S.T.E.A.M. in Early Childhood

Thomas T. Peters, Ed.D.
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Eugene T. Moore College of Education, Clemson University

Nichole Myles
Children’s Museum of the Lowcountry

Tracy Lamb, Moderator
SC First Steps Board of Trustees

2017 Chairmen’s Summit on Early Childhood:
Equity Begins Here
STEM IN EARLY CHILDHOOD
FIVE “SIMPLE” STEPS TO SUCCESS.

Dr. Tom Peters
Executive Director
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FIRST STEPS SC  December 8, 2017
QUIZ Time!!!!!

Part 1 – Name that Acronym!

a. STEM
b. STEAM
c. STREAM
d. THEMAS

Part 2 – Who Cares?

You may discuss with a neighbor.
STEM + Pipeline = A Pervasive Association

Source: NCES Digest of Education Statistics; Science & Engineering Indicators 2008
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What are some things this visual tells you?
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General knowledge about the world we live in matters for future STEM success.
FIRST, Do No Harm!
SECOND, Engage Parents!

Before college, WHAT got you interested in STEM?
34% of males and 39% of females identify a family member.

Interest begins at age 7-8!!!
(Harris Poll 2011)

Who had the most influence on your decision to study in this area?
36% of college STEM students identify a family member.
THIRD, Explore...don’t Bore!

Your Sense of Smell

You use your nose to smell things. This is your sense of smell.
Look at each picture. Circle the pictures that show things you can smell.
FOURTH, Play Matters!

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YOUR BRAIN ON CHILDHOOD

The Unexpected Side Effects of Classrooms, Ballparks, Family Rooms, and the Minivan
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Understanding STEM practices to better support 21st century learners

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Why STEM?

- STEM was originally conceived not because of content but because the ways in which we engage in content are the same across Science, Technology, Engineering, and Mathematics.
Problem Solving

NGSS: Asking questions (science) and defining problems (engineering)

NGSS: Planning and carrying out investigations

ISTE: Critical thinking, problem solving, and decision making

ISTE: Creativity and innovation

Reasoning & Proof

NGSS: Analyzing and interpreting data

NGSS: Constructing explanations (science) and designing solutions (engineering)

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ISTE: Creativity and innovation

Communication

NGSS: Engaging in an argument from evidence

ISTE: Communication and collaboration

ISTE: Research and information fluency

ISTE: Creativity and innovation

Representation

NGSS: Developing and using models

NGSS: Obtaining, evaluating, and communicating information

ISTE: Research and information fluency

ISTE: Creativity and Innovation

Connections

NGSS: Using mathematics and computational thinking

ISTE: Research and information fluency

ISTE: Creativity and Innovation
STEM starts with problem solving

- The teachers’ role in an early childhood classroom is to facilitate learning through **problem solving scenarios** (either play-based or formal lessons) and through **questioning**.

- Teachers can pose short-term or long-term problems or scenarios (e.g.)
  - How can we set the table for snack? How can we make sure we all have the same amount of food?
  - How can we organize the materials in the art center so that they are accessible without teacher help?
  - How can we work together to solve this puzzle?
In addition to everyday experiences, teachers can develop open-ended explorations—also known as provocations.

- Implement in learning centers, outdoors, or any space where learning can occur.
- Provocations give teachers opportunities for intentional observations.
- Teachers carefully select materials and media and set out for children to explore without giving instructions or directions.
  - A teacher wants to examine what children know and understand about early materials, “create a provocation area where children engage with rocks, sticks, leaves, sand, seashells, cotton, and other materials” (Eckhoff & Linder, 2017).
What do EC Teachers think of STEM/STEAM?

- Examination of teacher beliefs related to STEAM education following a one-day conference for early childhood educators (Jamil, Linder, & Stegelin, 2017).
  - 41 participants
  - Professional development focused on STEAM integration across the early years
  - 35 item survey- STEAM beliefs
  - Follow up interviews to better understand participant needs/challenges related to implementing STEAM practices
## Brief Survey Findings

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* Scale of 1 (Strongly Disagree) to 6 (Strongly Agree)
Follow Up Interviews

- Focus on Products
- Priorities for Instruction
- View of Children
- Management
Moving Forward

- Sustained PD experiences focusing on STEM/STEAM processes
- Support for teachers when implementing STEM/STEAM practices
- Further research on teacher beliefs and motivation towards STEM/STEAM
full STEAM ahead:
STEM & STEAM learning in the informal space

Nichole Myles, Executive Director
nichole@explorecml.org
Where young children learn
STEAM

- science
- technology
- engineering
- arts
Informal experiences in STEAM learning

- interdisciplinary
- open-ended
- hands-on
- project-based
- creative process focused
- values failure
- develops 21st century skills
STEAM learners in the informal space

- Wide developmental ranges of students
  - academically
  - socially/emotionally
  - motor
- Wide variety of experiences
  - opportunity gap
  - family/school culture
Engaging parents in the informal space

- collaborative
- observation
- follow up
- context and messaging
- meaning and importance
- NAEYC for families

*parents need to know it’s okay if things don’t work - there will be days that things won’t work but children will figure it out.*
Teachers in the informal space

- observations of student behavior, interests and skills
- confidence building experiences
- relationship building experiences
- new classroom competencies
- inspiration
- practice
STEAM language

Open Ended Questions

How did you…?
Why did you…?
What do you think?
Making room for STEAM failures

- failure as part of the process
- it’s a glitch
- finding safe spaces to fail
Technology in the informal space

- not just electronics
- age-appropriate tools
- simple machines
- child-directed tools
- problem-solving opportunities
A word about the arts in STEAM

- not just visual arts; dramatic arts, dance & music
- process vs. product
- open-ended
- let students choose and explore the media
- retelling stories in other formats (songs, dance)
STEAM to support Standards

- South Carolina Early Learning Standards
- Head Start Early Learning Outcomes Framework
  - Approaches to Learning
  - Social and Emotional Development
  - Language and Literacy
  - Cognition
  - Physical Development
Is it a STEAM experience?  
...what’s the intention?

- what is this intended outcome of the activity/experience or lesson?
- does the child have to ‘complete’ the activity to be successful?
- are STEAM/STEM skills (implicit or explicit) central to the activity/experience or lesson?
- is everyone who is participating expected to leave with the same product?
STEAM Resources

- Children’s Museum of the Lowcountry exportcml.org/resources
- CML STEM Google Drive starr@explorecml.org
- STEM to STEAM stemtosteam.org
- STEAM Art Lessons www.smore.com/tgcsteam-art-lessons
- TinkerLab tinkerlab.com
- The Show Me Librarian showmelibrarian.blogspot.com/p/all-things-steam.html
- Education Closet educationcloset.com/st
STEAM Resources

- **STEM/STEAM Lessons, Activities, and Ideas by We Are Teachers on Pinterest**

- **Babble Dabble Do**

- **How to Smile**
  [howtosmile.org](http://howtosmile.org)

- **Library Makers**
  [librarymakers.blogspot.com](http://librarymakers.blogspot.com)

- **PreKinders**
  [prekinders.com/science-page](http://prekinders.com/science-page)
STEAM Resources

1. 17 New ways to build
   www.modernparentsmessykids.com/play-idea-17-unique-materials-building-creating/

2. Teach Preschool
   teachpreschool.org/category/science-and-nature/

3. Math Science Music
   mathsciencemusic.org/#/

4. Sphero Education
   www.sphero.com/education

5. NAEYC Teaching Young Children
   naeyc.org
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Incorrect response
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STEM Pipeline - About 1,500,000 results (0.61 seconds)

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Diagram adapted from Takeuchi & Levine, 2014
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Observing
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- PreKinders [prekinders.com/science-page](http://prekinders.com/science-page)
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- 17 New ways to build
  www.modernparents messykids.com/play-idea-17-unique-materials-building-creating/

- Teach Preschool
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