-and

inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

Visit the Fossils in the Classroom web site

www.colorado.edu/cumuseum/programs/schools-and-groups/fossils-classroom

LESSON 5

Harvest/Foss

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

After considering fossil fuel vs. non-fossil fuel energy, students will rehearse and perform the Harvest/Foss song from *Shine* as a class.

Concepts

1. In the course of their evolution, humans began to explore using varied forms of energy to meet their needs and fulfil their desires
2. Both leaders and followers are needed for groups to use embodied communication together

Outcomes

Upon Completion of this lesson, students will be able to:

1. Identify and discuss the impact of different forms of energy
2. Use embodied communication as a group including both leaders and followers

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Outline

I. Set Up (20 min.)

For this lesson, we'll be setting up and performing the second song of *Shine*, "Harvest". The choreography for "Harvest" on the *Shine* website is rather advanced: **http://www.insidethegreenhouse.org/shine/shine_choreography.html**. On this video at the 6:47 mark, a much simpler chorography is demonstrated. Both provide examples of the choreography you could be teaching for this song, though you and the students are encouraged to design your own movements: **https://www.youtube.com/watch?v=gsnbX8gLfq0**.

Read through pages 4 through 11 of the script, which will be performed as part of this lesson. You'll need a screen, projector, and an internet connection for this lesson.

II. Introduction (15 min.)

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment: "Scattergories"
Divide students into groups of two to five. Explain the game: They will be given a category and their goal is to create a list of five items that they don't think any other group will think of in that category. They will only be given points for unique answers. Each round, they will only have two minutes to brainstorm. At the end of the round, have one representative come up and write the group's answers on the board.

Example: (This will also be the category you use for the first round, so don't show this example to students)

Energy sources used to create electricity

Group 1:	Group 2:	Group 3:
~~Coal~~	Oil	~~Gasoline~~
~~Water~~	~~Gasoline~~	~~Water~~
Nuclear power	~~Coal~~	Geothermal
Methane	Bicycle powered generator	Wood (generator)
~~Solar~~	Wind	~~Solar~~
Points: 2	Points: 3	Points: 2

In this round, group two wins because they have the most unique answers. You can keep track of scores through the rounds or start over each round. Some answers may spark some debate. If there is a debatable answer, the teacher should ask the group that provided the answer to specify what they meant and based on their answer decide if they get the point.

In the next round, ask students to brainstorm transportation options that involve releasing carbon dioxide found in fossil fuels. In the third round, ask students to brainstorm transportation options that don't involve fossil fuels.

Assessment (Outcome 1): *): After three rounds are complete, ask students, either in small groups or as a class, to discuss the pros and cons of using fossil fuels for electricity and transportation. Examples might include: "Fossil fuels help us get things done faster/there are limited amounts of fossil fuel because they take so long to form." And "Fossil fuels make travel across the country easy and affordable/Fossil fuels release stored carbon into the atmosphere." Discuss the difference between carbon that is in a natural earth cycle and carbon that has been released due to human intervention.*

III. Embodied Warm-Up Activities (20 min.)

Note that the warm up activities listed here are the same as lesson four. The purpose for repetition is to help students deepen their experience and get to know these activities better. Ask students to find different partners for 1 by 2 by Bradford and have different students lead Rhythm Repeater.

"1 by 2 by Bradford"

Objective: Fostering concentration and working together

Relevance of Activity to lesson: Helps students begin to think about replacing verbal communication with movement & sounds.

Activity: Have everyone partner up. Start by telling each pair to count to three, but by alternating numbers (person A says 1, person B says 2, A says 3, B says 1, A says 2 and so on). After a minute of that, tell the

groups to continue doing this, but replace 3 with a sound (the sound each group creates should remain consistent throughout the activity). Let all the groups practice that for a minute, and then tell them they now need to replace 1 with a movement (the movement each group creates should remain consistent throughout the activity). After a minute or so of practicing that, tell each group that they now have to replace 2 with a movement and sound (that too should remain consistent throughout the activity). Let the pairs continue for another minute, and encourage them to experiment with changing the tempo, volume, and energy levels. Can ask if any groups would like to demonstrate what they came up with for the entire group one at a time.

"Rhythm Repeater"

Objective: Help students to consider leading and following in an activity

Relevance of activity to lesson: This activity will help prepare students to create movements and work together in the next part of the lesson

Activity: Gather students is a large circle and send one student out of the room. This student will come back in once they hear the rhythm has begun and they will try to guess who is leading. Ask a student in the circle to start a rhythm that everyone can follow. They can create this rhythm by clapping, stomping, snapping, etc., but shouldn't use language. Let the rhythm leader know that they should change rhythms every 20 to 30 seconds. When they do, everyone should follow as quickly as possible. When the guessing student comes back in the room, they will have three chances to guess who is leading the rhythm. If they don't guess right, the leader reveals themselves. Pick a new student to go outside and a new rhythm leader and repeat for two to three rounds.

Assessment (Outcome 2): *Students work together as a group including leaders and followers while using embodied communication.*

IV. Rehearse and Perform (20 min.)

Optional (depending on time between lessons and if a recap of the plot of Shine is needed):

Begin by reading through pages 4 to 8.5 of *Shine* to establish the movement of the plot from "Long Time Comin'" to "Harvest." This can be done through choosing character roles to read, rotating through student volunteers, or by the teacher.

As a class, watch the "Inside the Studio" feature with composer Tom Wasinger from minute 7 to minute 11:30: **https://vimeo.com/217016473**. This should help give students a feel for how the song was composed and which instruments were used. If you'd like you can also watch the "Harvest" choreography as a class:

https://vimeo.com/217015452. However, note that the choreography in the video is quite advanced and it may work better for you to come up with your own movements as a class.

For this song, the focus will be on performance and choreography rather than signing (Unless you have extra class time and would like to teach the full song to students! Full lyrics are available in the scrip). Select the "Harvest" song with vocals here: **http://www.insidethegreenhouse.org/shine/shine_music.html**. Divide students into two groups. Perform the song with students divided into two groups, the Harvesters and the Followers of Foss. If time allows, perform the song twice so that each group can perform both roles.

Assessment (Outcomes 1): *Ask students to do a 60 second writing prompt on what created the conflict between the Followers of Foss and the Harvesters to wrap up this lesson. Responses can be shared depending on time.*

V. Follow-Up Activities

a. Dig into the history of agriculture:

Using the New World Encyclopedia (**http://www.newworldencyclopedia.org/entry/Special:Cite?page=History_of_agriculture**) or another appropriate source as a reference, create a class timeline that details the history of agriculture from ancient to modern. This timeline may have overlapping sections to accommodate multiple societies/practices happening together.

Assessment (Outcomes 1): *In their class timeline, students highlight the crops, animals, and tools that were the focus of each group/age. Students should also consider which sources of energy were/are used in the production of crops throughout history.*

b. What seeds does your community sow?

Make a list of all the crops that are grown in your area as a class. Assign students one crop to research either in pairs or individually. Students should highlight where the plant is originally from, how it came to the United States, and how it is currently used.

Assessment (Outcome 2): *Students design one prop to represent their crop and present it to the class.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

History of agriculture, 2019. New World Encyclopedia, 10 Jan 2018, 15:28 UTC. 20 Jan, 17:29, http://www.newworldencyclopedia.org/p/index.php?title=History_of_agriculture&oldid=1008693.

b. Vocabulary

Fossil fuel energy: Energy created by burning fossil fuels such as coal, methane and gasoline.

Non-fossil fuel energy: Energy created by using non-fossil fuel sources such as wind, sun, and water.

Harvest: The process or time of gathering crops

Agriculture: The practice of raising animals and growing plants for human use

VII. Standards Addressed

a. Next Generation Science Standards Addressed

4-PS3-2 Energy
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-LS1-1 From Molecules to Organisms: Structures and Processes
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS1-1 Earth's Place in the Universe
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

5-PS3-1 Energy
Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

b. JeffCo Generations Skills

Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

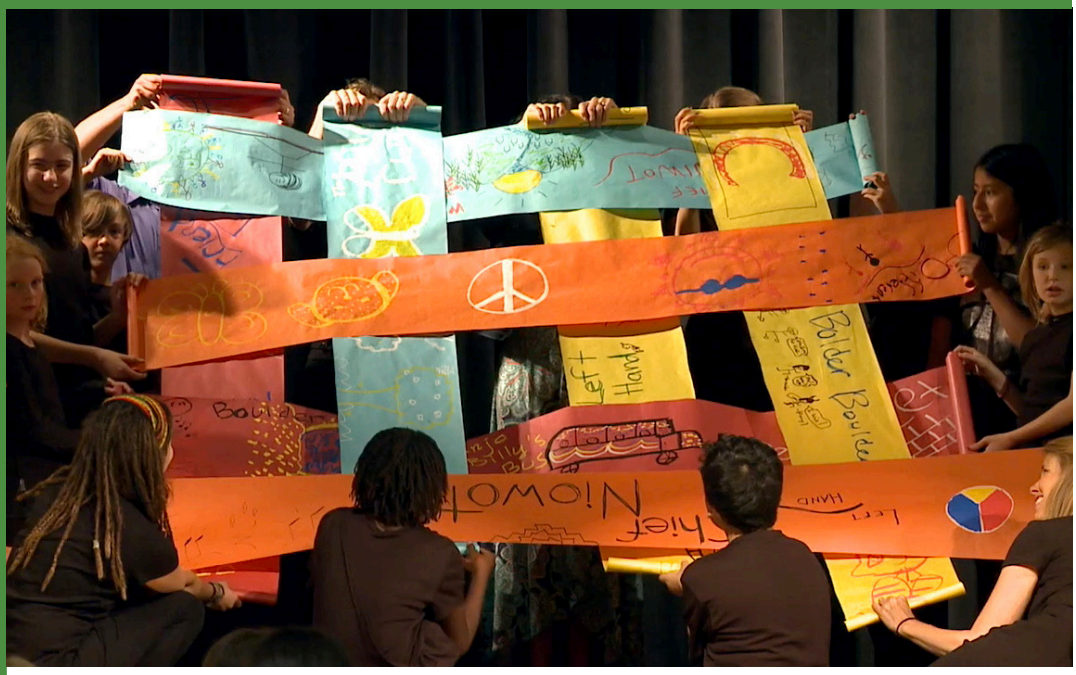
- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 6
Weaving Song

insidethegreenhouse.org/shine



The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

Students will decorate the strips of paper that will be woven into the fabric of community for the Weaving Song. To do so, they will express symbols and ideas about their community through drawing and writing.

Concepts

1. Every city has unique characteristics, features, and resources that distinguish that community and are valued
2. Students can be authors and actors in performance-based communication

Outcomes

Upon Completion of this lesson, students will be able to:

1. Identify and discuss the resources, unique features, and characteristics of their city
2. Through the symbols, ideas, and words they focus on, create a visual representation of community identity

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Outline

I. Set Up (5-10 min.)

The paper strips used for this lesson will need to be prepared and other materials will need to be gathered.

Materials Needed

- Pencil and paper for writing activities
- Set of 8, 20-foot x 1-foot strips of paper in various colors
- Multiple wide-tip colored water-based markers (avoid tempura paint as it will make the paper strips difficult to roll again after being decorated)

II. Introduction (15 min.)

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment:
Ask students to spend a few minutes writing about what is important to them in their community. This can include places that they visit, businesses where they shop, sports teams, works of public art, places of worship, parks, and another other elements that define the place. It can also include places and things that represent challenges to that the community faces (forest fires, homelessness, floods…).

Based on what they're written, ask students to spend a few minutes in a facilitated peer-to-peer discussion. This will take the same format as this activity did in lesson one.

Split students into two groups. Have one group form a circle facing out and the second group form a circle around the first group facing in. Each student should be standing in front of and facing a partner. If there's an odd number, a teacher/classroom aide can join in. Each student will have 30 seconds to share their thoughts about the community with their partner, so each pairing should take one minute. The teacher or another adult should keep time and ask the group to rotate to the next partner in the circle after one minute. Try to get through at least five rotations, but feel free to extend or shorten the activity depending on time.

Optimally, the teacher will have the opportunity to listen to the conversation of multiple students in order to consider categories for the next activity.

Assessment (Outcome 1): *): Students communicate with peers about how they see their community and what they feel is important.*

III. Community Circle (10 min.)

Now that students have had a chance to think about what matters to them in the community, they're ready for an embodied activity based on those ideas. The teacher will act as the first activity leader and should focus on aspects of the community mentioned in the peer-to-peer discussion.

To start, everyone stands in a circle facing outwards. The leader shouts out an aspect of community (ex. Popular sports in this community, recognizable buildings, animals that live naturally in this community, flowers that grow, historic figures, favorite foods…), everyone counts to three, and then claps. On the clap, the players turn into the circle and make frozen images of an example of that using their bodies. After giving everyone a few minutes to look at each other's image, ask for volunteers to talk about what they represent and why they choose that. This helps explore identifying aspects of their community and lets the players express themselves through their bodies.

Assessment (Outcome 1): *Students use embodied communication to highlight aspects of their community.*

IV. Create the Fabric of Community (35 min.)

After the two preceding activities, students should have lots of ideas in mind for decorating the strips of paper that they will weave together in the next lesson to form the fabric of community. These paper strips will serve to create a prop that will help show what defines the community in the eyes of the students.

Students will decorate long pieces of paper with images that represent their city, making up the "fabric of their communities" when woven together. They can draw on the paper images such as monuments, schools, nationalities, religions, sports, bodies of water, businesses, popular pastimes, favorite foods, types

of transportation, flags, etc. In addition to drawings, students are welcome to use words, and symbols. Challenge the students to try and do the drawings big enough to fill the entire strip. To avoid the strips moving while students are working, tape them to the floor about 3 feet from each other. This can present a challenge in a classroom; a hallway may need to be used. Students need to be careful not to step on the strips or rip them so they can be used for weaving. Students don't need to worry about decorating the last one to two feet of each strip on the ends since that is mostly rolled up and doesn't show as much during the weaving exercise in the next lesson.

Assessment (Outcomes 2): *About five minutes before the lesson concludes, have a brief "gallery show" in which students are invited to show each other what they've created and consider each other's work.*

V. Follow-Up Activities

a. Map It!

Split students into groups, one for each strip of the fabric of community, and give each group a large piece of paper with whatever landmark or building is established as the city center drawn in the middle. Ask students to map everything on the strip they are working with as accurately as possible. This may include some tricky choices when it comes to more abstract concepts.

Assessment (Outcomes 1 and 2): *Students present their map to the class, describing the choices that they made.*

b. Place-based stories:

Ask students to interview one member of the community, this could be a relative, business owner, friend, or anyone else who isn't part of the class. Students should ask what the interviewee's favorite memory of the place is, what makes this community different than others, and if there has ever been a challenge that the community faced and overcame that the interviewee can remember.

Assessment (Outcome 1): *Students take notes from their interview and share their findings with the class.*

c. Welcome an ambassador:

Ask students to imagine what they would bring/show to a foreign ambassador that came to town for a visit to explain/show off their community. What places would they show them? What would they have them eat? What piece of clothing would be a good souvenir? What contributions does your town make to the larger area of country? What game would they play with them that is popular in your town? What dance? What music?

Assessment (Outcome 1): *Students take notes from their interview and share their findings with the class.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

b. Vocabulary

Community: A group that shares place, values, or feelings and is connected through a physical or virtual space.

Metaphor: A figure of speech or a symbol that is representative of something else, especially something abstract (like community). Highlighting the similarities between the two and can help us the referenced idea or thing in a new or more nuanced way.

Fabric of community: Characteristics, features, monuments (natural and human made), local aspects of community such as foods, music, clothing, dance, recreation, that come together to provide an integrated community structure.

VII. Standards Addressed

a. Next Generation Science Standards Addressed

4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

5-ESS3-1 Earth and Human Activity
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

b. JeffCo Generations Skills

Civic & Global Engagement: Students take active roles in their communities, are prepared to be participatory citizens in our constitutional republic, and are engaged with issues of local, national, and global concern.

Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the

perspectives of others.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

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Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 7
Weaving Song

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

Students will rehearse and perform the Weaving song from *Shine* as a class and discuss the ideas, concepts, and challenges of the performance.

Concepts

1. Students can be authors and actors in performance-based communication
2. Dramatic metaphor can help us understand the concept of community

Outcomes

Upon Completion of this lesson, students will be able to:

1. Perform the unique expression of their community
2. Through fine art, movement and music, they will represent what binds their community and feel what it means to them

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Lesson 7: Weaving Song

insidethegreenhouse.org/shine

Outline

I. Set Up (15 min.)

For this lesson, we'll be setting up and performing the third song of *Shine*, "Weaving". The choreography for "Weaving" is on the *Shine* website: **http://www.insidethegreenhouse.org/shine/shine_choreography.html**

Read through pages 12 through 15.5 of the script, which will be performed as part of this lesson.

Watch the Human Knot video to better understand the warm up activity: **https://www.youtube.com/watch?v=KahMCA0bR7s**

Materials Needed

- The paper strips created in lesson six, rolled with a rubber band gently holding each
- A screen, projector, and an internet connection for this lesson

II. Introduction (20 min.)

Background: From Chapter 4 of Performance for Resilience: Engaging Youth on Energy and Climate Through Music, Movement, and Theatre:

…Dramatic metaphor has the capacity to tease out a more nuanced understanding of both problems and solutions. A movement, action, property, or piece of dialogue can make a comparison to something dissimilar, in order to enhance its meaning and to reveal what they might have in common. Metaphor extends beyond

one thing merely serving as a symbol for the other. When working with youth, dramatic metaphor can be useful in learning the meaning of complex concepts because it can provide a more visual and active description.

James Geary, author of the book I Is an Other: The Secret Life of Metaphor and How It Shapes the Way We See the World, asserts that metaphor "systematically disorganizes the common sense of things–jumbling together the abstract with the concrete, the physical with the psychological, the like with the unlike–and reorganizes it into uncommon combinations[i]." He goes on to say that metaphor, "shapes our view of the world, and is essential to how we communicate, learn, discover, and invent, yet we typically fail to recognize it" as it "takes place mostly outside our conscious awareness[ii]." This is powerfully relevant in *Shine*, where the use of metaphor seeks to jumble the many factors at play to invigorate youth towards fresh ways of approaching both global and local challenges. Putting metaphor into performance means that a sideways scattering of the hips distributes the harvest seeds. The heartbeat of a drum pumps life into ancient animals. A pole thrust into the earth signals ownership of the black gold beneath its depths. A storm of fossil fuel flags disrupts the natural carbon cycle, its wreckage ripping through the fabric of community. With arms reaching towards the sky, youth stretch for new solutions with outstretched hands. The use of metaphor here reaches into the bones and muscles; it needn't be intellectually understood to be effective, in fact, it's more effective if it is first felt, sung, danced, and experienced. Invention can arise from unlikely configurations and improvised action.

[i] James Geary, I Is an Other: The Secret Life of Metaphor and How It Shapes the Way We See the World (New York: Harpers Perennial, 2012), 3.
[ii] Ibid.

Lesson 7: Weaving Song

insidethegreenhouse.org/shine

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment:
Human knot: We will work through this activity twice, once with basic instructions and a second time with a community metaphor focus.

Round One

1. Divide students into groups of five to six people (four will be a little too easy and seven will be a little too hard for this activity).
2. Ask each group to form a circle facing in.
3. Have each student raise their right hand and grasp someone's hand across from them (if there are an odd number, one person will have to grab with their left hand as well).
4. Next, grasp left hands with a different person.
5. Students have now formed a human knot. They should carefully try to untie themselves without letting go of anyone's hand. They can go under, over, around, and through the arms of classmates, change level, twist, and turn in order to reform a circle in which students can either be facing in or out (careful not to painfully twist each other's arms).

Round Two

1. Divide students into groups of five to six people (four will be a little too easy and seven will be a little too hard for this activity).
2. Ask each group to form a circle facing in.
3. Everyone in the group should think of a problem they see in their community.
4. When they have each thought of something, each student should raise their right hand and say their problem out loud.
5. Each student should then grasp someone's hand across from them (if there are an odd number, one person will have to grab with their left hand as well).
6. Next, grasp left hands with a different person.
7. Students have now formed a human knot that represents the interconnected problems of their community. They should carefully try to untie themselves without letting go of anyone's hand. They can go under, over, around, and through the arms of classmates, change level, twist, and turn in order to reform a circle in which students can either be facing in or out.

Optional variation or round three: Do everything the same as is listed in round two except when students get to step three, they should think of a problem they all see and agree is an issue. For step four, they should state their agreed upon problem as a group. All following steps remain the same. Finish by completing the assessment for this round.

Assessment (Outcome 1 and 2)*: After students have untied their knot and are standing in a circle, ask each person to think of a solution to the problem they had and share their solution with the group. Discuss as a class how a community must find solutions to their problems while maintaining their connection, and through helping each other we can find solutions. Through working together, we can untie our "human knots" while still maintaining the connections that enable us to be a group. Through this exercise, introduce the idea of metaphor. What would it mean for someone to let go during this game? Did the circle look the same before and after we worked through the knots? What does that say about community?*

III. Weaving (15 min.)

As a class, watch the "Inside the Studio" feature with composer Tom Wasinger located in the music section of the *Shine* website from minute 11:30 to minute 17: **https://vimeo.com/217016473**. This should help give students a feel for how the song was composed and which instruments were used. Next, watch this video (link is also in additional resources) that features a Turkish woman weaving: **https://www.youtube.com/watch?v=KpoXTVT5tr4**

Assessment (Outcome 2): *In pairs, small groups, or as a class ask students to describe the sounds which they can identify from each video that are similar and which are different. Have students make a list to compare and contrast. You may need to play the weaving song and the video again. How closely does the music match the sounds of the loom?*

IV. Rehearse and Perform (25 min.)

Optional (depending on time between lessons and if a recap of the plot of *Shine* is needed):

Begin by reading pages 12 to 15 of *Shine* to establish the movement of the plot from "Harvest" to "Weaving." This can be done through choosing character roles to read, rotating through student volunteers, or by the teacher. Next, watch the "Weaving" choreography as a class: **https://vimeo.com/217015849**

For this song, the focus will be on performance and choreography rather than signing (Unless you have extra class time and would like to teach the full song to students! Full lyrics are available in the script). Select the "Weaving" song with vocals here: **http://www.insidethegreenhouse.org/shine/shine_music.html**

In lesson six, students created eight paper strips decorated to represent the fabric of their community. For the weaving, each strip will require two students, one on each end. This will accommodate 16 students. Each student should have an opportunity to perform, so this likely means working through the weaving, as shown in the choreography, twice. Some students may need to perform in both rounds. Ask the students not performing to be an attentive audience and take a moment after the performance to ask the audience their feedback (What went well, what could have been stronger, what did they learn/better understand by watching).

Assessment (Outcomes 1 & 2): *Perform the choreography to the "Weaving" song using the props created in lesson six.*

Assessment (Outcomes 2): *Ask students to consider the metaphor of weaving. How is the action of bringing our paper weaving strips together as a group like forming community? How is it different? How did the activity make them feel? How many people did it take the weave the paper fabric and how many does it take to weave and create the "fabric" of their community? Spend 5-10 using these questions as writing prompts*

V. Follow-Up Activities

a. Weave on!

In this activity, ask each student to create their own individual paper weave. You will need construction paper scissors and glue. Cut slits at regular intervals leaving a one-inch border in the piece of paper that will serve as your background color. Next, weave ½" to 1" strips of a different color through the background. Detailed instructions can be found here: **https://cdn.dick-blick.com/lessonplans/paper-weaving/paper-weaving-paper-weaving.pdf**. Once a student has created their paper weave, ask them to fill in the squares

with symbols of their community. In the center, have them draw what they feel is the center of the community to them. This could be their house, school, the town square, or something else. From there, have them fill in the adjacent squares with elements of the community that are directly connected to it. This could be roads, people, adjacent buildings, etc. Students should continue until all paper weave squares are filled with symbols.

Assessment (Outcomes 2): *In small groups or as a class, have students present their paper weaves and explain the symbols they chose. .*

b. The sound of community

So far, we've been focused on the visuals that create community and weaving them together. For this activity, we will focus on the sounds.

If weather allows, open the windows. Gather students in a circle. Ask everyone to be completely silent and close their eyes. Next, ask students to listen to the sounds that are farthest away. Allow time for everyone to focus. Then ask students to try and listen to the sounds near the school. Then, ask students to listen to the sounds inside the school and classroom. Have each student mentally identify as many sounds as possible during this process, without shouting out or sharing.

Ask each student to choose one sound they heard or to think of another that represents their community (ex. A honking car horn, a dog barking, a train moving). Have them decide how to represent that sound with voice or body. Go around the circle and ask each student to make their sound (Don't identify what it is yet so that students have the freedom to make different sounds to represent the same thing). Next, have one student step into the circle and begin making their sound. They should keep making it as other students step in and each add their sound until all students are making their sounds together. This process can happen randomly with volunteers stepping in or by going around the circle. Option: Have students consider the relative volume of the sound they chose and adjust the volume in relation to the other sounds being make.

Assessment (Outcome 2): *Students work together to create the soundscape of their city. After the soundscape is complete, ask each student to identify the sound they chose and why.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

Dick Blick Art Materials' Paper weaving lesson: https://cdn.dick-blick.com/lessonplans/paper-weaving/paper-weaving-paper-weaving.pdf

Osnes, B. (2017). Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Cham, Switzerland: Palgrave Macmillan.

Turkish woman weaving via YouTube: https://www.youtube.com/watch?v=KpoXTVT5tr4

b. Vocabulary

Weaving: Bringing multiple strands together to form an integrated whole.

Community: A group that shares place, values, or feelings and is connected through a physical or virtual space.

Metaphor: A figure of speech or a symbol that is representative of something else, especially something abstract (like community). Highlighting the similarities between the two and can help us the referenced idea or thing in a new or more nuanced way.

Dramatic Metaphor: A movement, action, property, or piece of dialogue can make a comparison to something dissimilar, in order to enhance its meaning and to reveal what they might have in common through performance.

Fabric of community: Characteristics, features, monuments (natural and human made), local aspects of community such as foods, music, clothing, dance, recreation, that come together to provide an integrated community structure.

VII. Standards Addressed

a. Next Generation Science Standards Addressed

5-ESS3-1 Earth and Human Activity
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

b. JeffCo Generations Skills

Civic & Global Engagement: Students take active roles in their communities, are prepared to be participatory citizens in our constitutional republic, and are engaged with issues of local, national, and global concern.

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Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Design a scene through an inventive process, and perform the scene

Perform

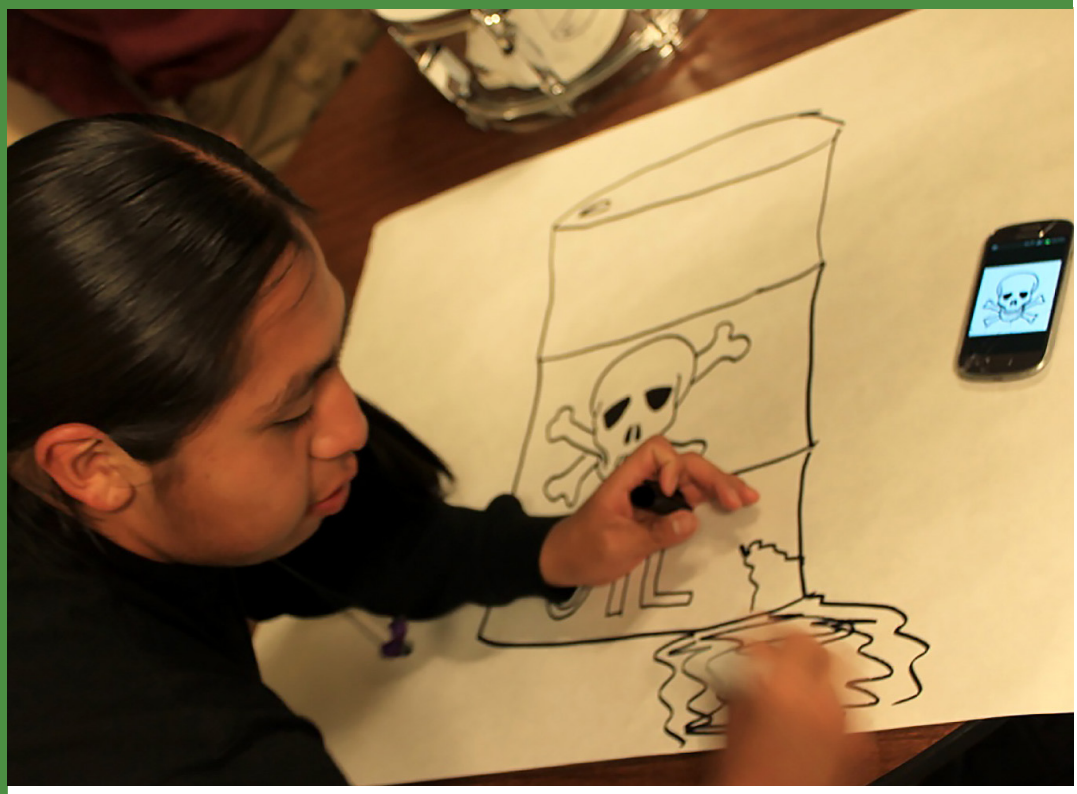
- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 8
Fossil Fuel Flags

insidethegreenhouse.org/shine



The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

Students consider energy choices made historically and in their own community and create fossil fuel flags as representations of those choices that will be used as props in lesson 9.

Concepts

1. The transition to fossil fuels changed the way we used energy and our impact on climate
2. Properties (or "props") can serve as communication aids in performance and dance

Outcomes

Upon Completion of this lesson, students will be able to:

1. Describe the benefits and drawbacks of using fossil fuels
2. Create props that communicate ideas and roles effectively

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Outline

I. Set Up (15 min.)

In this lesson, we'll be creating the props for the next song, the fossil fuel flags. Gather the materials before the lesson begins.

Materials Needed

- Two 11"X17" pieces of white printer paper per student
- Tape
- Black markers

II. Introduction (20 min.)

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment:
Begin with a warmup activity to help students get into their bodies. For this exercise, ask students to stand and find a little space to themselves (they should be able to stretch out their arms without touching another student). Next, ask them to "wake up" the space around them as if it had been sleeping. This may involve jumping, waving arms, clapping, reaching, making sounds, or any other movements or noise that students feel accomplishes the task. Spend at least a couple minutes with this activity until all students have settled into their movements and sounds.

Be a tool
From within this 'woken' space, students will embody the movements of tools to consider energy use and impact. We'll begin with manual tools (human powered), then power tools (mostly fossil fuel powered).

Ask students to think of a screwdriver, and then make the shape of the tool with their bodies as if their feet were the driver bit. Then, ask then to do the motion of the tool as if they were being turned to tighten a giant screw in the floor beneath their feet. Have students include the sound the screwdriver might make when turning the screw. Next, ask students to think of themselves as an electric drill turning the same screw in the floor and do the associated movement (this will likely involve fast spinning, be careful!). Have students add the sound of the drill to their movement. Follow the same instructions for the following pairs to add both sound and movement to each (spend a few minutes on each tool so that students can feel how much more energy is expended with power tools): Sledge hammer/jackhammer (breaking the floor), hand saw/power saw (using arms as saw blades cutting an invisible board in front of them). Ask the students if they can think of other examples and give instructions to the class on how to perform them.

Assessment (Outcome 1): *Ask students to describe the difference between the two types of tools and develop a compare/contrast table. This can be done in small groups and shared, or as a class depending on time. Which one was faster? Which jobs would be done by each type of tool? Which required more energy? Where would the energy come from to run these tools? Create a list on the board that you can leave for the rest of the lesson. As a class, discuss the energy sources for these tools step by step on the board to establish that power tools generally get their energy from fossil fuels and manual tools are human powered.*

III. Scattergories Fossil Fuel Brainstorm (10 min.)

We'll play two rounds of Scattergories to brainstorm possibilities for illustrating the fossil fuel flags for this lesson. So, please keep the list created in both rounds on the board for students to refer to when illustrating their flags along with the compare/contrast list created in the last activity.

Divide students into groups of two to five. Explain the game: They will be given a category and their goal is to create a list of five items that they don't think any other group will think of in that category. They will only be given points for unique answers. Each round, they will only have two minutes to brainstorm. At the end of the round, have one representative come up and write the group's answers on the board.

Example: (This will also be the category you use for the first round)

Machines that use fossil fuels:

Group 1:	Group 2:	Group 3:
~~Cars~~	Television	~~Cars~~
Washer/Dryer	~~Xbox~~	~~Chainsaw~~
~~Chainsaw~~	Computer	~~Xbox~~
Jackhammer	~~Cars~~	~~Lightbulb~~
~~Lightbulb~~	Buses	Cellphone
Points: 2	Points: 3	Points: 1

In this round, group two wins because they have the most unique answers. You can keep track of scores through the rounds or start over each round. Some answers may spark some debate though in this round, because the electric items could run off fossil fuels or renewables. If there is a debatable answer, the teacher should ask the group that provided the answer to specify what they meant and based on their answer decide if they get the point.

In the next round, ask students to brainstorm items that were made with fossil fuels that you could find in the school. This round has lots of room for interpretation, but nearly all synthetic items were made using fossil fuels. If a student includes an item that doesn't contain fossil fuel but was made using them, it's up to you whether or not to include it. This may bring up interesting discussions!

Assessment (Outcome 1): *Students identify machines and items that use fossil fuels in their communities and schools.*

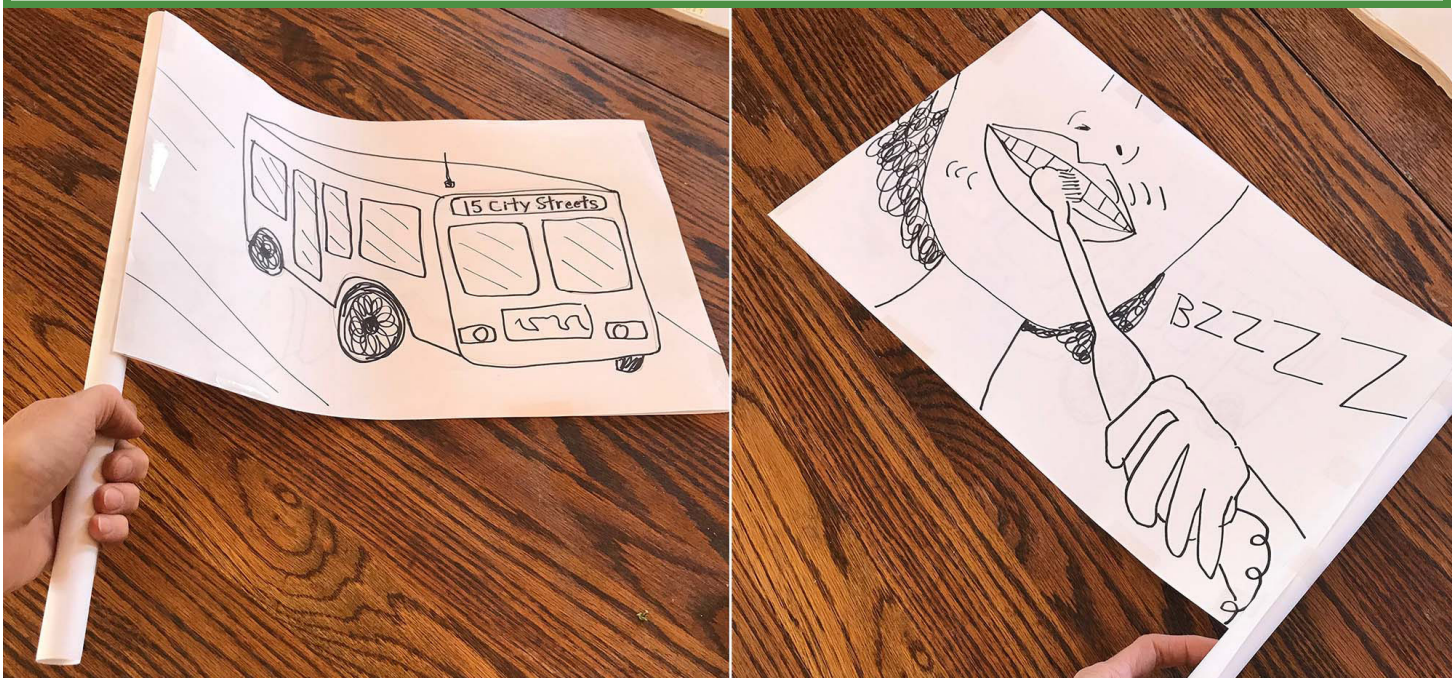
IV. Create the Flags! (30 min.)

Using the lists from the Scattergories rounds, ask students to draw one machine or item that uses fossil fuel on an 11"X17" piece of construction paper. This should be something that is used in their community and, optimally, something that they use. Remind students that this could be large or small, a water treatment facility/public bus/ coal power plant or a motor scooter/computer/ electric pencil sharpener. Using a black marker will symbolize oil and fossil fuel. Challenge students to only use black in their drawings and grey shading. They may want to first draw in pencil and then go over the lines with marker. These drawings will be turned into flags that represents the character Foss in *Shine* and should symbolize his belief that fossil fuels enable humanity to advance more quickly with less effort. If students finish early, they can complete a second drawing- although they will eventually choose one.

Once all students have finished their work, ask them to find a partner who's drawing they like. Each pair should then tightly roll up a blank piece of construction paper lengthwise so that they create a roughly 1/2" by 17" tube. Tape the tube at multiple points so it does not unravel. Next, ask students to tape their two drawings together facing outward and tape their completed flag to the tube so that it can be waved back and forth.

Assessment (Outcome 2): *Students create a flag that will be used as a symbol for Foss' values by the followers of Foss in the next lesson. Ask each pair to present their flag to the class and explain the choices that they made.*

Lesson 8: Fossil Fuel Flags



V. Follow-Up Activities

a. Classroom Flags

In this lesson, students created flags that symbolized Foss' values. Flags have been used throughout history as symbols of communities and groups. Ask students to make another set of flags that exemplify the values, ideas, and students that make up their class. Display these flags in the hall with a description of what they symbolize for the school to see or work together to create a choreography to present the flags to the school and/or community through performance.

Assessment (Outcome 2): *Students create a flag that will be used as a symbol for their class and display their flags for the school to see.*

b. Behind the flag

We see flags in our classrooms, schools, and communities but rarely take the time to consider the symbols, ideas, and designs they depict. Ask students to form groups of two to four. Each group will choose one flag they are familiar with. It could be a state or national flag or a flag representing a group. Student groups should work as a team to research their flag and create a short (2-4 minute) skit on the history of their chosen flag. Students should select props to use in their skit that help them convey the ideas they hope to communicate. It's okay if groups choose the same flag, their skits and props should be different depending on the story they choose to tell.

Assessment (Outcome 2): *Students create a skit and use props to communicate the history of a flag of their choice.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

Osnes, B. (2017). Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Cham, Switzerland: Palgrave Macmillan.

b. Vocabulary

Tool: A device used to do work.

Symbol: An item, idea, or representation that is used to represent something else. Often, the symbol provides a simple visual version of a complex idea.

Flag: A visual symbol that represents a group or idea.

Fossil fuel energy: Energy created by burning fossil fuels such as coal, oil, natural gas

Property (prop): An object, often used to represent something it is not, for dramatic effect by an actor.

VII. Standards Addressed

a. Next Generation Science Standards Addressed

4-PS3-2 Energy
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

5-ESS3-1 Earth and Human Activity
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

b. JeffCo Generations Skills

Civic & Global Engagement: Students take active roles in their communities, are prepared to be participatory citizens in our constitutional republic, and are engaged with issues of local, national, and global concern.

Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.
Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 9

The Progress Song

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

Students will rehearse and perform the Progress song from *Shine* as a class and discuss the ideas, concepts, and challenges from the performance.

Concepts

1. The choices we have made about our energy sources impact our communities and society as a whole
2. Students can be authors and actors in performance-based communication

Outcomes

Upon Completion of this lesson, students will be able to:

1. Use performance to communicate how energy choices impact us
2. Through the movement and sound, create a visual representation of energy choices and impacts

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Lesson 9: The Progress Song

insidethegreenhouse.org/shine

Outline

I. Set Up (10 min.)

For this lesson, we'll be setting up and performing the fourth song of *Shine*, "Progress": **https://vimeo.com/217015719**. The choreography for "Progress" is on the *Shine* website: **http://www.insidethegreenhouse.org/shine/shine_choreography.html**

Read through pages 16 through 18 of the script, which will be performed as part of this lesson.

Materials Needed

- The paper strips created in lesson six, rolled with a rubber band gently holding each
- The flags created in lesson eight
- A screen, projector, and an internet connection for this lesson.

II. Introduction (20 min.)

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment: Machine Brainstorm
Ask students to consider this definition for machine:

Machine: An object that combines several parts and uses power to accomplish a task

Give students sixty seconds to individually write down as many machines as they can think of (this should be review from lesson eight). At the end of their brainstorm, ask students to choose one of the machines they listed. Take another 60 seconds and ask students to list as many parts as they can think of for the machine they choose. Ask a few volunteers to share their answers with the class.

III. The Human Machine (30 min.)

Gather students in a circle and ask them to count off into ones and twos (going around the circle, each student says one or two and remembers their number). Both the ones and twos will get a chance to take part in the activity, but students will go in two groups to simplify logistics. Let students know that they are going to create a human machine. Begin with group one and ask for a volunteer to start who will go to the center of the circle and repeat a mechanical sound and movement. It can be any sound and movement, but the student should have a machine and a function in mind. It doesn't have to be a machine that exists in the real world. One at a time, each student joins in with their own sound and movement in such a way that each movement is interrelated to one other person, thus making a human machine. While group one goes, group two watches from the outside of the circle. Then, the groups switch and group two goes.

Have short discussion on what worked well in each group and what could have been improved. Students are encouraged to speak from their own experience of what they found fun and challenging.

Next, divide the class into six groups and give each group an energy source, coal, oil, natural gas, solar, wind, hydro. Challenge each group to create a human machine connected to that energy source using their bodies. The machine should perform a specific task, whether it is a real machine or one that could exist, and each group member should know their role in helping the machine perform its task. Give groups ten minutes to decide on their machine and roles and practice their movements and sounds. The parts of the machine and the machine's sounds and movements should connect to the power source the machine is powered by.

Assessment (Outcomes 1 and 2): *After each group has had time to practice, ask them to demonstrate their machine to their classmates without first explaining what they've created. At the end of each demonstration, take a few guesses from the class on what the machine was. Then, have each group explain their design.*

IV. Rehearse and Perform (25 min.)

In the performance of *Shine*, there is no dialogue between "Weaving" and Progress, but it may be helpful to remind students of where we're at in the script and what we did in lesson seven. You may want to watch the choreography for "Weaving" as a reminder: **https://vimeo.com/217015849**. Next, watch the "Inside the Studio" feature with composer Tom Wasinger located in the music section of the *Shine* website from minute 17 to minute 23: **https://vimeo.com/217016473**. This should help give students a feel for how the song was composed and which instruments were used. After the music composition video, watch the choreography for "Progress" as a class: **https://vimeo.com/217015719**.

Lesson 9: The Progress Song

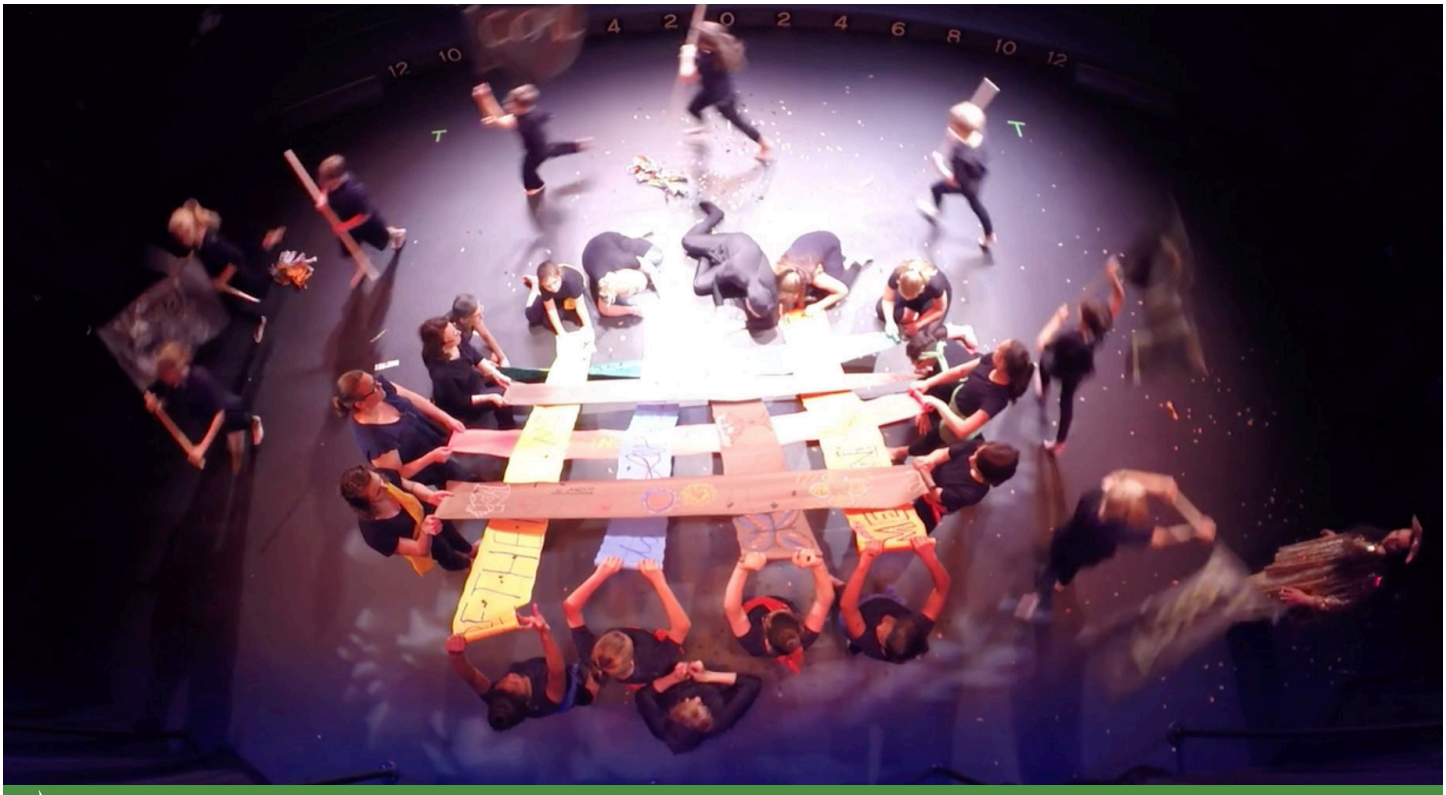
insidethegreenhouse.org/shine

For this performance, we'll be working in two groups. Sixteen students will be weavers and the other will be followers of Foss. To begin this performance, the 16 weavers should perform the "Weaving" song with vocals, found here. The weavers should hold their woven 'fabric' together and stay there during the next section. Switch to the "Progress" song with vocals using the fossil fuel flags created in lesson eight, eventually destroying the fabric of community by ripping through it near the end of the Progress song.

After the performance, read through pages 17 and 18 of the *Shine* script as a class. Let students know we'll be working toward solutions in the lessons to come.

Assessment (Outcomes 1 and 2): *Perform the choreography to the "Progress" song using the props created in lesson eight.*

Assessment (Outcome 2): *Ask students to consider how they feel after this performance. Discuss how Foss' ways can threaten the fabric of community and start to consider how we can work together to keep the fabric together (this is something we'll be working on in the next few lessons, but this should serve as a brainstorm session while the experience of this session is still fresh and give students a way to process their feelings on ripping through the fabric of community). In the time left, give students a few minutes to write about this lesson.*



V. Follow-Up Activities

a. The machine that we need

In groups of four to six, ask students to imagine and design a non-fossil fuel machine that would benefit their community. Using what they've learned in this lesson, ask students to demonstrate the design of their machine to the class using their bodies as different parts. They are free to use sounds and props as well.

Assessment (Outcomes 1 and 2): *Students work together in groups to design a green machine and present their design to the class using embodied expression and props.*

b. Go green!

In groups of four to six, ask students to think of one machine in their community that runs of fossil fuels that could be converted to use a renewable energy source. Each group should first create a human machine version of their choice, then rearrange the human machine's parts to accommodate a switch to a different fuel source.

Assessment (Outcomes 1 and 2): *Students work together in groups to create a human machine version of a fossil fuel-based machine and convert it to a renewable fuel-based human machine. Groups present their machines and conversions to the class and classmates provide feedback.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

Osnes, B. (2017). Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Cham, Switzerland: Palgrave Macmillan.

b. Vocabulary

Community: A group that shares place, values, or feelings and is connected through a physical or virtual space.

Metaphor: A figure of speech or a symbol that is representative of something else, especially something abstract (like community). Highlighting the similarities between the two and can help us the referenced idea or thing in a new or more nuanced way.

Dramatic Metaphor: A movement, action, property, or piece of dialogue can make a comparison to something dissimilar, in order to enhance its meaning and to reveal what they might have in common through performance.

Tool: A device used to do work.

Machine: An object that combines several parts and uses power to accomplish a task.

Symbol: An item, idea, or representation that is used to represent something else. Often, the symbol provides a simple visual version of a complex idea.

Flag: A visual symbol that represents a group or idea.

Fossil fuel energy: Energy created by burning fossil fuels such as coal, methane and gasoline.

Property (prop): An object, often used to represent something it is not, for dramatic effect by an actor.

VII. Standards Addressed

a. Next Generation Science Standards Addressed

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

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

4-PS3-2 Energy
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

5-ESS3-1 Earth and Human Activity
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

b. JeffCo Generations Skills
Civic & Global Engagement: Students take active roles in their communities, are prepared to be participatory citizens in our constitutional republic, and are engaged with issues of local, national, and global concern.

Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Critical & Creative Thinking: Students learn to evaluate, weigh evidence, and apply reasoned decision making to problems. Students learn to use imagination, innovation, and ingenuity to solve problems.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters
- Define stage direction and body positions

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 10
Creating Skits

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

Based on the knowledge and skills gained through the curriculum, students will create narrated statues to demonstrate activities and solutions that exemplify positive steps that can be taken in their community to create a bright future.

Concepts

1. Students can take roles as authors of knowledge and partners in communication
2. Students can be leaders in their communities

Outcomes

Upon Completion of this lesson, students will be able to:

1. Create and perform skits with fellow students
2. Offer resiliency solutions to create stronger communities

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Lesson 10: Creating Skits

insidethegreenhouse.org/shine

Outline

I. Set Up (10 min.)

Review Liz Lehrman's Critical Response Process: **https://lizlerman.com/critical-response-process/**. Though it's unlikely you'll have time to go through the entire process after each skit, it's a great guide for providing useful feedback to artists and will be useful to keep in mind.

Watch a short video on "Yes, and?" to get a sense of our small group warm up game: **https://www.youtube.com/watch?v=Qe2a3ppacUk**

Materials Needed

- Each student will need notecards or small pieces of paper and a pen/pencil to provide feedback to their classmate's performances at the end of the lesson.

II. Introduction (15 min.)

Background: "Being embodied, collaborative, and creative, performance can be a highly effective tool for exploring yet unimagined possibilities. It provides a forum for witnessing proposed solutions in real time with real community members who can be inspired to mobilize them in their daily lives. It gives a community the chance to witness possibilities being played out before actual resources are invested and with minimal risk of unintended damage or consequences. It provides the chance to improve upon ideas, try them again,

improvise, and to stimulate creative energy and new ways of imagining. It infuses joy and creativity into the entire process. It could be that the inclusion of joy is possibly the most sustaining ingredient in ensuring continued engagement by a larger constituency. We'll come back to something time and again if it makes us feel good. Performance offers a highly time-efficient, cost-effective, nuanced, and fun approach to resilience planning. Fun could be one of the most sustainable yet largely untapped forces for galvanizing communities into action on behalf of their community's resilience."

-Osnes, *Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Chapter 4*

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment: Machine Brainstorm
We'll be doing both a full class and a small group warm up for this lesson. At the end of this learner level assessment, ask students to stay seated in their small groups for the next activity.

Large group warm up: Shake it Out.
Ask students to stand and find some space of their own to move in
Teacher narrated directions:

1. "Everyone shake out your entire body while making an "ah" sound." (30 seconds)
2. "Continue shaking it out with an "ah" while turning in one direction. (30 seconds)
3. "Turn in the other direction." (30 seconds)
4. "Move out of your space and gently bump into other people while shaking it out and making the 'ah' sound."

Assessment (Outcome 1): *Work through the following discussion questions with students to prepare for creating skits together: When we are coming up with new ideas, do we sometimes bump up against each other? What happens when we do? Can we all still work together even with some bumps? Does being relaxed and loose help?*

Divide students into groups of four to six and ask them to sit in their groups in a circle.

Small group warm up: Yes, and

This is an improv communication game based on agreeing and adding information rather than fully or partially contradicting those you're communicating with. Often when we talk to each other we don't focus on building on what has been communicated to us. Instead, we either partially or fully reject what was said or ignore it for the sake of our own idea. This game asks students to do the opposite. One person in the circle begins with a statement, the person sitting to their left will start their reply by saying, "Yes, and …"

Continue around the circle two or three times each round and run a few rounds. Here's an example of what this game might look like:

Student 1: "I like bubblegum"

Student 2: "Yes, and you can buy it at the store"

Student 3: "Yes, and you can also buy cake there"

Student 4: "Yes, and they always have chocolate cake"

Student 1: "Yes, and it always has sprinkles"

The game can go anywhere from the original statement as long as it stays in the yes, and format.

Assessment (Outcome 1): *Ask students to describe what it feels like to really listen and be listened to in a group and compare the experience to others that they've had.*

III. Review Drawdown (10 min.)

Note that this activity is the same as the one conducted in the introductory lesson to this curriculum. Depending on the time elapsed, feel free to keep it the same, add more Drawdown solutions, or focus on a different solution.

Present students with the Drawdown solutions posted on enactingclimate.org. These solutions have been adapted from the original set at **Drawdown.org** so that they are accessible to fifth grade students and above. They are the top solutions to climate change. Project the top ten solutions to the class and ask if they are surprised by any of them. Project solution number one, Reduced Food Waste, and ask students to read through the solution. Discuss any questions the students have.

Assessment (Outcomes 2): *After reading through Reduced Food Waste, ask students to write down three ways food waste could be reduced at school. Create a combined list of all the possibilities on the board.*

IV. Enacting a Skit as a Narrated Statue (35 min.)

This is a method for creating a skit that can be achieved in a limited amount of time. Students will work in small groups (four to six students per groups) to create a short (one to two minute) skit on reducing food waste in their school. These groups can be assigned randomly, can be the same groups from the "yes, and" intro activity, or can be focused on students who have similar interests based on the brainstorm in the last activity. Each group will be using their bodies to create a statue that conveys their solutions in an active and interesting way. One person in the group will stand to the side of the statue to narrate for the audience what solution is being communicated. Give each group five to ten minutes to design their statue, and to decide who will narrate and what that spokesperson will say.

Assessment (Outcomes 1 and 2): *Each group will perform their skit for the class. Ask each student in the audience to write one piece of constructive feedback on a notecard or piece of paper with their name in case the group has questions for them about their feedback. Students should also write the names of the group. After all groups have performed, ask everyone to hand in their written feedback to each group and take five minutes for each group to read through their comments.*

V. Follow-Up Activities

a. A second performance

Ask each group to take the feedback they received and revise their skit. Once each group is ready, have them perform again for the class.

Assessment (Outcome 1): *After each performance, ask the groups to describe how they addressed comments received and how they responded with specific changes. Provide the audience an opportunity to ask questions in a "What if…" format to share other possible ways of doing the skit. This process should help students consider that there are nearly infinite ways to design a performance, and each variation can communicate something different.*

b. Mix it up

Every group has a different dynamic. Create new groups and ask them to create new narrated statue skits.

Assessment (Outcomes 1 and 2): *Ask each group to perform and allow time for audience feedback. After all performances, as students to write for two minutes on the differences they experienced in working with their two groups. If they need a prompt, ask students to consider leaders, followers, and group communication.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

Osnes, B. (2017). *Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Cham, Switzerland: Palgrave.*

b. Vocabulary

Resilience: The capacity of communities to function, so that everyone—particularly those who are under-resourced and vulnerable—survive and thrive, no matter what social stresses or climate shocks occur.

Community: A group that shares place, values, or feelings and is connected through a physical or virtual space.

Metaphor: A figure of speech or a symbol that is representative of something else, especially something abstract (like community). Highlighting the similarities between the two and can help us the referenced idea or thing in a new or more nuanced way.

Dramatic Metaphor: A movement, action, property, or piece of dialogue can make a comparison to something dissimilar, in order to enhance its meaning and to reveal what they might have in common through performance.

VII. Standards Addressed

a. Next Generation Science Standards Addressed

4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-ESS3-2 Earth and Human Activity
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

5-ESS3-1 Earth and Human Activity
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

b. JeffCo Generations Skills

Content Mastery: Students understand academic concepts and are able to apply and transfer that knowledge into multiple settings. Students must also understand how to access and process changing information, updating their own thinking and processes.

Civic & Global Engagement: Students take active roles in their communities, are prepared to be participatory citizens in our constitutional republic, and are engaged with issues of local, national, and global concern.
Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Critical & Creative Thinking: Students learn to evaluate, weigh evidence, and apply reasoned decision making to problems. Students learn to use imagination, innovation, and ingenuity to solve problems.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Create and write simple dramas and scenes
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters
- Define stage direction and body positions

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 11

Activate Solutions

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Description

Based on the knowledge and skills gained through the curriculum, students will self-author skits to demonstrate and activate solutions that can create a bright future for their community.

Concepts

1. Students can take roles as authors of knowledge and partners in communication
2. Students can be leaders in their communities

Outcomes

Upon Completion of this lesson, students will be able to:

1. Create and perform skits with fellow students
2. Offer resiliency solutions to create stronger communities

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Outline

I. Set Up (5 min.)

You'll notice that there are many similarities between this and the previous lesson. This is because both focus on guiding students through the creation process for conceiving, designing, and performing skits that response to local climate and resilience solutions based on Project Drawdown's research on climate change.

Review Liz Lehrman's Critical Response Process. Though it's unlikely you'll have time to go through the entire process after each skit, it's a great guide for providing useful feedback to artists and will be useful to keep in mind: **https://lizlerman.com/critical-response-process**

II. Introduction (5 min.)

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment: Shake it Out
Ask students to stand and find some space of their own to move in

Teacher narrated directions:
1. "Everyone shake out your entire body while making an "ah" sound." (30 seconds)
2. "Continue shaking it out with an "ah" while turning in one direction. (30 seconds)
3. "Turn in the other direction." (30 seconds)
4. "Move out of your space and gently bump into other people while shaking it out and making the 'ah' sound."

III. Image Theater Skit Prep (30 min.)

For this activity, break into small groups (four to six students per group). These can either be the same groups from activities in lesson 10 or new groups depending on class dynamics and time between lessons. Students can either focus on the same food waste solution they did in lesson 10 or choose a new solution.

After each group has decided on a food waste solution to work on for a skit, ask them to create three distinct images (human statues without narration) using their bodies: 1) an image of the food waste issue they are highlighting 2) an image of the solution 3) the transitional image, or an image of the action that got them from the problem to the solution. Each "image" shows a frozen scene made up of their bodies that physically communicates each prompt. Ask them to portray a specific manifestation of the problem. For example, if the problem is homelessness, the image of the problem might be a single old woman sitting on the sidewalk reaching up for spare change as two other people walk by her with their chins up and their gaze avoiding her. The solution might be an image of this old woman in a cooperative living residence making a meal with other residents. The transition from the problem to the solution might be an image of neighborhood residents in the office of their mayor advocating for housing for the homeless.

Once each group creates their three images, have them take turns sharing these with the class, one group at a time. First, they show the image of the problem, then the solution, and finally the transition. They are not allowed to use any words when presenting these nor are they allowed to announce what their issue is.

Assessment (Outcomes 1 and 2): *After each problem/solution/transition set, ask their classmates to communicate to the performers what they saw. This gives each group a chance to hear what physicality communicated clearly and what might need more description or clarification. Groups can then tell their classmates what they intended to communicate. If what they intended doesn't match what the class understood, ask classmates to offer "What if" statements to help groups improve their skits.*

IV. Youth Authored Skits (25 min.)

Next, give students time, in the same groups, to create a one to two minute skit based on the same issue they worked on in the last activity. Urge them to be playful with the creation of their skits, not to over-think them, but, rather, to get on their feet and actively work through the creative process. To support this, only give them ten minutes to create their skits as a group.

Assessment (Outcomes 1 and 2): *Each group shares their skit to receive positive feedback for constructive suggestions for improvement.*

V. Follow-Up Activities

a. A second performance

Ask each group to take the feedback they received and revise their skit. Once each group is ready, have them perform again for the class.

Assessment (Outcome 1): *After each performance, ask the groups to describe how they addressed comments received and how they responded with specific changes. Provide the audience an opportunity to ask questions in a "What if…" format to share other possible ways of doing the skit. This process should help students consider that there are nearly infinite ways to design a performance, and each variation can communicate something different.*

b. Mix it up

Every group has a different dynamic. Create new groups and repeat sections III and IV of this lesson.

Assessment (Outcomes 1 and 2): *Ask each group to perform and allow time for audience feedback. After all performances, as students to write for two minutes on the differences they experienced in working with their two groups. If they need a prompt, ask students to consider leaders, followers, and group communication.*

VI. Additional Resources

a. Sources

Script of *Shine*: http://www.insidethegreenhouse.org/shine/assets/shine_script.pdf

Music of *Shine*: http://www.insidethegreenhouse.org/shine/shine_music.html

Choreography of *Shine*: http://www.insidethegreenhouse.org/shine/shine_choreography.html

Osnes, B. (2017). *Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Cham, Switzerland: Palgrave.*

b. Vocabulary

Resilience: The capacity of communities to function, so that everyone—particularly those who are under-resourced and vulnerable—survive and thrive, no matter what social stresses or climate shocks occur.

Community: A group that shares place, values, or feelings and is connected through a physical or virtual space.

Metaphor: A figure of speech or a symbol that is representative of something else, especially something abstract (like community). Highlighting the similarities between the two and can help us the referenced idea or thing in a new or more nuanced way.

Dramatic Metaphor: A movement, action, property, or piece of dialogue can make a comparison to something dissimilar, in order to enhance its meaning and to reveal what they might have in common through performance.

Image Theatre: a technique for applied theatre developed by Brazilian theatre artist and scholar, Augusto Boal, that uses still images made with the body to explore abstract ideas and issues.

VII. Standards Addressed

a. Next Generation Science Standards Addressed

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

4-ESS3-1 Earth and Human Activity
Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-ESS3-2 Earth and Human Activity
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
5-ESS3-1 Earth and Human Activity

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

b. JeffCo Generations Skills

Content Mastery: Students understand academic concepts and are able to apply and transfer that knowledge into multiple settings. Students must also understand how to access and process changing information, updating their own thinking and processes.

Civic & Global Engagement: Students take active roles in their communities, are prepared to be participatory citizens in our constitutional republic, and are engaged with issues of local, national, and global concern.
Self-Direction & Personal Responsibility: Students take initiative, are inquisitive, entrepreneurial, and curious. They persevere through challenging situations, take calculated risks, and stand accountable for their actions. They continually advocate for their own needs as well as the needs of others.

Communication: Students learn to effectively communicate in written, digital, artistic, and oral forms. Students learn to explore and articulate their own points of view, while respectfully exploring and understanding the perspectives of others.

Critical & Creative Thinking: Students learn to evaluate, weigh evidence, and apply reasoned decision making to problems. Students learn to use imagination, innovation, and ingenuity to solve problems.

Collaboration & Leading by Influence: Students learn to work together, harnessing the power of teamwork, and learn the importance of influence to motivate others to get things accomplished.

Agility & Adaptability: Students learn to change in response to dynamic situations, environments, and complex problems. Students adjust to disruptions, ambiguity, and uncertainty in themselves, their organizations, and their communities – and thrive in spite of the obstacles.

Colorado Academic 2020 Standards Drama and Theatre Arts

Create

- Create characters from scripts or improvisation using voice, gestures and facial expressions
- Create and write simple dramas and scenes
- Design a scene through an inventive process, and perform the scene

Perform

- Participate collaboratively with partners and groups
- Demonstrate safe use of voice and body to communicate characters
- Define stage direction and body positions

Critically Respond

- Develop selected criteria to critique what is seen, heard, and understood
- Examine character dynamics and relations

LESSON 12

Shine Performance

insidethegreenhouse.org/shine

The creation of this curriculum has been funded in part through Inside the Greenhouse project at CU Boulder

This lesson strives to address NGSS, Colorado 2020 and JeffCo Generations standards and goals, cited at the bottom of the lesson, by communicating science through embodied expression

Shine, The Musical
insidethegreenhouse.org/shine

Inside the Greenhouse

University of Colorado Boulder

Description

It is a tradition in cultures throughout the world to end public gatherings with an inspirational song and dance that ensures the sustainability of the energy and commitment necessary to follow through with the issues addressed at the gathering. We'll complete this curriculum by performing "Shine."

Concepts

1. We have the power to change the future
2. Dance, movement, and song can combine to create a powerful performance experience for both participants and audience members

Outcomes

Upon Completion of this lesson, students will be able to:

1. Use embodied, written and verbal communication to describe new possibilities for their communities that will lead to a more resilient future.
2. Use dance, movement, and song, to create joy and hope

Outline

I. Set Up (10 min.)

Background: Performance: The Importance of Celebration
It is a tradition in cultures throughout the world to end public gatherings with an inspirational song and dance that expresses the achievement of the gathering's purpose. A song combined with synchronized movement can nudge the follow-through from concern to action regarding the purpose addressed at the gathering. If you leave humming the final tune, you carry the spirit of commitment with you into your daily life. It can infuse your thoughts and actions with the inspiration that was built into the event purposefully by its organizers. Participating in song can provide an experience of connection and joy which allows the singer to feel the value of community, which in turn, will hopefully strengthen the resolve to act on its behalf.

Shared cultural expression unites us, allows us to feel who we are as a community and provides a medium to communicate that beyond our borders. The final song may even set the attitude for moving forward towards new behavior. Attitudes inform behavior. Without the right attitude, certain behaviors don't make sense; if you don't have an attitude of generosity, sharing your lunch doesn't make sense. If we are hoping adults will change behavior, we best attend to our attitude.

The culminating song is best characterized as being accessible, catchy, and affirmational for group membership. In her book Utopia in Performance, Jill Dolan "investigates the potential of different kinds of performance to inspire moments in which audiences feel themselves allied with each other, and with a broader, more capacious sense of a public, in which social discourse articulates the possible, rather than the insurmountable obstacles to human potential ." When people dance and wave streamers in rhythm to a beat, they literally take up more room as they expand into the public realm, and, despite their many

Lesson 12: *Shine* Performance

insidethegreenhouse.org/shine

differences, feel part of a unified beat, pumping life through their shared community. Songs and anthems are a vital tool in nation building and can be used for city spirit building as well.

- Osnes, Performance for resilience: Engaging youth on energy and climate through music, movement, and theatre. Chapter 4

For this lesson, we'll be setting up and performing the final song of *Shine*, "*Shine*". The music for "*Shine*" is on the project website. One version of the choreography is there as well. This can serve as an inspiration, but your students can also create their own simpler choreography. Please watch and review before the lesson.

Read through pages 17 through 18 of the script to review where we are at in the performance. While we have already worked through this dialogue as a class, a review may also be useful for students.

Lesson 12: *Shine* Performance

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II. Introduction (15 min.)

Behavior Guidelines: This lesson involves embodied learning. Please review the "Guidelines for Embodied Lessons in the Classroom" included in this curriculum.

Learner Level Assessment: Lesson 11 review
Ask students to get back into their groups from the last lesson in which they created and performed skits. Give groups two or three minutes to remember and rehearse their skits. Next, ask each group to find a group to partner with and perform their skit. The group watching has a responsibility: they should note what they feel is the most powerful single moment in the skit they watch.

Assessment (Outcomes 1 and 2): *Each group tells their partner group what they feel is the most impactful moment of their partner's performance.*

III. Rehearse and Perform (45 min.)

After finishing the song "Progress" in lesson nine, we read through pages 17 and 18 of the *Shine* script to prepare for our skits. It may be helpful to remind students of where we're at in the script and what we did in lesson nine before moving on to the final song, "*Shine*."

For this performance, we are going to try to learn both the music and choreography. Begin by learning the words to the song. Full lyrics are available in the script. Practice a couple times as a class using the "*Shine*" with vocals track found here: **http://www.insidethegreenhouse.org/shine/shine_music.html**

Next, it's time to create your choreography. You can find the full video for the choreography of "*Shine*" here: **https://vimeo.com/217015793**. Watch as a class and then work through each movement, following along. If the movements in the video prove too difficult, create your own!

Find a place to perform: To share this final song, perform to another class, the front office, or in front of your school. Making it public is part of a civic celebration and helps lead to a sense of culmination! If you can amplify the backing music with a speaker, great. If not, the students can perform it a cappella. If it's not possible for you to perform outside the classroom, you can film the performance on a cell phone and share it to parents and others as a video (this is also an option if you do find a performance venue!).

Assessment (Outcomes 1 and 2): *Perform "Shine" as the culminating activity for this curriculum.*

IV. Follow-Up Activities

a. Perform *Shine* for your community!

After working through this curriculum, you're ready to show the world what you've learned! *Shine* can be performed in its entirety to actively engage students in issues related to energy, climate, and resilience. Give yourself several class periods to rehearse using the script and choreography and create any props you'll need. Be sure to include students' skits from lesson eleven in the performance.

Assessment (Outcomes 1 and 2): *Students work together to show their community what they've learned, create a sense of joy and hope, and start conversations that motivate action for a sustainable future.*

V. Additional Resources

a. Sources

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Dils, A., & Albright, A. C. (2001). *Moving history / dancing cultures: A dance history reader*. Middletown, Conn: Wesleyan University Press. https://www.oberlinlibstaff.com/acceleratedmotion/primary_sources/texts/ecologiesofbeauty/anthro_ballet.pdf

Jill Dolan, *Utopia in Performance: Finding Hope at the Theater* (University of Michigan Press, 2005), 164.

Osnes, B. (2017). P*erformance for resilience: Engaging youth on energy and climate through music, movement, and theatre*. Cham, Switzerland: Palgrave Macmillan.

b. Vocabulary

Community: A group that shares place, values, or feelings and is connected through a physical or virtual space.

Dance: American anthropologist and dance researcher Joann Wheeler Kealiinohomoku defines dance as "a transient mode of expression, performed in a given form and style by the human body moving in space. Dance occurs through purposefully selected and controlled rhythmic movements; the resulting phenomenon is recognized as dance both by the performer and the observing members of a given group." (Dils and Albright, page 38)

Metaphor: A figure of speech or a symbol that is representative of something else, especially something abstract (like community). Highlighting the similarities between the two and can help us the referenced idea or thing in a new or more nuanced way.
Dramatic Metaphor: A movement, action, property, or piece of dialogue can make a comparison to something dissimilar, in order to enhance its meaning and to reveal what they might have in common through performance.

Celebration- the action of marking an important event or occasion by engaging in enjoyable, typically social, activity, a public performance, to mark with a deviation from routine.

Backdrop- Painted, drawn, or designed material that hangs behind a performance to set the scene

VI. Standards Addressed

a. Next Generation Science Standards Addressed

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