Creative Arts + STEM Collaborations: Effective Tools to Build a STEAM Program

Oct. 29th – STEM Symposium
The vision of the collaborative is to advance high quality Arts + STEM education so that students will be prepared to drive the innovative workforce of the future.

The Arts + STEM Collaborative was established to provide arts, STEM and education leaders the opportunity to share best practices and identify areas of convergence.
Denise Grande
Director of Arts Education
LA County Arts Commission
A Tale of Three Counties

Los Angeles County:

- 81 School Districts
- LA County Office of Education
- LA County Arts Commission
A Tale of Three Counties

Orange County: 28 School Districts
Orange County Dept. of Education
Arts Orange County
A Tale of Three Counties

San Diego County: 42 School Districts
San Diego County Office of Ed
STEAMConnect

ARTS EMPOWER SAN DIEGO
The Vision of One Grantmaker
Central Question

What difference can we make together through collaboration to influence the quality and rigor of STEAM education?
Process

- Literature Review
- Sharing our Work
- Expanding the Tent
Common Definition

Arts + STEM is an approach to teaching and learning that prepares all students to be critical thinkers, innovative employees, entrepreneurs and engaged citizens. Arts + STEM is the intentional integration of the processes, content and practices in arts, science, technology, engineering and math.
A Blueprint for Creative Schools

- Partnership with national STEM network
- Share best practice and exemplary models
- Create model standards-based arts integrated curriculum for grades K-6
Kim Richards
Coordinator, Arts & Stem Collaborative
Founder, KDR PR & STEAM Insight
2015-2016 Activities

- Conduct 9 site visits across the 3 counties, collect; insights from STEAM schools.

- Convene stakeholders to calibrate S.T.E.A.M. definition and analytic tools to current practice.

- Develop and pilot implementation guide.
Site Visit Highlights
STAR Education is a charitable 501(c)(3) non-profit organization that has been selected the leader in innovative educational programming and community-based cultural enrichment projects for over 25 years. STAR services more than 500 schools in over 60 school districts, reaching over a million students and their families every year. STAR works with students, families, schools and communities to provide exceptional educational and cultural enrichment opportunities.

THE ART OF 3-D PRINTING

BEAUTY IN SCIENCE

BIOMECHANICS WITH UCLA VOLUNTEERS
STAR’s Initiative to Work Collaboratively With Community Professionals To Approach Instruction from an Interdisciplinary Perspective.
S.T.E.A.M.

A Model of Thinking
CONCEPTUAL FRAMEWORK
WHY INTEGRATION?

“Are We Building Cooks or Chefs?” SUSAN RILEY

Interdisciplinary Instruction is about the tools that we use to provide the opportunities for teachers and students to make connections and thereby long term learning.
GETTING STARTED:
Focusing on the Obvious

- Eliminating Silos
- Recalibrating Perspective
- Understanding Lenses

SHIFTING YOUR INSTRUCTION

ONE STEP AT A TIME
The Foundation of S.T.E.M.: ARTS - The Key Stone to Learning

Context, Meaning, Creativity, Innovation
The Arts Foundation

DEVELOPING ARTISTS WITH A COMPLETE UNDERSTANDING OF THEIR DISCIPLINE = ARTISTS WITH STRONGER TECHNIQUE
The S.T.E.A.M. PROCESS

1. Investigate
2. Discover
3. Connect
4. Create
5. Reflect

Collaboration

F = MA

Education Closet
MODELS OF THINKING

ENGINEERING/DESIGN PROCESS

CRITICAL THINKING
Bloom’s Taxonomy (Revised)

CREATIVE THINKING
CREATIVE THINKING PROCESS
IT TAKES BOTH SIDES
The Kennedy Center’s Definition for Arts Integration

Arts Integration is an APPROACH to TEACHING in which students construct and demonstrate UNDERSTANDING through an ART FORM.

Students engage in a CREATIVE PROCESS which CONNECTS an art form and another subject area and meets EVOLVING OBJECTIVES in both.
ELEGANT CONNECTIONS
IDENTIFY YOUR INSTRUCTIONAL GOAL OR STANDARD

Key Vocabulary

WHAT DO YOUR STUDENTS NEED TO KNOW TO TACKLE THIS CONCEPT?

WHAT ARE THE NEW IDEAS YOU ARE ADDRESSING?

WHAT IS THE MEDIUM TO INTEGRATE THE TOPICS VIA CONTEXT?
(HANDS ON/ DO IT LEARNING)

HOW ARE YOU CHALLENGING YOUR STUDENTS TO DERIVE QUESTIONS AND CONNECT CONCEPTS VIA INVESTIGATION, EXPERIMENTATION, IMPROVISATION AND PRACTICE?

 EVALUATE THE LEARNING THROUGH ACTIVE REFLECTION WHICH ENGAGES STUDENTS IN THEIR OWN LEARNING PRACTICE.
DANCE PHYSICS - Example
# Example Integrated Lesson in Science & Dance

## Science Content

**Next Gen Science Standard**  
MS-PS2-1  
Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.

## Arts Content

**California Art Standard**  
6 Grade  
2.1 Invent multiple possibilities to solve a given movement problem and develop material into a short study.

## Lesson Objective:

Using Improvisation work as a group to explore Newton’s Laws of Motion. Focusing on Newton’s Third Law, design multiple movement phrases that apply the idea of action/reaction.
LESSON HOOK:
What do these two things have in common?
KEY CONCEPTS

BALANCE

FORCES

ACCELERATION
GRAVITY PUSHES THE DANCER TOWARDS THE GROUND—BUT WHY ISN’T SHE FALLING RIGHT NOW? OPPOSING FORCES KEEP HER BALANCED.
NEWTON’S FIRST LAW: Inertia

An object at rest stays at rest unless acted upon by an outside force.
Newton's Second Law:
The greater the mass, the greater the force.

Total Force = mass x acceleration
Bodyweight force acts at the center of mass where there is an even amount of mass on all sides.
NEWTON'S THIRD LAW:

Each action has an equal, but opposite reaction
EXPLORATION:
CHOREOGRAPHY TIME

GUIDED PRACTICE → STUDENT CHOREOGRAPHY EXPLORATION

We Do → You Do

REFLECTION
ARTFUL THINKING-
HARVARD PROJECT ZERO

i SEE

i THING

i WONDER
<table>
<thead>
<tr>
<th>Objective</th>
<th>Standard or Focus</th>
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<td>Key Concepts/Vocabulary</td>
<td>NXT GEN</td>
<td>ART Content</td>
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<td>Hook-Essential Question</td>
<td>Process or Procedure</td>
<td>Reflection - Evaluation</td>
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What’s Next

- Contribute – Join the Findings Analysis Think Tank (FATT) team that will develop the guide.

- Host – Volunteer to be a pilot school for the implementation guide.

- Connect – Stay informed about our work.
Site Visit Highlights
Arts + STEM Collaborative for 21st Century Learning

A tri-county partnership between Los Angeles, Orange and San Diego counties

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