THE EDUCATION FUND

FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

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ECO Inks: Botanical Colors

ECO Inks: Botanical Colors

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Black Beans create Medium Violet Ink

GOALS

- To raise awareness of global issues
- To think like an artist/scientist
- To experiment as citizen scientist
- To examine the impact of color practices on the environment
- To use natural sustainable materials
- To assess art making skills
- To explore ideas for drawing

Turmeric roots make Dark Yellow Ink

OBJECTIVES

- Participants will examine sustainable color practices
- Participants will identify a variety of color producing plants and minerals
- Participants will experiment with ink making processes
- Participants will create a botanical color chart
- Participants will develop formulas to make color inks
- Participants will make mark making tools
- Participants will explore mark making techniques
- Participants will produce a limited edition of drawings

FLORIDA STATE STANDARDS

Science Standards:
Nature of Science
SC. 5. N.11/ SC.68. N.11/ SC.912. N.11
The Practice of Science
Define problems, use appropriate reference materials to support scientific understanding.

Technology
Color production and sustainable practices.

Engineering
Phases of production include formulating, mixing, filtration, and testing.

Visual Arts Standards:
Skills, Techniques, and Processes
VA.5. S.1 / VA.68. S.1 / VA.912. S.1
The arts are inherently experiential and actively engage learners in the processes of creating, interpreting, and responding to art.
Organizational Structure
VA.5. O.1 / VA.68. O.1 / VA.912. O.1
Understanding the organizational structure of an art form provides a foundation for appreciation of artistic works and respect for the creative process.
Historical and Global Connections
VA.5. H.3 / VA.68. H.3 / VA.912. H.3
Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields.
Innovation, Technology, and the Future
VA.5. F.1.1/ VA.68. F.1.1/ VA.912. F.1.1
Use divergent thinking, abstract reasoning, and various processes to demonstrate imaginative or innovative solutions for art problems.

Math
Cluster 2: Represent and interpret data.
MAFS.5.MD.2.2 A data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions to solve problems involving information given different measurements of liquid. Cognitive Complexity: Level 2: Basic Application of Skills & Concepts.

COURSE OUTLINE

I. ECO Inks: Botanical Colors
- A. Forage for Natural Materials
- B. Practice Dye/Pigment Extraction Processes

II. Botanical Color Chart
- A. Identify Plants and Natural Materials
- B. Categorize Color

III. ECO Ink Formulas
- A. Prepare Color Ink
- B. Make Color Test Strips

IV. Tool Making
- A. Gather Natural Materials
- B. Construct Tools/Brushes

IV. Mark Making Techniques
- A. Create a Grid
- B. Practice Mark Making

VI. Limited Edition Drawing
- A. Draw Enso Circular Form
- B. Explore Abstract Style

Red Onion Skins produce Pink Ink

OVERVIEW

Calling all Artists Scientists!
In this workshop you will think like a scientist and practice like an artist as you discover nature's palette, create botanical inks, and examine color processes that are natural, sustainable, and renewable.

You will increase your observational skills as you forage through the urban environment around the school or even in your own backyard to find colorful plants, flowers, leaves, seeds, berries, lichen, or moss. You can even make botanical inks from fruits, vegetables, or spices from your own kitchen.

ECO Inks: Botanical Colors has two distinct features: the color process of extracting pigment and the product, botanical ink. You will use scientific inquiry and artistic practice to identify a variety of color producing plants and minerals, make a plant-based color charts, document formulas for color palettes, explore marks making tools and techniques, and produce a limited edition of drawings.

Annatto Seeds yield Red-Orange Ink

INQUIRY QUESTIONS

1. What do artists/scientists make?
2. Why is observation essential?
3. How does science and art connect?
4. Why is it important to think like an artist?
5. How would you define sustainability?
6. Why are ECO friendly products critical to the environment?
7. If you could create a new color, what color would it be?
8. What are ways this project explores citizen science ideas?

Black Berries become Violet Ink

VISUAL ART RUBRIC

Student		Student	Lesson			Date	
Category	Question	Criteria	4 excellent	3 good	2 fair	1 emerging	0 limited
Composition	How is it organized?	Elements of Art Principles of Design Structure					
Completion	How is it finished?	Realized Accomplished Fulfilled					
Content	How is it communicated?	Subject Media Genre					
Creativity	How is it innovative or new?	Unique Interesting Innovative					
Craftsmanship	How is it made?	Presentation Quality Artistry					
TOTAL							
GRAND TOTAL							
COMMENTS							

EDUCATIONAL RESOURCES

bookstores

books and books	booksandbooks.com
amazon	amazon.com

visuals

davis publications	davis.org
scholastic arts	scholastic arts.org

supplies

the toronto ink company	jasonslogan.com/the-toronto-ink-company
jerry's art-a-rama	jerrysartarama.com
blick art materials	blick.com
jo-ann fabric and craft stores	joann.com

materials

ocean bank warehouse	educationfund.org

museums

museum of contemporary art	mocanomi.org
frost art museum	frost.fiu.edu
the met	met.org
museum of modern art	moma.org
oolite arts	oolite.org

fieldtrips

fairchild tropical botanic garden	fairchildgarden.org
miami beach botanic gardens	mbgarden.org

organizations

national art education association	naea.org
florida art education association	faea.org
dade art educators association	daea.org

videos

Art21	art21.org
metkids	metkids.org
tatekids	tatekids.org
ted ed visual art videos	teded.org

SELF ASSESSMENT

NAME	DATE
Question	**Answer**
1. Describe three things you enjoyed about this learning activity?	
2. Explain what part of this activity you would like to learn to do better?	
3. Discuss what part of this learning activity was the most difficult?	
4. Identify three innovative ideas, skills, or information you learned?	
5. State what you would do differently if you could do this project again? Why?	

GLOSSARY OF TERMS

- Assessment • to evaluate an outcome
- Binder • allows pigments to attach to the surface of the paper
- Botanical • made from parts of a plant
- Botany • the scientific study of plants
- Citizen Scientist • conduct experiments, collect data, results, and solve problems
- Color • the hue, value, and intensity
- Color Chart • an organized arrangement of pigments and plants
- Drawing • creating a picture using lines and other marks
- Dye • a natural substance used to add or change color
- Eco • not harming the environment
- Extract • a substance in a concentrated form
- Formulas • procedures written in a mathematical equation
- Funnel • a narrow tube with a wide top used to guide liquid into a small opening
- Gum Arabic • plant-based gum from the acacia tree used to thicken ink
- H
- Ink Making • Plant Material/Color + Water/Alcohol + Heat/Pressure + Preservative + Binder/Gum = Natural Ink
- J
- K
- Limited Edition • small number of copies of a print or drawing
- Mark Making • various kinds of lines, patterns, and textures used to make art
- Mordant • forms a bond between the paper and dye/pigment/ink
- Mortar • a sturdy bowl made of stone, ceramic, or wood
- Natural Materials • plants, animals, stones, minerals, or metals
- O
- Pestle • a rounded grinding tool
- Pigment • a substance that gives color to something
- Plant Based • fruits, vegetables, grains, beans, nuts, seeds, herbs, or spices
- Q
- Recycle • transform into a reusable material
- Reuse • use more than once
- Reduce • less in amount
- Stainless Steel • metal that does not stain or rust
- Sustainability • to maintain a balance
- Techniques • the way to perform a task
- Tool • an instrument or device used by the hand
- U
- Value • the lights and darks of a color
- W
- X
- Y
- Z

MATERIALS LIST

NATURAL MATERIALS	SUPPLIES	TOOLS	EQUIPMENT
Fruits Vegetables Flowers Beans Leaves Berries Seeds Herbs Roots Spices Water Salt White Vinegar Gum Arabic Whole Clove	Rubber Gloves Coffee Filters Paper Strips Sticks Watercolor Paper Newsprint Apron Cotton Twine Cloth Rubber Bands Paper Towels Rags	Mortar and Pestle Paint Brushes 2-3 Stainless-Steel Pots with lids Glass Jars with lids Measuring Cups Fine Wire-Mesh Strainers Funnels Teaspoons Kitchen Scissors Wooden Spoons Tongs Fork or Masher	Portable Burners

Plant Based materials fruits, vegetables, leaves, flowers, beans, seeds, herbs, or spices

BOTANICAL COLOR CHART

DYE COLOR	NATURAL PLANTS	DYE COLOR	NATURAL PLANTS
Red Orange	Annatto Seeds	Deep Green	Parsley
Red	Strawberries	Medium Green	Grass
Dark Red	Cherries	Light Green	Laurel Leaves
Pink	Red Onion Skins	Dark Green	Spinach Leaves
Light Pink	Avocado Stones	Blue Violet	Red Cabbage
Red Violet	Beets	Violet	Blackberries
Bright Orange	Carrots	Medium Violet	Black Beans
Orange	Eucalyptus Leaves	Light Violet	Grapes
Peachy Yellow	Pomegranate	Light Brown	Mushrooms
Yellow Orange	Saffron Flowers	Medium Brown	Bark
Yellow	Chamomile	Dark Brown	Coffee
Dark Yellow	Turmeric	Brown	Cinnamon
Light Yellow	Lemon Peels	Grey	Black Tea
Green	Green Tea	Dark Black	Charcoal

ECO INK FORMULAS

COLOR INKS	FORMULAS
Red Orange	Annatto Seeds + Water + HEAT + Salt + Vinegar + Gum Arabic
Pink	Red Onion Skins + Water + HEAT + Salt + Vinegar + Gum Arabic
Light Pink	Avocado Stones + Water + HEAT + Salt + Vinegar + Gum Arabic
Red Violet	Beet + JUICE + Salt + Vinegar + Gum Arabic
Yellow Orange	Saffron Flowers + Alcohol + Gum Arabic
Yellow	Chamomile Flowers+ Water + HEAT + Salt + Vinegar + Gum Arabic
Dark Yellow	Turmeric + Water + HEAT + Salt + Vinegar + Gum Arabic
Light Yellow	Lemon Peels + Water + HEAT + Salt + Gum Arabic
Green	Green Tea + Water + HEAT + Salt + Gum Arabic
Light Green	Laurel Leaves + Water + HEAT + Salt + Vinegar + Gum Arabic
Dark Green	Spinach Leaves + Water + HEAT + Salt + Vinegar + Gum Arabic
Violet	Black Berries + Water + MASH + Salt + Vinegar + Gum Arabic
Medium Violet	Black Beans + Water + HEAT + Salt + Vinegar + Gum Arabic
Dark Brown	Coffee + Water + HEAT + Salt + Vinegar + Gum Arabic

LEGEND

Salt = Preservative
Vinegar = Mordant
Gum Arabic = Binder
Water/Alcohol = Vehicle
Plant Materials = Pigment
Heat/Juice/Mash = Release Color
Clove = Additive

RATIO
Vinegar 1 tablespoon: 1 cup Water
Salt 1 tablespoon: 1 cup Water
Plant material 1 cup: 2 cups Water

LESSON PLAN: ECO INK MAKING

Title: ECO INK MAKING	
Contributor: Susan Feliciano	**Email:** susanfeliciano@dadeschools.net
School: Marjory Stoneman Douglas EL	**County:** Miami-Dade
Level of Lesson: Elementary/Middle/High/Museum	**Lesson Length:** 60 minutes

Essential Questions

1. What do artists/scientists make?
2. How do science and art connect?
3. If you could create a new color, what color would it be?

Objective

Participants will engage in a sustainable ink making project ECO Ink: Botanical Colors, examine sustainable color practices, identify a variety of color producing plants and minerals, experiment with ink making processes, develop formulas to make color inks, and create a botanical color chart.

Procedures

1. Wear apron.
2. Cover workspace with newsprint.
3. Gather/forage plants, flowers, leaves, vegetables, and fruits.
4. Cut plants, flowers, leaves with scissors.
5. Peel, Chop, Juice or Smash fruits, vegetables, or berries.
6. Measure 1 cup of plant-based material.
7. Check ECO Ink Formulas for steps #8-9.
8. Add 2 cups of water. Or add alcohol. Or juice or mash plant-based materials.
9. Add a tablespoon of salt and 2 tablespoons of vinegar to the liquid.
10. Heat plant-based material in large metal pot over simmering water for 20 minutes.
11. Dip test strip into colored water to identify color intensity. Label strips by color.
12. Heat longer for more intense color. Let cool.
13. Use tongs/wooden spoons to remove large chucks of floral and vegetal material.
14. Utilize wire mesh strainer to remove smaller bits of plant-based materials.
15. Pour liquid into glass jars using coffee filter and funnel.
16. Include a teaspoon of gum Arabic and a whole clove in the jar.
17. Create your own botanical chart using selected floral and vegetal materials.

Self-Assessment/Rubric:

Self-Assessment/ Visual Arts Rubric

Sketchbook/Journal:

Note Taking/ Formulas / Record Experiments / Sketches

ESOL Strategies:

Visual Clues / Model Task / Hands-on Activities / Cooperative Learning / Use Graphs

LESSON PLAN: TOOL MAKING TECHNIQUES

Title: TOOL MAKING TECHNIQUES	
Contributor: Susan Feliciano	**Email:** susanfeliciano@dadeschools.net
School: Marjory Stoneman Douglas EL	**County:** Miami-Dade
Level of Lesson: Elementary/Middle/High/Museum	**Lesson Length:** 60 minutes
Essential Questions 1. How do artists determine goals for designing objects, places, or systems? 2. Why are ECO friendly products critical to the environment?	
Objective Participants will engage in a sustainable tool making project, explore natural materials, experiment with tool making techniques, and examine sustainable practices.	
Procedures 1. Wear apron. 2. Cover workspace with newsprint. 3. Gather/forage flowers, branches, stems, sticks, twigs, and leaves. 4. Cut plants with scissors. 5. Select small branches and long sticks for handles. 6. Bundle twigs, flowers, leaves, stems in plant groups. 7. Gather bundles of plant groups around different branches or sticks. 8. Use cotton twine to tie and secure bundles. 9. Create your own set of mark making tools using selected plant materials.	
Self-Assessment/Rubric: Self-Assessment/ Visual Arts Rubric	
Sketchbook/Journal: Note taking/ Tool Ideas /Sketches	
ESOL Strategies: Visual Clues / Model Task / Hands-on Activities / Cooperative Learning / Use Graphs	

LESSON PLAN: MARK MAKING TECHNIQUES

Title: MARK MAKING TECHNIQUES	
Contributor: Susan Feliciano	**Email:** susanfeliciano@dadeschools.net
School: Marjory Stoneman Douglas EL	**County:** Miami-Dade
Level of Lesson: Elementary/Middle/High/Museum	**Lesson Length:** 60 minutes
Essential Questions 1. Why is it important to think like an artist? 2. How do artists and designers create works of art or design that effectively communicate?	
Objective Participants will engage in a sustainable mark making project using ECO Inks: Botanical Colors explore mark making techniques	
Procedures 1. Create an 8” x 8” grid on paper. 2. Measure 2” squares with a ruler. 2. Use mark making tools. 3. Apply ECO Inks. 4. Experiment with various kinds of lines, patterns, and textures. 5. Label all 16 different marks.	
Self-Assessment/Rubric: Self-Assessment/ Visual Arts Rubric	
Sketchbook/Journal: Note taking/ Mark Making /Sketches	
ESOL Strategies: Visual Clues / Model Task / Hands-on Activities / Cooperative Learning / Use Graphs	

LESSON PLAN: DRAWING

Title: DRAWING	
Contributor: Susan Feliciano	**Email:** susanfeliciano@dadeschools.net
School: Marjory Stoneman Douglas EL	**County:** Miami-Dade
Level of Lesson: Elementary/Middle/High/Museum	**Lesson Length:** 60 minutes
Essential Questions 1. How do artists and designers create works of art or design that effectively communicate?	
Objective Participants will engage in a sustainable drawing project using ECO Inks: Botanical Colors, apply various botanical colors, experiment with mark making techniques, execute Enso circular form, explore abstract styles, and produce a limited-edition drawing series.	
Procedures 1. Wear an apron optional. 2. Cover workspace with newsprint. 3. Distribute mark-making tools and paper. 2. Place ink in wide mouth glass jars. 3. Use mark making tools. 3. Apply ECO Inks. 4. Execute with Enso, circular form. 5. Explore abstract styles. 6. Produce a limited-edition drawing series.	
Self-Assessment/Rubric: Self-Assessment/ Visual Arts Rubric	
Sketchbook/Journal: Note taking/ Practice Enso /Sketches	
ESOL Strategies: Visual Clues / Model Task / Hands-on Activities / Cooperative Learning / Use Graphs	

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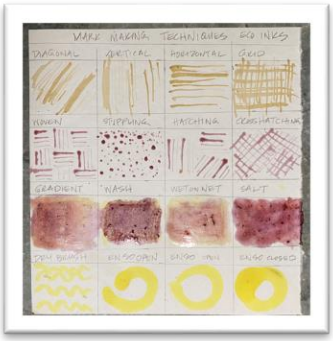
GALLERY OF IMAGES

ECO Ink Making

Mark Making Technique



Tool Making

Drawing