STEAM
Science, Technology, Engineering, Art, Math

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Why STEAM now?

• AM means (definition)

• Current efforts

• Examples of STEAM in classrooms

• Future preparation - cradle to career
Statistics and Trends

- 2014 reported 5.7 million openings in STEM fields; 4.4 million require a bachelor’s degree.
- Only 5% of US citizens are employed in a STEM field despite the growth in STEM education and increasing STEM graduates.
- Where are the STEM graduates? Entering fields that encourage diverse ways of thinking and thought—including interdisciplinary fields that incorporate the arts.
- Women fill close to half of all jobs in the U.S., yet hold less than 25% of STEM-related jobs.
- 43% of U.S. school-age children today are of African American, Latino, or Native American descent. Less than 15% hold an engineering bachelor’s degrees.
- We need to improve the composition of the STEM education pipeline to include more women and underrepresented minorities to reflect America’s shifting demographics.
The goal of initiatives instilling STEM in classrooms is not to create more scientists, engineers, or mathematicians but instead to develop capable students who can function in a highly technological world that draws upon multiple knowledge types (Vasquez, Sneider & Comer, 2013).
What is STEAM?

• STEAM educational practices draw on each of the disciplines, while appealing to a broader base of students who explore and make connections between art, music, mathematics, science, and engineering and technology.

• Adding the “A” means.....
STEAM teaching extends beyond aesthetics and includes the liberal arts.

STEAM teaching increases motivation, engagement, and effective disciplinary learning in STEM areas.

Studies of STEAM-based curricula demonstrate a higher percentage of students interested in pursuing careers supporting the fields of math and science.
Scenario: numbers that are surprising the wildlife officials. In addition, the number of live births of sea turtles is declining at an alarming rate. Obstacles faced by young and adult sea turtles are staggering, but it is the increasing threats that are causing them to be very close to extinction.

Problem: Investigate the causes of the deaths of the mature sea turtles and causes of the low birth rates.

Goal: Once the causes are determined, groups will create a variety of ways to disseminate this information to increase the public’s awareness and understanding about sea turtles. This information will be displayed at the Greenville Zoo and revealed on June 6, 2015- National Oceans Day.
Another Scenario

In May 2015, 15-yr-old “Trevor” was taken to the emergency room at Mary Black Hospital after being unable to get out bed and complaining of headache and severe muscle aches. Trevor arrived with a high fever (101°F) and his parents noted small red bumps had appeared all over his body the day before. Doctors noted he had returned from a family vacation in Jamaica three days prior, where he played sand volleyball every afternoon, often getting numerous mosquito bites. After running some blood tests to confirm their suspicions, Trevor was diagnosed with a mosquito-borne infection.
Synergy – Current Efforts

• Faculty in Residence – Fisher Middle School
• Educating Teachers
• Assessment of Teaching and Learning
• Scalable District-wide Models
• STEAM Certification
Faculty in Residence
Educating Teachers
SCALE and CoMeasure

STEAM Classroom Assessment of Learning Experiences (SCALE)

Domains
- Subject Matter Agreement
- Conceptual Integration
- Problem Solving Skills
- Instructional Approaches
- Assessment Practices
- Equitable Participation

Dimensions
- Instructional Content
- Learning Context

Criteria
- Clear Objectives
- Measurable Outcomes
- Connected Ideas
- Appropriate Content
- Multiple Disciplines
- Conceptual Integration
- Multiscale Approach
- Cognitive Skills
- Interaction and Collaboration
- Creativity
- Problem-based Learning
- Authentic Tasks
- Inquiry Rich Student Choice
- Technology Integration
- Teacher Facilitated
- Authentic Assessment
- Embedded in Learning Tasks
- Regular Feedback
- Ongoing Adjustments to Teaching
- Student Reflection
- Multidimensional Engagement
- Responsive to Student Needs, Interests, and Challenges
- Awareness of Student Content & Experiences

Sample STEAM Scenario:
Each year thousands of hatching turtles emerge from their nests along the southeastern U.S. coast and enter the Atlantic Ocean. Sadly, only an estimated one in 1,000 to 10,000 will survive to adulthood. The natural obstacles faced by young and adult sea turtles are staggering, but it is the increasing human threats that are causing them to be very close to extinction. Today, all sea turtles found in U.S. waters are federally listed as endangered, except for the loggerhead, which is listed as threatened. Many people think the issue is overblown or not really worth spending time and money to protect the turtles. Your task is to research the risks for sea turtles, calculate the changes in population ratios including the live births and numbers of deaths each year, research the historical significance of sea turtles for South Carolina, and finally create a presentation providing visitors with relevant information about how to help prevent this turtle from going extinct. This information will be displayed at the Greenville Zoo next to giant sea turtle sculpture made out of recycled materials on World Oceans Day, which you will also create with your team. (Portions of this scenario courtesy of Sea Turtle Conservancy)

Inquiry Rich / Multiple Paths

Attribute
- Develops unique questions towards solving the problem
- Chooses method or materials appropriate to solving the problem posed
- Verifies knowledge and multiple sources to support inquiry

Needs Work
- Student begins inquiry process without group discussion
- Student chooses methods or materials without negotiating with group members
- Student does not rely on peers for source or knowledge verification

Acceptable
- Student suggests questions to support inquiry but does not refine questions as he/she begins problem solving
- Student sometimes negotiates methods or materials; they are not always appropriate to facilitate problem solving
- Student checks in with peers to verify sources and knowledge or provide peer feedback to direct communication. Only one

Proficient
- Student suggests and refines questions to support inquiry towards problem solving
- Student negotiates methods and materials appropriate for inquiry to facilitate problem solving
- Student checks in with peers to verify sources and knowledge aligned with inquiry, and provides peer feedback to direct communication.
STEAM Certification

4 courses

Project-based Learning
Digital Media and Learning
Reflective Practice
Assessment
Impact

• Transferable skills across disciplines
• Preparation for jobs in industries demanding STEAM and 21st century literacies
• Global reach and competitive workforce