Young Audiences Arts for Learning

FULL STEAM AHEAD

Occupations in STEM fields are the second-fastest growing in the nation, just behind health care, according to a *Georgetown University* study.

And while the nation is expected to have more than 8.6 million STEM-related jobs available in 2018, as many as 3 million of those jobs might be unfilled, warns the *National Math and Science Initiative.*

Creativity and Innovation

…consists largely of rearranging what we know in order to find out what we do not know. Hence, to think creatively, we must be able to look afresh at what we normally take for granted.

George Kneller

STEM to STEAM

- In bringing the Arts to STEM, we begin to look *afresh*. The arts serve as a constructive lens by which we study and understand STEM, in such a way as the arts have been used to view and interpret the humanities.
- The effectiveness of this pursuit is also dependent on our understanding and fluency in the arts as well; studied as a discrete content area as well as applied throughout the school day.

Some Arts careers involving STEM/STEM careers involving the Arts

- Archivists
- Audio and Video Equipment Technicians
- Broadcast Technicians
- Camera and Photographic Equipment Repairers
- Commercial and Industrial Designers
- Computer Programmers
- Curators and Video Editors
- Graphic Designers
- Media and Communication Equipment Workers
- Multimedia Artists and Animators
- Museum Technicians and Conservators
- Photographers
- Set and Exhibit Designers
- Sound Engineering Technicians
- Technical Directors/Managers
- Audio and Video Equipment Technicians
- Camera Operators, Television, Video, and Motion Picture
- Film and Video Editors
- Radio Operators
- Data Entry Keyers
- Desktop Publishers
- Etchers and Engravers
- Prepress Technicians and Workers
- Print Binding and Finishing Workers
- Printing Press Operators
- Computer, Automated Teller, and Office Machine Repairers
- Electronic Home Entertainment Equipment Installers and Repairers
- Film and Video Editors
- Telecommunications Equipment Installers and Repairers, Except Line Installers
- Telecommunications Line Installers and Repairers
- Fashion Designers
- Fine Artists, Including Painters, Sculptors, and Illustrators
- Graphic Designers
- Interior Designers
- Locomotive Engineers
- Photographic Process Workers and Processing Machine Operators
- Prepress Technicians and Workers
- Set and Exhibit Designers
- Acoustician
- Robotics
- Cartography
- Photogrammetrists
- Surveyors
- Designers
- Naval Architects
- Marine Architects
- Automotive Design
- Architectural Drafters
- Electronic Drafters
- Civil Drafters
- Industrial Design
- Park Naturalists
- Remote Sensing Scientists
- Psychologists
- Sociologists
- Anthropologists
- Archeologists
- Geographers
- Historians
- Community and Social Service Specialists
- Teaching
- Archivists
- Curators
- Museum Technicians and Conservators
- Molecular Imaging

Scientific and Artistic Disciplines

research, observation, experimentation, discovery, collaboration, innovation, creativity, revision, rehearsal, reflection, composition, perspective, balance, symmetry, response, motion, sequence, repetition, hierarchy, engagement, persistence, grit, diligence, participation, resilience

- *What does this all look like in the classroom?*

Amy Rasmussen, Executive Director
Scott Sikkima, Education Director

CHICAGO ARTS PARTNERSHIPS FOR EDUCATION (CAPE)

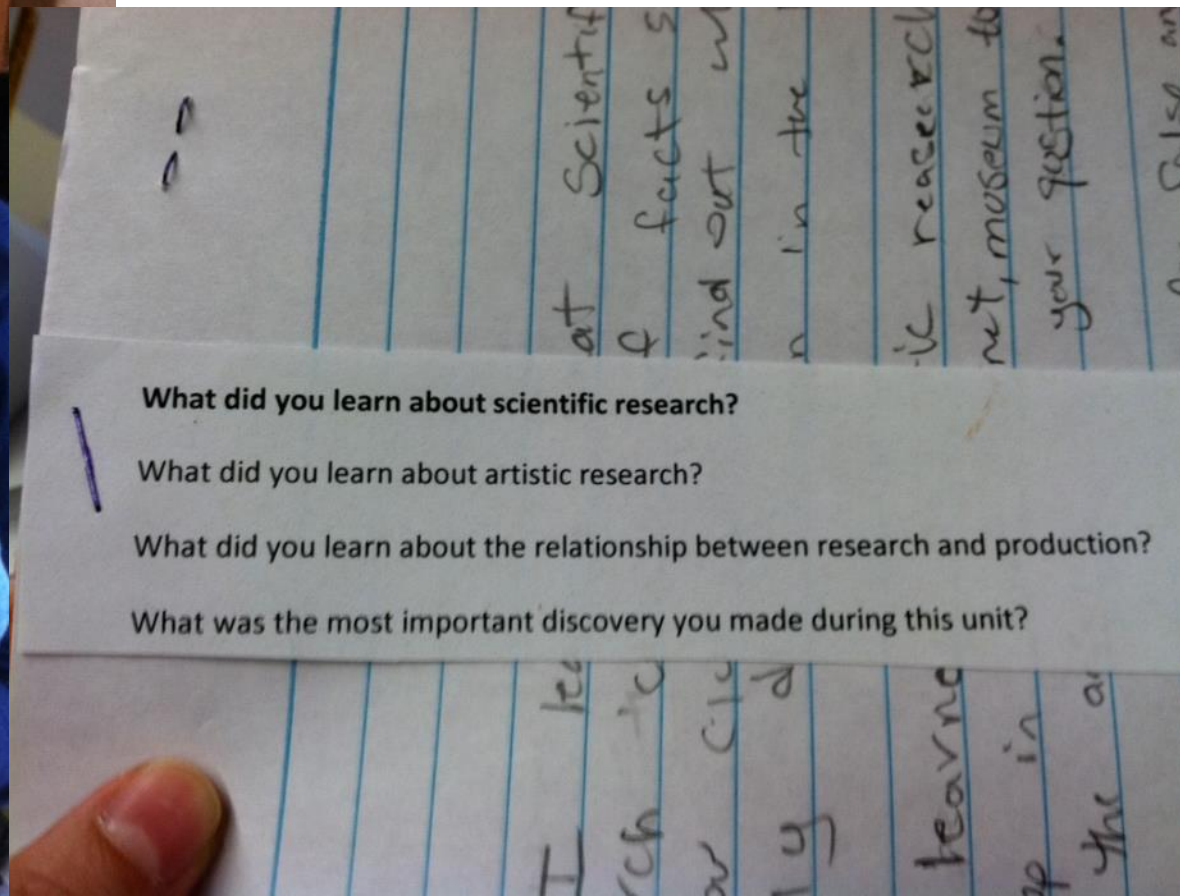
Chicago Arts Partnerships in Education

STEM + Arts Integration

Inquiry Question:

- How do we effectively integrate STEM and Arts instructional practice to deepen student learning in these content areas?

How do we define practice across STEM and the Arts?



Common Core Standards for Mathematics defines good mathematical practice as:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of other arguments
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

The Next Generation Science Standards defines good scientific practice as:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

CAPE Defines quality arts integration practice as:

- Big Idea
- Inquiry
- Create
- Document
- Reflect
- Share
- Assess

Commonalities across STEM (Science and Math) and the Arts:

- Asking Questions
- Problem Solving
- Reflection and Critique
- Sharing and Communicating

Examples from CAPE of STEM + Arts Integration:

Asking Questions

How do different functions together create designs and patterns?

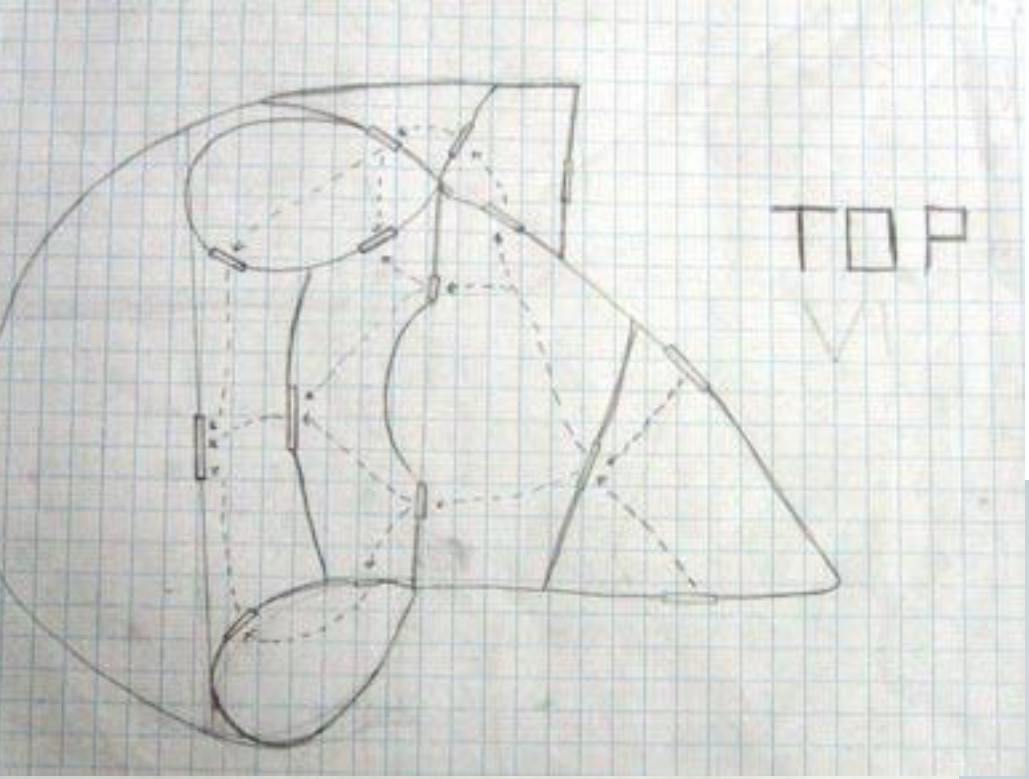
Examples from CAPE of STEM + Arts Integration:

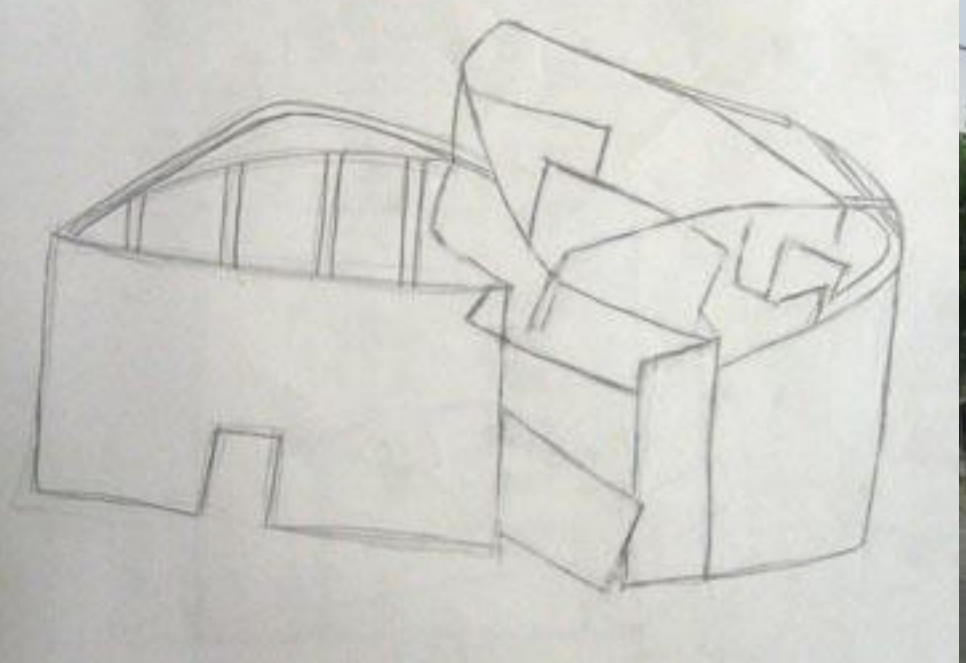
Asking Questions

How will or can I use these lines for the design?

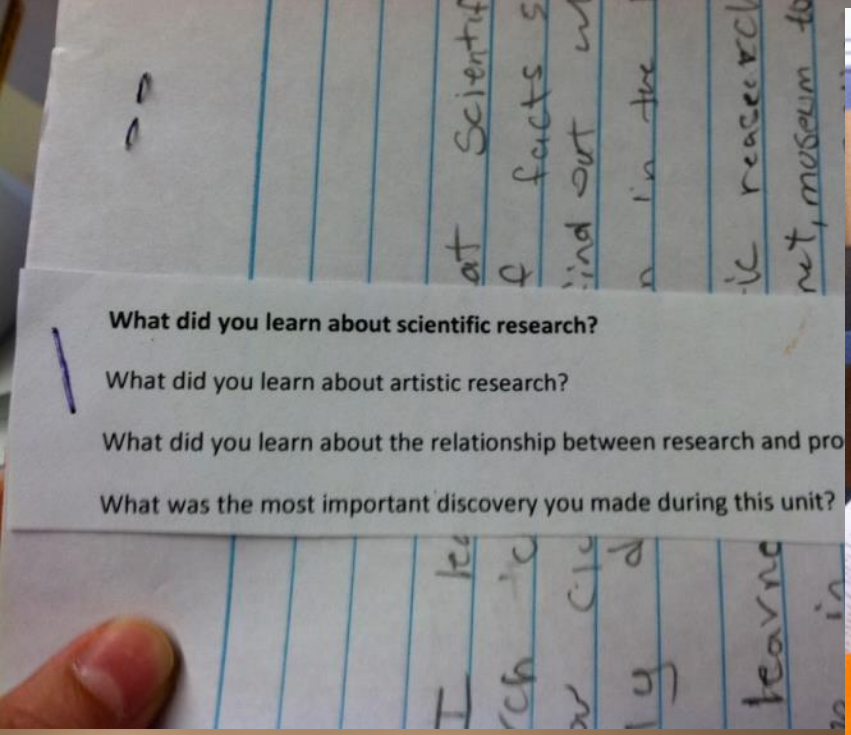
How do you create a function for a particular shape of a parabola?

Examples from CAPE of STEM + Arts Integration:
Problem Solving


TOP



Examples from CAPE of STEM + Arts Integration:
Reflection and Critique


What did you learn about scientific research?
What did you learn about artistic research?
What did you learn about the relationship between research and pro
What was the most important discovery you made during this unit?

Name: Jacques Agbodji Date Pre-test: Dec-16-2011 Date Post-test: 1/17/2012

CAPE unit: Change Over Time

Before	Question	After
Earth has been living for over Five billion years. All earth's ground was together but they got seperated somehow. A lot of people believe that humans used to be animals but then turned to Neanderthals and then they turned into regular human form. Dinosaurs were very big through time, they started to become extinct due to the lack of food that they usually eat.	Describe the history of the earth	Overtime, Earth and the things that have lived on it for so long changed in many ways. Dinosaurs became extinct and their bones were fossolized. Before humans, there were mammals. what were before mammals?
If the food that organisms eat becomes extinct, the organisms will start to die. Or sometimes, the organisms just grow old and die.	Explain what happens over time to the types of organisms living on earth	Overtime, the types of organisms living on Earth becomes extinct. Some organisms are parasites so when their producer (producers?) becomes extinct, they would start to die also. The provider(s) might become extinct due to the lack of food.

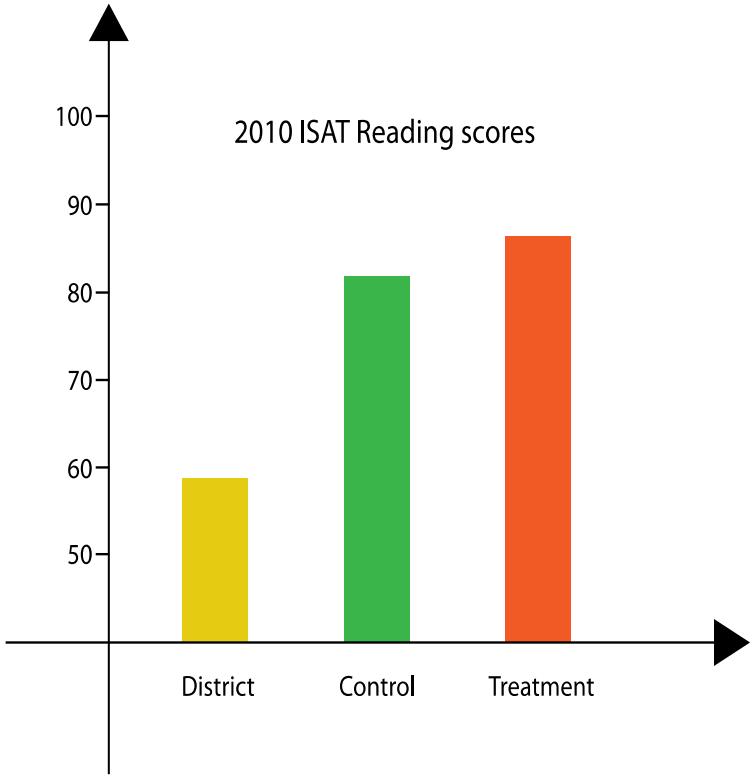
Researching the effects of Arts Integration on Academic Growth

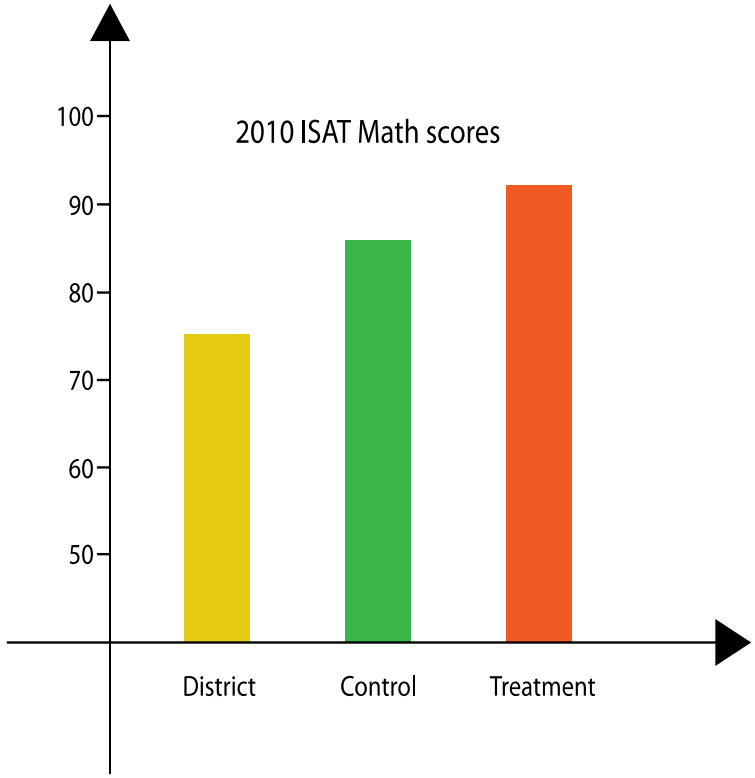
Measuring the effect of Arts Integration analyzing:

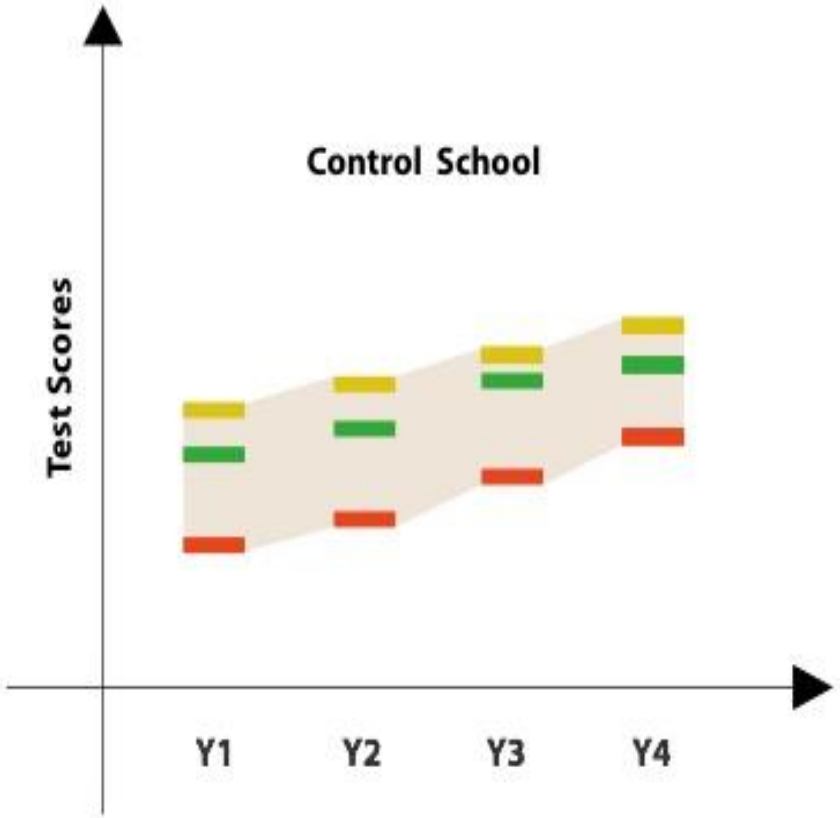
- Standardized Test Scores
- Student Artifact Analysis
- Arts Integration Performance Assessment Interviews (students ability to articulate abstract arts integrated concepts)
- Portfolio Conference Interviews (an alternative performance assessment interview that asks a group of HAL designated students to explain their own portfolios of art integrated work)

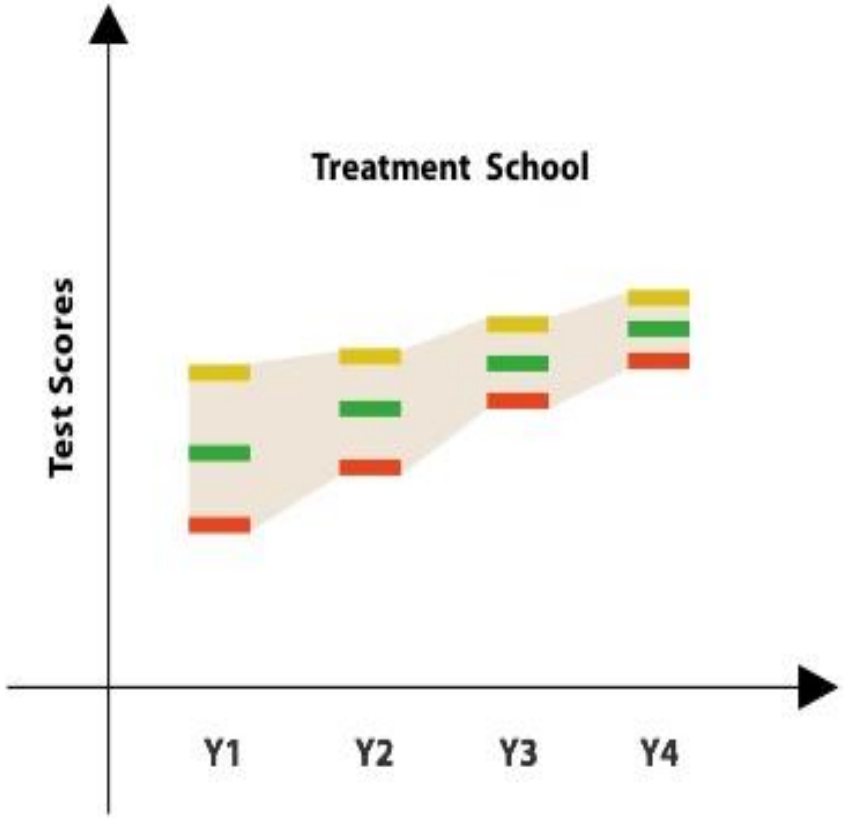
- Pairresults.org

Analysis of Standardized Test Score: Analysis of Treatment and Control Students






Control School
Test Scores
Y1
Y2
Y3
Y4


Treatment School
Test Scores
Y1
Y2
Y3
Y4

Chicago Arts Partnerships in Education

Katie Lynn, Executive Director

ARTS PARTNERS, WICHITA

STEM Learning through the Arts

- There is recognition among a growing number of leaders in business and in education that the arts, used in concert with STEM subjects, increase the development of skills deemed necessary for our workforce to thrive in the global economy.

- These skills include creativity, innovation, critical thinking, problem solving, communication, collaboration, flexibility, and adaptability.

- This is particularly important in Wichita where more than 21% of the jobs are STEM-related, according to a new study by the Brookings Institute that ranked Wichita 22nd among the 100 largest metro areas for STEM jobs.

Akua Kouyate, Senior Director, Education
Laura Schandelmeier, Master Teaching Artist
Megan Kowalczik, Kindergarten Teacher, Fairfax County Public Schools

WOLF TRAP INSTITUTE FOR EARLY LEARNING THROUGH THE ARTS

- The Wolf Trap Institute for Early Learning Through the Arts supports the cognitive, emotional, and physical development of children ages three months to five years old, with the goal of increasing their school readiness. The Institute provides in-classroom training and professional development programs for early childhood educators — all to infuse the performing arts into standard lesson plans, helping young children:

  - Develop their emergent literacy skills and language;
  - Learn math and science concepts, vocabulary, and habits of mind;
  - Practice and experience 21st century skills such as communication, creativity, collaboration, and cooperation, which are key to future success; and
  - Achieve pre-K and Kindergarten learning outcomes as defined by national education organizations and local education districts.

Young Audiences Arts for Learning

FULL STEAM AHEAD