SPARKed
SPARK in Education

EDUCATOR GUIDE

Story Theme: Art Meets Nature
Subject: Natalie Jeremijenko
Discipline: Visual Arts

SECTION I - OVERVIEW 2

SECTION II – CONTENT/CONTEXT 3

SECTION III – RESOURCES 5

SECTION IV – VOCABULARY 7

SECTION V – ENGAGING WITH SPARK 8

Conceptual artist Natalie Jeremijenko amidst a field of cloned trees - part of her OneTree(s) project. Still image from SPARK story, February 2004.

SPARKed
SPARK in Education

SECTION I - OVERVIEW

EPISODE THEME

Art Meets Nature

SUBJECT

Natalie Jeremijenko

GRADE RANGES

K-12 & Post-secondary

CURRICULUM CONNECTIONS

Visual Arts & Language Arts

OBJECTIVE

To introduce students to conceptual art and the role of information as an artistic medium through the OneTree(s) work by Natalie Jeremijenko

STORY SYNOPSIS

SPARK follows conceptual artist/engineer Natalie Jeremijenko as she works on her One Tree(s) project, planting 100 pairs of cloned trees throughout the Bay Area.

INSTRUCTIONAL STRATEGIES

Group oral discussion, review and analysis, including peer review and aesthetic valuing as a group
Teacher-guided instruction, including demonstration and guidance
Hands-on individual projects in which students work independently
Hands-on group projects in which students assist and support one another
Critical reflection on personal expressions and how they are seen and received by others

INSTRUCTIONAL OBJECTIVES

To introduce students to Conceptual art and its guiding principals
To provide a context for the understanding of the use of information as an artistic medium
To inspire students to develop their own concepts, ideas and questions with regards to art-making

EQUIPMENT NEEDED

SPARK story "OneTree(s)" about Natalie Jeremijenko on VHS or DVD and related player
Computer with Internet access, navigation software, speakers and a sounds card, printer
Cassette player, CD player, or computer audio program

MATERIALS NEEDED

Access to libraries with up-to-date collections of periodicals, books, and research papers
Pencils, pens, and paper

INTELLIGENCES ADDRESSED

Bodily-Kinesthetic - control of one's own body, control in handling objects
Interpersonal - awareness of others' feelings, emotions, goals, motivations
Intrapersonal - awareness of one's own feelings, emotions, goals, motivations
Spatial - ability to manipulate and create mental images in order to solve problems
Logical-Mathematical - ability to detect patterns, reason deductively, think logically

Find more information on Multiple Intelligences at www.kqed.org/spark/education.

SECTION II – CONTENT/CONTEXT

CONTENT OVERVIEW

Natalie Jeremijenko has been working hard on an art project large enough that it will span the entire Bay Area. In "Art Meets Nature," Spark follows Jeremijenko as she works on her OneTree(s) project, which involves planting 200 identical trees in pairs in cities all around the region.

The trees are all clones from one "mother tree" in Oakdale, California, a 100-year old walnut tree that is more than 100 feet tall. Because all the trees will be genetically identical, the differences in the way they grow can be accounted for by the areas in which they will be planted. In this way, the project will map the diverse social, economic, and cultural backgrounds of the people that care for them, and of the environmental differences in the neighborhoods in which the trees will exist.

Burchell Nurseries in Oakdale produced the clones in a biological laboratory. Since they were four to five feet high, they have been growing outside in a field. While the field conditions have been basically uniform, the trees have already begun to show individual differences. Now at two years old, the trees are ready to be planted. All 200 of the trees will be installed in urban environments, however the neighborhoods will vary greatly in terms of climatic conditions and socioeconomic status. These differences will determine how the trees grow over time and cause variances between them.

Natalie Jeremijenko, "OneTree(s)" project cloned trees on view at the Exploratorium, San Francisco, 2001. Still image from SPARK story, 2003.

Like the work of many contemporary artists, Jeremijenko's art is as much about process as it is about product. Planting 200 trees in a number of municipalities is a complicated process: to get the project off the ground, Jeremijenko must negotiate with authorities, argue the artistic merits of the project to property owners, and generally promote her ideas to the communities at large. Jeremijenko considers these negotiations all part of her work of art. Where artists in past centuries might have relied almost exclusively on their technical skills in the execution of individual works of art, Jeremijenko and other artists working in this genre must develop interpersonal, communication, and negotiation skills.

Born in Australia in 1966, Jeremijenko now lives in New York City where she is a research fellow at the Center for Advanced Technology at the Computer Science Department of New York University.

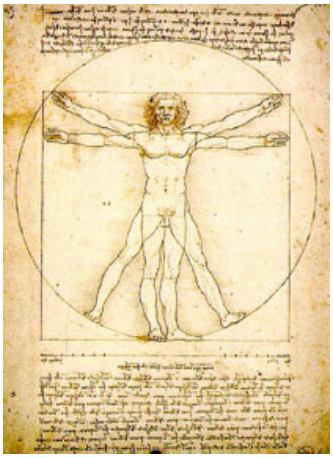
Jeremijenko gets help planting one of her cloned trees from two aspiring artists. Still image from SPARK story, March 2003.

THE BIG PICTURE

By employing the sciences of biology and genetics as a means of getting to a question about differences in urban environments across the Bay Area, Jeremijenko's work challenges conventional thinking about art.

This genre of art–sometimes referred to as conceptual or information art–is concerned with the use of information to explore and express ideas. This type of artwork emphasizes concept and/or process over product. Final "products" include non-traditional art forms, such as written documentation, research findings, recorded commentary, documentary photographs, audio and video recordings, Web sites, printed data, etc. These records are sometimes considered works of art in and of themselves, although more commonly, they are considered parts of a larger work.

The use of new tools and emerging technologies by artists can have profound implications on our culture through the artists' representation of information traditionally considered to be objective (i.e. scientific conclusions). By presenting "facts" in different ways, artists raise questions about the veracity of scientific data and encourage new interpretations of information.



Leonardo da Vinci, Study of Proportions, based on Vitruvius' De Architectura, originally published in 1521.

Another artist in history who united new science and math technologies to art is Leonardo da Vinci. In his now famous drawing Study of Vitruvian Proportions, da Vinci attempted to quantify ideal human proportions using the Vitruvius' newly developed mathematical system of architectural proportions. In the Study, da Vinci physically described the ideally proportioned male body alongside mathematical notations.

At the time, the idea of applying an abstract mathematical concept to the human form contrasted greatly with the conventional approach to representations of the human form in art, introducing a new way for artists to think about making images.

SECTION III – RESOURCES

TEXTS

Atkins, Robert. ArtSpeak : A Guide to Contemporary Ideas, Movements, and Buzzwords, 1945 to the Present (Speak Series). New York: Abbeville Press, 1997.

Goldsworthy, Andy. Time. New York: Harry Abrams, 2000.

Hopkins, David. After Modern Art: 1945-2000. Oxford: Oxford University Press, 2000.

Osborn, Peter. Conceptual Art: Themes and Movements. London: Phaidon Press, 2002.

Strelow, Heike, ed. Aesthetics Of Ecology

WEB SITES

Acorn - gateway to site where educators can order Good Earth Art: Environmental Art for Kids, a how-to-guide of 200+ practical, easy and open-ended art activities - http://www.acorn-group.com/ .

Art & Science Collaborations, Inc. – A membership organization and Web site dedicated to art and science. - http://www.asci.org

Eelink - Resource for students, teachers, and professionals for K-12 environmental education – http://www.eelink.net

Explanation of use of Punnet Square in charting biological process in offspring - www.athro.com/evo/gen/punexam.html

Getty Center for the Arts, The - Resource site providing curricula and activities for K-12 educators - www.getty.edu/education

Guggenheim Museum - Conceptual art definition, artists & images – http://www.guggenheimcollection.org/site/movement_works_Conceptual_art_0.html

WEB SITES (Continued)

KQED's "You Decide" Interactive Web site - select "Cloning" from archive – http://www.kqed.org/topics/news/perspectives/youdecide/pop/cloning/

One Tree(s) project Web site - www.onetrees.org

Orlo - Non-profit organization dedicated to exploring environmental issues through the creative arts - www.orlo.org

Project Learning Tree – Award winning K-12 environmental education program of the American Forest Foundation - www.plt.org

United States Environmental Protection Agency, The - www.epa.gov

Viewing Space - http://www.viewingspace.com
See pages on Creative Cloning - http://www.viewingspace.com/genetics_culture/pages_genetics_culture/gc_w08/gc_w08.htm

MEDIA

"Art 21: Art in 21st Century" Seasons 1 and 2 (2pc each) (2003) (VHS and DVD – Color) PBS (Direct), 2003.

"Nova - Cracking the Code of Life," (2001) VHS (VHS – Color) Closed-captioned, WGBH Boston Video, 2001.

"Pioneers in Art and Science: Gustav Metzger" (DVD – Color), The Arts Council England, Pinnacle Entertainment Distribution, 2004.

"Science: Behind Closed Doors, Vol. 3 - Human Cloning: Scientific Miracle or Crime Against Creation," (1911) (VHS – Color) UFO Video, Inc., 2002.

BAY AREA FIELD TRIPS

CA Academy of Sciences
Golden Gate Park
55 Music Concourse Drive
San Francisco, CA 94118
415/379.8000
http://www.calacademy.org/

Exploratorium
At the Palace of Fine Arts
3601 Lyon Street
San Francisco, CA 94123
415/561.0399
Hours: Tuesday-Sunday, 10am to 5pm
http://www.exploratorium.org

The Tech Museum of Innovation
201 South Market Street
San Jose, CA 95113
408/294.TECH
Hours: Open Daily, 10am to 5pm
http://www.thetech.org/

Lawrence Hall of Science
Centennial Drive
Berkeley, California 94720
510/642.5132
Open Daily 10 a.m. - 5 p.m.
http://www.lawrencehallofscience.org

Bay Area Discovery Museum
East Fort Baker
557 McReynolds Road
Sausalito, CA 94965-2614
415/339.3900
http://www.badm.org

SECTION IV – VOCABULARY

DISCIPLINE-BASED VOCABULARY AND WORDS AND CONCEPTS IN THE SPARK STORY

Clone
An individual grown from a single somatic cell of its parent and genetically identical to it; one that appears to be an exact copy of an original

Cloning
To propagate a clone or exact replica from; to make a copy or copies of an original

Concept
Something conceived in one's mind; a thought, notion or idea; an abstract or generic idea generalized from particular instances

Conceptual
Being of or related to concepts

Conceptual Art
An art movement beginning in the 1960s and 70s in which artists deliberately sought to avoid using traditional art materials and approaches. Conceptual artists aim (generally speaking) to create works of art based on the analysis and investigation of the language of art and the system within which it exists. Conceptual materials, processes of inquiry, and creation are akin to scientific analysis, such as that used in science philosophy. Conceptual art takes its data from science or linguistics and the need in our culture for definite meaning or truth, using these forms of data and inquiry to question the nature of the concepts

Contemporary
Happening, existing, living, or coming into being during the same period of time

Genetics
A branch of biology concerned with heredity and the variation of living organisms

Negotiations
The action or process of negotiating or being negotiated -- often used in plural

Environment
The circumstances or conditions by which one is surrounded; the full complement of physical, chemical, and biotic factors (as climate, soil, and living things) that affect an organism or an ecological community and determine its form (shape, size, etc.) and its survival over time

SECTION V – ENGAGING WITH SPARK

STANDARDS-BASED ACTIVITIES AND DISCUSSION POINTS

Talking about Information as Art

Natalie Jeremijenko's artwork emphasizes concept and/or process over product. She cultivates "cloned" plants, and chart differences in their development over time through various forms of visual information, including traditional art forms such as drawing, painting, and photography, and conventional scientific forms, such as graphs, tables, and written observations. This genre of art– sometimes referred to as conceptual or information art – is concerned with the use of information to explore and express ideas.

Using the resources in this guide, explore the "OneTree(s)" project and the "OneTree(s)" Web site, focusing on the ways in which Natalie Jeremijenko approaches the project and displays information. Show students a variety of forms of "documentation" - ways in which data is presented - including graphs, tables, statistics, Audubon animal prints, Web site pages, X-rays, tables, anatomical drawings, etc.

Invite students to examine the differences between the forms of information, asking:

- What do the different forms communicate?
- What are the differences between they way they look?
- What are the differences between a drawing and a graph in terms of the information each provides?
- Which ones are "art" and which ones are not? What are the differences?

Discuss student responses to these questions ensuring that key issues are addressed, such as:

- Is visual presentation of information an art form?
- By presenting "facts" in different ways, can artists challenge notions of objectivity in relation to scientific data?
- Can new forms of representation of information encourage new interpretations of information?

RELATED STANDARDS
VISUAL ARTS
Grade 5
1.0 ARTISTIC PERCEPTION
Analyze Art Elements and Principles of Design
1.3 Use their knowledge of all the elements of art to describe similarities and differences in works of art and in the environment

Grade 7
5.0 CONNECTIONS, RELATIONSHIPS, APPLICATIONS
Visual Literacy
5.3 Examine art, photography, and other two and three-dimensional images, comparing how different visual representations of the same object lead to different interpretations of its meaning, and describe or illustrate the results.

Cloning Plants

Guide students through the process of creating tree clones by sprouting cloned potato plants from one "parent" potato. To cultivate the clones, have them place the "parent" potato in a dark, warm place and wait until it begins to sprout "eyes" (10-15 days). They will need to remove the eyes at their cores, and using toothpicks, suspend the tiny sprouts in containers of water, the bottoms just touching the surface. Once the eyes have sprouted roots, have students plant them in small pots and then cultivate them in different conditions, varying the amount of light, water, attention, and oxygen.

Cloning Plants (continued)
Ask students to formulate hypotheses about how their plants will grow, given the selected conditions, including height, density, and color. Encourage them to document the growth by:

- Keeping a daily or weekly "plant journal" with written observations.
- Drawing (using color) the plants every day or week documenting changes in gesture, shape and color
- Charting the plants' development in a table, mapping changes in height, width and density of the plant, or alternatively using simple graphs for each plant that show the changes over time.
- Taking weekly photographs of the plants.
- Drawing the interior of the plant including the cells, and structures for transporting water and oxygen, and processing sunlight.

Invite students to compare the results between the clones, mapping how each grew and changed using Punnet Squares, tables or graphs.

Challenge students to create an exhibition of the various information forms. They should also present their completed research, comparing their findings to their hypotheses and explaining the differences and variations.

More advanced students they may enjoy creating animated presentations of their findings, combining their photographs, drawings, and research results into PowerPoint or Micromedia Flash programs. They should focus on the comparison between their findings and their original hypotheses.

To conclude the activity, discuss the changes as a group, asking each student to present what s/he learned and how the forms of information relate to their findings.

Talking about Cloning
Begin with a discussion about cloning. In each case, ask students to support their opinions with rationales, including research findings, religious beliefs, and/or historical precedents.

- What do they understand about "cloning" and "clones"?
- What examples can they identify?
- What is the difference between creating clones and creating art?
- How is creativity defined in terms of creation?

For 9-12th grades ask students to explore the implications of cloning in terms of:
Science - benefits to science, knowledge about disease, tampering with genetic coding
Morality - creating life through scientific method rather than through procreation
Cultural/Historical - implications on culture, cultural purity, cultural difference

Ask students to write a 1000 word essay on - *Cloning – what are the key issues in contemporary society?*

RELATED-STANDARDS
SCIENCE
Grade 5
Investigation and Experimentation
6a-i Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

Grade 7
a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e. g., motion of Earth's plates and cell structure).
e. Communicate the steps and results from an investigation in written reports and oral presentations
Grade 9-12 Proficient
Genetics 2a-g, 3a-e, 4a-f, 5a-e
Ecology 6a-g

SPARKLER:

⁎ Show students 2 or 3 different images of conceptual artwork and initiate a compare and contrast conversation. Possible works might include:

- "OneTree(s)" project
- Works by Ana Mendiata
- Works by Bruce Nauman
- Works by Michael Heizer
- Works by Andy Goldsworthy
- Works by Mel Chin

Discuss:

1. What the different works communicate - what are the concepts behind them?
2. How are these concepts communicated?
3. What material(s) are they made from?
4. What does the material(s) have to do with the concept?

For more information about SPARK and its educational content, including the Visual & Performing Arts Standards, visit the Web site at http://www.kqed.org/spark/education.

For more information about the California Visual & Performing Arts Standards, visit the CA Dept. of Education at http://www.cde.ca.gov/be/st/ss/index.asp

RELATED-STANDARDS
LANGUAGE ARTS

Grade 5

2.0 Reading Comprehension (Focus on Informational Materials)

2.1 Understand how text features (e.g., format, graphics, sequence, diagrams, illustrations, charts, maps) make information accessible and usable.

2.3 Discern main ideas and concepts presented in texts, identifying and assessing evidence that supports those ideas.

2.0 Writing Applications

2.3 Write research reports about important ideas, issues, or events by using the following guidelines:

a. Frame questions that direct the investigation.

b. Establish a controlling idea or topic.

Grade 7

Writing Strategies

1.2 Support all statements and claims with anecdotes, descriptions, facts and statistics, and specific examples.

Grade 11&12

Writing Strategies

1.3 Structure ideas and arguments in a sustained, persuasive, and sophisticated way and support them with precise and relevant examples.

1.4 Enhance meaning by employing rhetorical devices, including the extended use of parallelism, repetition, and analogy; the incorporation of visual aids (e.g., graphs, tables, pictures); and the issuance of a call for action.