Lesson/Unit Title: Bio Art - Painting at the Cellular Level with Bacteria

Grade Level(s): Grade 6

Duration: 6 weeks

Big Idea/Unit Overview:
Students are synthesizing and related scientific knowledge and personal experiences to make art through painting with bacteria.

Essential Questions:
- How do you experiment with bacteria?
- How do you grow bacteria?
- How many colors can I get to grow?
- What patterns of growth can I get with bacteria?
- How long does it take to grow a certain colors?
- What kind of picture can I make?

Objectives/Outcomes:
- Science and art can be integrated to create an innovative creative idea.
- Students will know artistic and scientific methods are similar.
- Students will relate artistic ideas and work with personal meaning using external context.
- Students will investigate and developing awareness of perceptions and knowledge through experiences.
- Students will be able to construct a scientific explanation based on evidence for how environmental influences can affect the growth of organisms.

Vocabulary:
- Antibiotic
- Bacterium or bacteria
- Bacterial colony
- Cell
- Inoculating loop
- Agar
- Microbe
- Negative space
- Petri dish
- Pigment
- Mitosis

Materials:
- Toothpicks
- Glass beads
- Cotton swabs
- Petri dishes
- Nutrient agar
- Rhizobium leguminosarm
- Sarcina aurantiaca
- Serratia marcescens
- Staphylococcus epidermis
- Micrococcus roseus
- Digital Microscopes
- Inoculating loop
- Microscope cameras
- Painting with bacteria kit
- Paint brushes

Resources (websites, videos, images, books, etc.): Google slide presentation
Procedure:
Through experimenting with bacteria growth, the students will produce an agar picture through growing bacteria in the way they planned.

Introduction:
What prior knowledge do students already have?
- Structure of bacteria cell
- Different places bacteria can be found
- Grown bacteria cultures in petri dishes
- Used microscopes and can prepare slides
- Talked about Ecoli
- Chemical interactions of bacteria in the body

Demonstration:
- How to handle bacteria in a safe way.
- How to document the process.

Process:
- Day 1 - Introduction: Review bacteria unit and use the slide presentation to define agar painting and show examples to promote motivation.
- Day 2 - Demo on setting up experiments, show how to do journals, break students into groups for experiments. During art have students brainstorm ideas for their projects.
- Day 3 - Students start working with bacteria to understand how they will grow
- Day 4 - Continue working on practice plates
- Day 5 - Analyze bacteria growth and record in journals. Finalize plan for bacteria picture
- Day 6 - Start creating bacteria picture and record bacteria used and placement in journals
- Day 7 - Check bacteria growth and determine what alterations need to be made if any. Record findings in journal
- Day 8 - Continue creating bacteria pictures and record any changes or additions made
- Day 9 - Create presentation to share including the student’s process, types of bacteria used, and details on the bacteria used
- Day 10 - Continue working on presentation
- Day 11 - Share presentations with peers
- Day 12 - Continue sharing presentation with peers

Assessment:
- Pictures of progression of bacteria growth
- Documentation in science journals
- Brainstormed ideas of art idea
- Finished art (photo)
- Written explanations
Standards:

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<thead>
<tr>
<th>NATIONAL CORE ARTS STANDARDS (NCAS): (identify which art form/s)</th>
<th>Grade 6</th>
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<tbody>
<tr>
<td>• Brainstorm and generate artistic ideas and works that integrate science and art.</td>
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<tr>
<td>• Organize and develop artistic ideas and work.</td>
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<td>• Experiment with bacteria to see how bacteria grow.</td>
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<tr>
<td>• Refine and complete works of art.</td>
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<tr>
<td>• Refine artwork for presenting.</td>
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<td>• Convey meaning through presented artistic work.</td>
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<td>• Interpret intent meaning in artistic work.</td>
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<td>• Apply criteria to evaluate artistic work.</td>
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<tr>
<td>• Synthesize and relate knowledge and personal experience to make art.</td>
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<td>• Use science to create a work of art using bacteria as the medium.</td>
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