ART AS AN INTEGRATOR
RESEARCH , EDUCATION, and OUTREACH

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Abstract

To establish an interdisciplinary collaborative team (between NYU-Poly, New York City high schools/middle schools and artists) that makes objects, events and exhibitions that used real materials in art. The objective of this collaboration is to use art and materials used in art as the common interface between the scientific community (mostly materials science and mechanical engineering), the materials art community, students (from the youngsters to the graduate level, K-20) and the general public.

OBJECTIVE

1) Spread scientific and artistic literacy:

The materials used in an artistic work provide ways into technical discourse and interdisciplinary discussion in materials science and mechanical engineering as well as an interface to discuss ethical and cultural impact of conventional/new materials technologies. This collaborative team would work on designing and creating art work supported or illustrated by scientific knowledge.

(2**) Infuse and stimulate knowledge, skills, creativity, versatility and a sense of wonder among the youngsters:**

The use of art as a vehicle for transmitting knowledge offers an informal approach to introduce fundamental concepts in materials science and mechanical engineering and removes the mathematical barrier to discussion. The encounter with the art work suddenly changes the appreciation of both its artistic and scientific content.

(3**) Integrating scientific activities into artistic creations and vice versa:**

Materials discovery and development now largely belongs to the scientific realm while art generally appropriates rather quickly the dividends of scientific quests. Here we propose to close the loop by including artists in the development of research programs in a cross-disciplinary approach to transform “traditional” research and educational practices. One could easily imagine the artist play his/her full role in determining the focus of materials research, introducing materials and mechanics problems from an artistic context, but also being an integrated part of a course to introduce students to concepts of inquiry-based science teaching, designing for interactivity, and rapid prototyping for art creation. At the same time, the scientist could introduce new materials and materials research themes into an artistic context.

(4) **Broaden the ties of NYU-Poly with the local community**:

NYU-Poly is nationally ranked No. 2 in contributing to student social mobility and already has several programs fostering ties with the New York community (Youth in Engineering and Science, GK12 Applying Mechatronics to Promote Science). This unique collaboration between the university, schools, school district and artistic community offers an alternative opportunity to further develop strategic partnerships with local business, community service organizations, various foundations and governmental agencies to pursue future activities along the same theme (Informal Science Education program at NSF, program at the Brooklyn Community Foundation or Motorola Innovation Generation Grant program for example).

RESEARCH

Art can be used as a vehicle to transfer scientific and mathematical theories. There have been several artists that have been inspired by science. Such as,

Nathalie Miebach won a 2009 Artist Fellowship for her recent works. This is a woven sculpture that depicts weather data. She researched the environmental interactions of weather. *(www.artsake.massculturalcouncil.org)*

Carl. H. Sequin was inspired by Celestial Events. When high-energy particles form the sun hit the Earth’s ionosphere, light displays and are called the Aurora Australis. (www.cs.berkeley.edu)

There have also been mathematicians that have been inspired by art. There is a father and son team ; Erik and Martin Demaine, at MIT that use art to demonstrate, prove and disprove mathematical theories. They have used their method to prove that the hyperbolic paraboloid doesn’t exist. (www.popsci.com)

There is also a distinguished professor of materials science and engineering, Rohit Trivedi; who has been inspired by art. He wrote a book, *Materials in Art and Technology* because he was fascinated by artist ability to manipulate materials without any science background.

RESULTS

For the Fall semester, we will implement a six-week program in a middle school math classroom. The focus will be on transformations which is a topic in the mathematics curriculum. The students will learn the techniques necessary to perform transformations and create a sculpture during the course of this program.

The math knowledge students will attain is of:
Basic geometric properties of 2D and 3D figures
Represent patterns and simple relationships
Identify the results of transformations on plane figures
Develop flexibility in solving problems

The art knowledge students will attain is of:
Classify art pieces into periods, such as cubism
Recognize famous artists and artwork
Consider limitations and advantages of certain materials
Exposure to multiple museums and galleries

The science knowledge students will attain is of:
Introduction to Material Science
Basic material properties (metal, ceramic, wood)
Conduct several laboratory experiments
Learn science through ideas not formulas
Exposure to molecular views of materials

The success of this program will based on the multiple assessment results. The students will be receive several types of assessments throughout the six weeks. All progress will be documented so that replication of the program be done.

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