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Grade: 3-5
Enduring Idea: Science

Rationale:

It is often believed that science and art are separate or even conflicting entities in the world today. Using an enduring idea of science can integrate these ideas and show how science and art can benefit one another. It can also be used to help students understand the ways they interact in the world.

Science is often used as a very methodical way of exploring and understanding our world while art is a more abstract way of observing the world. Students will learn how each method is beneficial and how they can be combined to benefit society/culture. It can help students better understand how and why things occur in their world.

In addition, science and art are often reviewed by very different and separate groups and this could help students explore how these groups are similar/different and the advantages/disadvantages of relating the two areas.

Using observation and research, science can help people understand their world and analyze the effectiveness of the ways in which science is represented in society. Additionally, students will learn to look critically at information and interpret it with proper knowledge of its possible downfalls.

Key questions:

How is science integrated into our lives?

How is science viewed in society today (subjectivity)?

How can we use observation and research to better understand our world?

How does science influence our beliefs (individually/societally)?

How is science applicable to everyday life?

Why/how is science controversial?

Objectives:

Students will understand the role that science plays in our everyday lives.

Students will understand the benefits of integrating art and science

Students will increase their understanding of life and art as science

Students will demonstrate an understanding of science as subjective.

Students will be able to draw connections between the steps (in creation of work and scientific method) and their own lives. (use in social contexts.)

Lesson One-Science or Art?

Understanding how art and science are related/can work together

Lesson Objectives: After researching one of the artists given below, students will answer individually in complete sentences the questions listed below.

After answering the questions mentioned above, students will evaluate the role and importance of science in some artwork by discussing their answers with a small group of students.

Students will demonstrate the ability to evaluate, in writing, the success of an artwork based on the intentions of the artist.

Materials/Supplies: lined paper, pencils, computer with internet, books, info sheets on artists

Instructional Strategies/Procedures:

(5 minutes) For the next 7 classes, we will be working with the idea of art and science. I know that in your class you have been talking about the scientific method. Who can tell me the steps for the scientific method?

Question

Research

Hypothesis

Perform Experiment

Analyze Data and Draw Conclusions

Have you ever used the scientific method in your everyday lives? Do you think art and science are related? How?

(15-20 minutes) Students will research one of the following artists: Mark Dion, Dan Peterman, Mel Chin, Tim Hawkinson, Leonardo DaVinci.

Today you are each going to choose an artist to research.

Students will answer individually, in complete sentences the following questions:

-Is the work science or art? Is this person a scientist or artist? Why?

-What role does science play in the projects?

-What role does art play in the projects?

-What makes these works successful/not successful?

Students will be given a list of websites that they may use to research the artists, print-outs, and books.

Students may discuss the questions quietly in groups of two if they want.

(10 minutes) Students will write a paragraph to one page about the artist they researched.

They must include a description of one of their pieces, how science plays a role and whether or not they consider the work to be art.

Now you have researched this person and know a bit about their work. You now will take what you know and using your notes, write

a paragraph to a page about the person you researched. They will be graded on whether or not you have a description of one of the works, a statement as to whether or not you believe the work is art and why, and what role science plays in the work.

For the following six classes we will be working on exploring other artists and the ways they use science in their artwork. We will continue to reference the scientific method so make sure you either know the steps or write them down somewhere so that you can refer back to them.

Assessment: Students will write papers on the artist of their choice and answer the questions on the next page.

Interdisciplinary: These artists all work with science as a part of their artwork. Language arts can also be included in this project with their writing.

Other things to keep in mind/possibilities: Work of impressionists and cubists and how it was affected by science. The use of medical illustrations, science book illustrations.

Links: <http://www.pbs.org/art21/artists/dion/index.html>
<http://www.pbs.org/art21/artists/chin/index.html>
<http://www.pbs.org/art21/artists/hawkinson/index.html>
<http://artnews.org/danpeterman/>
<http://www.mos.org/leonardo/>

Answer each of the following questions. Write at least two meaningful sentences for each question. (2 pts/question)

Describe one of the pieces of art that this artist has created.

What does it look like?

What is it made out of?

Does it do anything?

How does the artist use science to create their work?

Is this person working in art, science or both? Why do you think this?

List at least 2 other interesting facts about the artist.

Lesson Two- Beehive Collective

Understanding our environment using observation and research

Lesson Objectives: Students will critically discuss the work of the Beehive Collective
Working in groups of four, students will choose a site within their school and generate a list of features of the area they chose.
Students will use observation and research to evaluate their local environment.
Students will be able to research and record information about a site.

Materials/supplies: lined paper for lists/research, white paper, pencils, black markers

Instructional Strategies/Procedures:

(10 minutes) There will be a Beehive Collective poster hanging on the wall when students walk in. They will be asked to look at it and verbally answer:

What images do you see?

What do you think this image is trying to say/ what story is being told?

How many people do you think drew this and why?

How did the artists learn about this story?

*The Collective uses art to share stories about real life and real people. In order to **research** each story, the members of the collective visit the places that their drawings are about. They talk to people there, **observe** the places and **ask them questions**. They also do research about the history of the place. Some other very important features in their work is that it is easily readable. The collective only uses black and white so that they can easily reproduce the work. They work collaboratively on every drawing. Each person draws a different part (for example one person draws all of the ants).*

Students will work in groups of four to research the place that is chosen (the teacher will assign a different place to each class so the entire class is working on the same place, but each class is researching a different place. (one class may have the cafeteria and another may have the office, etc.) If parent volunteers are available may be able to choose different locations.):

(3 minutes) Students will generate a list of everything they already know about the site. (what is it used for, who uses it, describe the way it looks)

One student will record this list on a big paper. Each group will share one thing that they wrote (different student than wrote will share).

Think about **Who, What, When Where, Why and How?**

Who uses the space?

What do they use it for?

When is it used? When was it made?

Where is it located?

Why is it used?

How is it used?

(3 minutes) Students will generate a list of everything they would like to know about the site.

What else do you want to know about the site? What are some questions you could ask people who work there/use the space?

A different student will record on the other side of the paper. The last student in each group will share one of the questions they wrote. Students from other groups should add questions that they don't have to their list.

(20 minutes) Students will research their site (observe, ask questions, etc.)

Use the list of questions and research what you want to know about the site. If you think of some new questions as you go, add them to your list. Talk to people, write information and draw sketches.

(3 minutes) Students will return to the class to share their findings and organize information.

Did you learn anything new about your site?

Do you think that what we did today was art? Does it become part of the artwork?

Do you think doing this research will help you make your drawings?

Next class we will be using the information you found out about your area to work with your group and make a drawing that teaches us about your space.

What steps did we use from the scientific method? Questions, Research.

What do you think we will do next time? Drawing=experiment and analyzing data

(6 minutes) *leeway time for going to site, etc.*

Assessment: Students will be graded on the amount of information they gather and how well they stay on task throughout the class period. This will be assessed through their note-taking.

Interdisciplinary: Students use science skills to observe and record data about a specific environment. They also use these skills in the analysis and interpretation of the Beehive work. Social Studies comes into play with the interpretation of the Beehive Collective work as well because it references current events, politics and other cultures. Also, sociology can be included in the ways that people interact in different environments and the different ways that people respond to environments.

Student records or reports at least once during the class period	5 points
Student takes notes or sketches information about their area	5 points

Links: <http://www.beehivecollective.org/>

Lesson Three- Beehive Collective

Understanding our environment using observation and research

Lesson Objectives: Students will interpret the information gathered to create an artwork that reflects the chosen environment.
Students will create a drawing that tells a story and conveys information about the site they researched.
Students will work collaboratively to create one piece of art using the information they have gathered.

Materials/supplies: Sketch paper, pencils, black markers, large drawing paper

Instructional Strategies/Procedure:

(10 minutes) If students need more time, the first ten minutes may be spent finishing research that was started the class before. They should also share the information they found with other groups.

(5 minutes) Students will work with their group to decide what story they would like to convey about their space and okay their idea with the teacher.

Now you are going to take the information you found about the site and decide what you want your drawing to show. Maybe your drawing is going to be about the people who work in the space, how the space was built or what it is used for. Look through your information and discuss what idea interests you the most. When you are all done with the drawing, we will be sharing them with our friends and they will be answering these questions so make sure you keep them in mind while you work.

(3 minutes) Students will then each choose a section of their site to focus on and will draw that portion of the drawing. (For example, one could focus on furniture, one on people, etc.)

Now that you have decided what you are going to say about your space, you need to decide who is going to draw what part of the drawing. Do you remember how the Beehive Collective works on drawings? One will work on ants, one on letters and so on. Every person in the group will be drawing something on the drawing. Maybe one can do people and one can do furniture, for example.

(20 minutes) Students will each have a sketch piece of paper to practice drawing their part and will work one at a time on the actual drawing. Students will be told to change the person who is drawing about every five minutes.

Everyone take one of the smaller pieces of paper. You will each practice drawing your part on this piece of paper and then you will take turns drawing on the big paper. Remember when you are working on the drawings that you want to make things accurate according to the information you gathered last class. If the walls are brick, draw the walls with brick. Also remember that when you are drawing your part, you shouldn't just be drawing in one corner, you should be drawing in all different spots so that the

drawing all works together. See how the ants are drawn in many spots throughout the drawing?

You should also be talking with each other while you're drawing because these drawings belong to everyone in the group, not just one of you. You need to make sure everyone in the group knows what is happening with the drawing.

(7 minutes) Students will be asked to share their drawings and share what the drawing conveys about the place they researched.

What have you shown about the place you researched?

How did you use the information you gathered to create your drawing?

Did researching the place first change the way you thought about the place?

How do you think your drawing would be different if you hadn't researched the place first?

How was the research an important part of making the drawing?

How did we use step five in the scientific method? We analyzed the research we did to create drawings that told us about a specific place.

If there is extra time: Ask students how their stories/drawings were different from those of the Beehive Collective. What was their favorite/least favorite part of the project?

What was the hardest/best part of making a drawing as a group?

Possible Follow up: Students could create a brochure to go with their work or a presentation like the Beehive collective does.

Assessment: Students in one class will trade works with students in a different class. The students will see how easily they are able to identify the location that was chosen and what story is being told about the space.

Interdisciplinary: Students use science skills to record, observe and interpret information for a given place.

Links: <http://www.beehivecollective.org/>

Assessment

What place did this group research? _____

What is the drawing telling you about the place? Is there a specific story that the drawing is trying to convey?

What can you learn about the space by looking at this drawing?
Think about who, what, when, where, why and how.

Lesson Four: The Hokes Archive

Understanding the way science is presented can influence our beliefs

Lesson Objectives: Students will list how we learn about civilizations and what we tend to learn about civilizations.

Given the prompt, students will create an artifact using the fabricated civilization as a guide.

Students will use science to create subjective or fabricated accounts of reality by making an artificial artifact.

Students will write about how assumptions can be made about artifacts given their context and presentation.

Materials/supplies: slides of Hokes archive, large paper for lists, markers, paper for artifact, colored pencils, lined paper, pencils

Instructional Strategies/Procedures:

(3 minutes) When students walk in they will be asked to work in groups to discuss the following questions:

Who writes about different civilizations?

How do they learn about the civilizations?

After sharing their answers to the first questions, students should return to their groups to make lists to answer the following questions:

How do we learn about other civilizations?

What types of things do we learn about other civilizations?

Students will hang their lists so they can compare their answers to others.

(5 minutes) The teacher will introduce the students to a civilization they have probably never heard of (Aaruvian culture). The teacher will tell them where they are located and show some images of the artifacts from the culture (hieroglyphics, pottery shards, tools, etc.)

Students will be asked to share their thoughts on the civilization.

Have you ever heard of this civilization before?

Does it remind you of any other civilizations you know of?

How is it the same/different from other civilizations you have heard of?

How did we learn about this civilization?

(5 minutes) Students will then be told the truth about the civilization. They will be told how it was created. *Beauvias Lyons spent many years “creating” this civilization. He*

studied the way museums present information about different civilizations and used his knowledge to create a fake civilization.

They will then be asked why the civilization was so believable as real. (Important ideas: located in a real-world place, it is thorough and included all of the different aspects of a typical display on a civilization, way it was presented, the artifacts were made from materials found in the actual area)

Do you think that what Beauvais Lyons does is considered art?

How is art used in his work?

Why do you think Lyons does this work?

Students will then be given a prompt that gives them a specific location for their “new civilization” and will be asked to choose an artifact to create for their “new civilization.” (pottery shard, written language, a building, tool, etc.)

Students will be reminded that their artifact will be graded based on how accurately it represents the location described (uses material naturally found there, etc.) so if they need to do any additional research, they may.

We saw that for Lyon’s Aaruvian culture, there were pots made out of clay. How did this tell us about the place where the civilization was “found”? (in the desert, had plenty of access to clay)

Students will write a short paragraph describing their artifact. It should include when and where it was found, what it was made of and what it was used for.

When you have finished making your “artifact” you need to write information to go with it just as Lyons did. If you were Lyons creating this artifact for one of the shows, what would you tell people about it? What does it tell you about the civilization? Include how it was made, why it was made, what it was made for, who would use it, how it was used and other relevant information.

Steps used: Question: how can we use information that we know to create something that appears to be true?

Research: Mostly provided by prompt, but some people looked up information about the rainforest.

Hypothesis: Used the information to create something that we believe could have been made in that place.

Experiment: We can show our artifacts to other people and see if they believe that they are from the culture we created.

Links: <http://web.utk.edu/~blyons/>

Assessment: Assessment will be done through reading the paragraphs that students wrote.

Did they use materials that would have been available given the prompt?	2 points
Did they actually create something for the time/place (were they able to tell how and why their object was used?)	2 points
Were students able to tell how the work would be presented in a show/at a museum?	2 points

Interdisciplinary: This project incorporates science and social studies in the way that students take into consideration the effects of the climate and place on the people and what types of tools, etc.

Other things to keep in mind:

Ancient society vs. modern society

What do artifacts look like?

Examples of how to make artifacts look real

Do you need to give a demo on how to create an artifact?

Prompt:

A new civilization has just been discovered in the heart of the rainforests of South America. The land is covered with vegetation. There are innumerable trees and wild plants that grow in the area. Bushes with various kinds of berries are abundant and it rains often (sometimes several times in one day.) The temperature is often above 95 degrees. There are many wild animals including fish, birds and snakes. There is a river that runs near this ancient city.

Lesson Five: Komar and Melamid

Pros and Cons of using surveys to understand a group of people

Lesson Objectives: Students will compare/contrast the most/least wanted paintings for a given country.
Students will discuss what types of questions they believe would be on the survey that Komar and Melamid used.
Students will make predictions about their school's most/least wanted paintings.
Students will work in small groups to create surveys.
Students will work to combine their questions to create one survey for the entire class.

Materials/supplies: Gum survey, lined paper, pencils, large paper, markers

Instructional Strategies/Procedures:

(2 minutes) Students will be given a short survey to answer about gum.

(5 minutes) All of their information will be tallied on the board and the students will be asked to evaluate the information by answering the following questions (sticky/not sticky liked more, good for bubbles, fruity/minty, etc.)

- What characteristics do most people want in gum?
- What type of gum would be their favorite? (winterfresh, etc.)
- What things do they least want in gum?
- What type of gum would be their least favorite?

(5 minutes) Students will then be shown the work of Komar and Melamid (Most/Least Wanted painting for various countries).

(5-10 minutes) Students will be asked to describe the painting in as much detail as possible, comparing and contrast the most/least wanted paintings.

- What colors are used?
- What kind of paint? (will need to be told)
- What images? Abstract/non-objective/realistic?
- What is the subject matter of each painting?
- What size? (may need to be told)
- Horizontal/vertical?

Students will be asked what type of questions they think Komar and Melamid asked in their surveys.

Who can tell me what type of questions Komar and Melamid may have used for their survey? How could they find this information out using a survey?

What size painting do you like the most? Sofa size, fridge size, book size, baseball card size?

Do you prefer warm or cool colors in a painting?

Do you prefer bright colors or dull colors?

What do you like to see in a painting? Trees, landscape, people, etc.

Students will then be asked to make predictions about what they believe their school's most/least wanted painting would look like.

Would it be big/small?

What colors would be used?

What images?

What type of paint?

WHY?

(5-7 minutes) Students will break into small groups and discuss what types of questions they would ask to determine their school's most/least wanted painting. After working for a few minutes, students may be given some reminders on things to question (materials, size, subject matter, colors, smooth/textured).

Now you are going to work in groups of 2 or 3 to make your own survey questions. We are going to make the most and least wanted paintings for your school so we need questions that we can ask in order to find out what they should look like. Make sure you are thinking about all of the things that make up a painting; size, color, subject matter. You should write your questions on the paper you have so we can share them with the class.

Students will have one person record their questions on a large piece of paper.

(5 minutes) Students will hang their papers and discuss which questions are the same/different, which questions are most important, which questions aren't needed and if there are any other questions that are missing.

If we use these questions, do we have enough information to create the most and least wanted paintings for our school? Will we know size, shape, color, materials, subject matter?

(3 minutes) Students will decide on which questions would be best used to create a final, single survey for the class.

Scientific method used:

Question: What is the school's least/most wanted painting

Research: Used a new method of research; created surveys

Hypothesis: We made predictions about what the paintings will look like

(left-over time) *Komar and Melamid received money to do these surveys and to pay people to create the most and least wanted things. They don't, for example, know how to play an instrument so they hire someone to play for them. Is what Komar and Melamid do considered art? How is it related to art? What questions does it raise about art?*

What questions does it raise about society? How is science used in their work? Is science important to their work?

Assessment:

Completion of Survey	5 points	
Group questions completed (the whole group will be given the same grade)	5 points	

Interdisciplinary: Science, math and social studies all have ties to this lesson. Science is used in creating hypothesis about what their school's paintings will look like and creating questions for the survey. Math is used in recording and analyzing the data gathered in the surveys. Social studies can apply in the study of groups of people and how they differ/are related. This could be further enhanced by looking at and discussing the differences between the most/least wanted paintings from other countries.

Links: <http://www.diacenter.org/km/>

Lesson Six: Komar and Melamid (cont.)

Interpreting surveys, using the results and evaluating the effectiveness of surveys

Lesson Objectives: Students will write one paragraph to one page comparing/contrasting their work to that of another student's. Students will create a list of pros and cons of using surveys to create general assumptions of a group of people. Students will analyze the information gathered in the surveys to create a work from the given information by creating a most or least wanted painting.

Materials/Supplies: Survey results*, paper (various sizes), paint, water, brushes, lined paper, pencils

Instructional Strategies: **The teacher will create a survey by combining the questions from all the classes into one survey. The survey will then be passed out to all of the classes in their building for the children and adults to answer. When the surveys are returned, the teacher will record the results for the students to analyze in their next class.*

(3 minutes) The students will then be given the results from the surveys that had been given out to students at an earlier time.

The results will be written on the board (for example, 10 people liked sofa sized paintings and 20 liked book sized paintings) so the students can read the info and describe what type of painting is most/least desirable.

Looking at the information who can tell me what size the most wanted painting would be and how they know that? Why do you think most people want this size?

They will continue to interpret the information to define the characteristics of the most/least wanted paintings in their school.

(30 minutes) Using the information, students will each make either a most or least wanted painting.

Using the information we have gathered from the surveys, each of you will create either the school's most wanted painting or the school's least wanted painting. Who thinks they would like to make the school's most wanted painting? Can you tell me what size your painting will be? How did you decide that? Who would like to make a least wanted painting? What colors will you use? How did you decide that? It will help each of you before you start if you write down all of the things that you need for your painting. (what size, what colors, subject matter, etc.) I will pass out the rubric with the information that will show you what we are looking for in the end.

Clean-up

(5-10 minutes) Students will compare and contrast their painting to that of another student working with the same information. They will write a short paragraph to a page about how the paintings are similar/different and why they think the paintings looked different. At the bottom of the page, the students will use what they have learned from the lesson to create a list of pros and cons to using surveys to gather information.

Scientific Method Used:

Performed Experiment: Surveys

Analyze Data and Draw Conclusions: Used survey results to figure out the most/least wanted paintings. Created paintings from the information gathered.

Assessment:

Assessment will be done through the follow-up writing that the students do at the end of the project. The writing will be graded based on the standards listed in the rubric.

Points	5	3	1	0
Content of Paper	Student discusses at least 2 differences and 2 similarities of the two artworks.	Student discusses at least 1 difference and 1 similarity of the two artworks.	Student discusses at least 1 similarity or 1 difference of the two artworks.	Student does not compare and contrast the two artworks
Format of Paper	Paper is one paragraph to one page and uses complete sentences.	Paper is one paragraph to one page, but does not use complete sentences.	Paper is less than one paragraph and does not use complete sentences	Paper was not completed
Pro and Con List	Lists at least 5 pros and 5 cons in using surveys to create general assumptions.	Lists at least 3 pros and 5 cons in using surveys to create general assumptions.	Lists at least 2 pros and 2 cons in using surveys to create general assumptions.	Lists less than 2pros and 2 cons in using surveys to create general assumptions.
Artwork	Painting uses all of the requirements for the Least or Most Wanted painting.	Painting uses at least 4 of the requirements for the Least or Most Wanted painting.	Painting uses at least 3 of the requirements for the Least or Most Wanted painting.	Painting uses less than 3 of the requirements for the Least or Most Wanted painting.

Interdisciplinary: Math and science can both be integrated in this lesson. The analysis of the surveys and the interpretation of the data can be included in the math discipline. Science is included in the way that the end results are compared and contrasted and the interpretations of the data are compared for accuracy of interpretation.

Links: <http://www.diacenter.org/km/>

Lesson Seven- Rube Goldberg

Understanding the ability of science to both help and hinder our ability to get things done and the way it relates to our everyday lives

Lesson Objectives: -Students will view images of Rube Goldberg cartoons and watch part of the movie *The Way Things Work*.
-Students will discuss how Rube Goldberg devices are used and why.
-Students will design their own Rube Goldberg device (pencil drawings like Goldberg's cartoons).
-Students will write a short explanation of each step of their device.

Materials/Supplies: Rube Goldberg images, *The Way Things Work* video, pencils, paper (maybe long or different size options),

Instructional Strategies/Procedures:

(2 minutes) Upon entering the room, students will be asked to think about all of the things they had to do to get to the classroom. (open the door, pull out their seat, sharpen their pencil, etc.)

(5 minutes) Students will then be shown images of the Rube Goldberg cartoons.

These cartoons are drawn by a man named Rube Goldberg. Who can tell me what is happening in this cartoon?

Students will discuss the following:

What are the cartoons depicting?

What purpose do the devices have?

Are there other ways that the same job could be done?

Why would Rube Goldberg create these devices?

What are the consequences of machines doing our jobs?

(5-10 minutes) Students will be shown a clip from *The Way Things Work* and be asked to discuss:

How is this different from the cartoons? Why would people make a Rube Goldberg device like the one in the movie? What is this work trying to tell us? Why would someone make such a simple task so complicated? Can you think of any times in your life when you made a simple task more complicated than it needed to be? Why did this happen?

(25 minutes) Students will then be asked to make their own cartoon depicting their own Rube Goldberg device that can be used at school.

We are going to create our own Rube Goldberg devices today. Each of you can choose something simple that you do everyday at school. Who can give me an example of something you do everyday at school (sharpen pencil, hang backpack on hook, etc.) You can each choose a task that you do everyday and create a machine that will do that task for you. We will be drawing the machine like Rube Goldberg did in his cartoons. You will also be writing a description to go along with your drawing that will tell us how your machine works and what happens at each moment in the machine. (For example, the door knocks over the glass of water, the water knocks over the dominoes, etc.)

Scientific Method used:

Question: How can we take something really simple and make it complicated?

Research: Rube Goldberg devices

Analyze Data: Why did we make a simple thing more complicated?

Who can remember some ways we used the scientific method throughout the past 7 classes? Did we always use all 5 steps? Why or why not? How have you used the scientific method outside of class? Did using the scientific method change our work at all?

Assessment: Student works will be assessed by their drawing of a complicated machine that is used to complete simple tasks. The work must convey a simple task being completed by a complicated means. They must also include a written description of how the machine works with steps that follow a clear order.

Interdisciplinary: Science could play a huge role in this lesson, explaining how levers, pulleys, etc. work. Social studies could also be included in drawing connections between the ways in which our society over-complicates things and the way systems work in our society.

Possible follow-up: Students will write an advertisement for their device, as if they are trying to sell it.

Other Things to Keep in Mind: If further examples are necessary, many can be found on YouTube.

Links: <http://www.rubegoldberg.com/>