The Benefits of Including Art in STEM… to make STEAM

Summary
- STEAM shows the inter-relationships of how subjects relate in real-life. Art and STEM are naturally intertwined, and existed and developed collaboratively
- Provides more enjoyable, meaningful, engaging learning experience.
- Provides hands-on, authentic learning experience
- Sparks student interests and passions
- Customizable to individual teaching and learning styles
- Aligns well with existing educational theories and instructional strategies
- Promotes student creativity and innovative thinking, which prepares students for fulfilling careers in a variety of fields, and is important to economic growth in U.S.
- Helps acquire problem solving skills and encourages use of imagination
- Art can engage underrepresented students in STEM learning, and increases motivation and the probability of STEM learning success
- Art offers more diverse learning opportunities and greater access to STEM for all types of learners
- Art provides diverse opportunities for communication and expression, and prepare students to be global citizens
- Studies show that training in arts boosts attention, cognition, working memory, and reading fluency, and improves student math and reading achievements (Dana Foundation, 2009)
- Arts contribute amazingly well to learning, regularly combining the three major tools the mind uses to acquire, store, and communicate knowledge: motor skills, perceptual representation, and language (Dr. Jerome Kagan)

Sources:

Why STEM Education Needs the Arts, Too
Tuesday, January 15, 2013
- John Maeda, the president at the Rhode Island School of Design, advocates the STEAM initiative — making sure arts is an integrated part of the STEM mission

STEAM
- STEAM provides an avenue for formally teaching the inter-relationships of how subjects relate in real-life
- STEAM-style education can be enjoyably and meaningfully delivered in more engaging and deeply embedding ways within the already well-established realm of education
- STEAM education can be engaging, hands-on and reality-based with many extensions to draw education, industry, government and the community together for the common good of bettering public education for all while meeting NCLB guidelines and STEM related goals
• It is customizable to individual teaching and learning styles without needing extension lessons to meet ‘Individual and Differential Educational Plans’
• It aligns well with many educational theories and instructional strategies already widely accepted such as: Marzano strategies, Bloom’s taxonomy, Constructivism, Multiple Intelligences, Actor Network Theory, and many more
• On January 11, 2010, the National Science Teachers Association published "Reaching Students through STEM and the Arts"

STEM to STEAM: Art Is Key to Building a Strong Economy
Posted: 11/13/2012 1:44 pm EST  by Jon Kamen and John Maeda
http://www.huffingtonpost.com/jon-kamen/stem-to-steam-art-is-key-_b_2123099.html
• What is missing from traditional STEM approaches is what has always been the "secret sauce" to American progress -- creativity
• In Rhode Island, Representative Jim Langevin (D-RI) introduced House Resolution 319, which "Expresses the sense of the House of Representatives that adding art and design into federal programs that target Science, Technology, Engineering and Math (STEM) fields, encourages innovation and economic growth in the United States”

From STEM to STEAM: Science and Art Go Hand-in-Hand
By Steven Ross Pomeroy | August 22, 2012
• Art and Science have long existed and developed collaboratively
• Nobel laureates in the sciences are seventeen times likelier than the average scientist to be a painter, twelve times as likely to be a poet, and four times as likely to be a musician
• At TED 2002, Mae Jemison, a doctor, dancer, and the first African American woman in space, said, "The arts and sciences are avatars of human creativity."
• Schools nationwide are eschewing art programs to instead focus on teach-to-the-test courses catered to math and reading. The problem here is that a narrow focus on testing reinforces narrow-minded thinking. Young Americans are being educated out of creativity.
• The Dana Foundation. (2009). Annual Report 2008 Support for Arts Education. Several studies from the report correlated training in the arts to improvements in math and reading scores, while others showed that arts boost attention, cognition, working memory, and reading fluency.
• Dr. Jerome Kagan, an Emeritus professor at Harvard University and listed in one review as the 22nd most eminent psychologist of the 20th century, says that the arts contribute amazingly well to learning because they regularly combine the three major tools that the mind uses to acquire, store, and communicate knowledge: motor skills, perceptual representation, and language
• “Art and music require the use of both schematic and procedural knowledge and, therefore, amplify a child’s understanding of self and the world,” Kagan said at the John Hopkins Learning, Arts, and the Brain Summit in 2009
Include arts in STEM learning. The Seattle Times Feb 12 2014, by Kristin Austin, Bothell
http://blogs.seattletimes.com/northwestvoices/2014/02/12/stem-education-include-arts-stem-isnt-right-for-everyone/

- Technical proficiency isn’t enough. You will need creative problem solving skills and imagination. Both can be acquired through the arts. The arts are valuable in and of themselves for the meaning, richness, depth and perspective that they add to our lives.
- If we want to engage more students, we need to spark their interests and their passions. The arts are a great way to accomplish this. Innovative thinking should prepare our students for fulfilling careers in a variety of fields.

STEM vs. STEAM: Do the Arts Belong? Published Online: November 18, 2014 By Anne Jolly

- Ruth Catcchen, an artist and educator, developed and pilot a STEAM program in Colorado. She concludes that the arts are a great learning tool and can serve as an on-ramp to STEM for underrepresented students. Engaging students’ strengths using art activities increases motivation and the probability of STEM success. She views art as a way of offering more diverse learning opportunities and greater access to STEM for all types of learners.
- Art also provides diverse opportunities for communication and expression. Ruth believes that in our technically-focused world, we have a responsibility to educate the whole child to become a global citizen in his or her community.