A road map for our connected journey

• STEM tools already in our hands
• Is it STEM or StEM?
• Obstacles and Opportunities
• What about STEM, STEAM, STREAM?
• The T in STEM Game Show
• STEM and 21st Century Learning / Executive Function
• Children as explorers, communicators and creators
The young and the digital
The old and the analog

STEM STEAM STREAM

- **SCIENCE** – Nurture a sense of wonder and curiosity about everyday experiences. Encourage investigation and asking “why”
- **TECHNOLOGY** – Give children tools to explore and discover. Provide tools for inquiry and investigation. Model using tools for communication, documentation and learning
- **ENGINEERING** – Identify a problem, think about solutions, try a solution, learn from success and failure, redesign, test again
- **MATH** – Find math in everyday activities like counting, comparing, sorting, identifying shapes. Use words like bigger, smaller, higher, lower.
STEM STEAM STREAM

• Find STEM everywhere
• Build on everyday moments
• Expand on children’s natural interests
• Encourage and appreciate children’s questions
• Create a meaningful context

Fred Rogers’ Approach to STEM, Hedda Sharapan

Obstacles – our STEM gap(s)

• 21st century teaching and learning with 20th century tools
• Analog knowledge, skills and experiences
• Attitudes and disposition toward technology in ECE
• Foundational skills for STEM
• Need hands-on play to gain confidence and competence
• Connect the dots for intentional and appropriate use
• Move educators along the continuum from consumers >> adopters >> adapters >> creators
• Teacher education and teacher educators
Early Childhood Educators and STEM

What’s your STEM disposition?

• Young children need to play, not use technology.
• I don’t do math.
• I’m no good at science.
• What is engineering?
• I don’t have time.
• We don’t have the resources.
• The children know more than I do.

[Image: When in doubt, find a border collie]

Opportunities

• Personal/Professional use
• Informal educators in third spaces
• Integrate into STEM/early learning
• Flavors of the day
  – Maker movement
  – Robotics
  – Tangible technology
  – Computational thinking
  – Coding
• Curation
• Digital leaders and innovators
It’s time to play...

The T in STEM GAME show

Please welcome Chip Donohue, your host.

Let’s play the T in STEM Game!

Can we spin the Wheel of Fortune

...and stay out of Double Jeopardy

...to make sure we avoid a Family Feud?
Let's play the game!

Screen time is bad for children.

True or False?

The T in STEM Game!

Either PLAY

STEM is all about play

Or LEARNING

STEM is all about learning
The T in STEM Game!

Early childhood teachers feel confident and comfortable with STEM topics and teaching science, technology, engineering and math
True or False?

The T in STEM Game

Simple add technology to the classroom and your STEM problems will be solve.

True?
False?
How do we avoid the “either...or” family feud and strive for STEM learning that advances the development of the whole child, inspires children to ask questions, and so we become more aware of the teachable moment in a child’s question.

The T in STEM Game
Brainstorm examples of practical ideas, favorite apps and websites that support

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STEM and 21st Century Goals

- Children are active and engaged
- Goals are clear and shared by all
- Curriculum is evidence-based
- Learning happens through investigation, play, and focused, intentional teaching
- Builds on prior learning and experience
- Subject-matter content aligns with standards
- Research evidence demonstrates beneficial effects

STEM and Executive Function Skills

- Organizing information
- Staying focused
- Strategizing
- Planning
- Exercising self control
Children as explorers, communicators and creators in STEM

- Children as “knowers”
- Children as communicators
- Children as creators
- Children as collaborators
- Children as investigators and designers
- Children need foundational knowledge and STEM mindsets/habits of mind

Children as explorers

Exploration matters:
- Builds on children’s natural curiosity about their world
- Capitalizes on children’s interests
- Helps children construct knowledge
- Promotes connections between the known and unknown
Children as explorers

Exploration includes:

• Observing, trying, digging, pouring...Learning about STEM disciplines by engaging in STEM practices
• Learning from experience and mistakes
• Messing about in STEM ways
• Investigating a variety of familiar and unfamiliar materials and situations in both open-ended and structured ways.

Children as communicators

Communication matters

• Children can show their understanding and misconceptions
• They can share ideas and encourage collaboration
• Technology and STEM activities invite interactions, supports and challenges by adults
Children as communicators

Communication is

- Developing explanations
- Using digital media and records
- Using technology to observe, measure, represent in multiple ways that they do easily without it
- Sharing ideas and encouraging collaboration
- Technology invites interactions, supports and challenges by adults

Children as creators

Creating matters

- Recognize that children are born engineers
- Emphasize the relationship between STEM and imaginative and creative thinking
- Promote the benefits of pretend play and open-ended experiences for STEM thinking
Children as creators

Creating includes:

- Generating their own questions, ideas, hypothesis and designing multiple solutions
- Constructing representations of ideas and learning
- Developing and using models
- Planning and conducting investigations

Children need natural and guided learning

- STEM disciplines are creative disciplines
- Young children are equipped with curiosity, basic skills and dispositions to make sense of their world
- Children are natural and capable learners and teachers can foster and build on these qualities through the lenses of STEM
- Children are active in developing their own understanding of the world
- Children need support for their curiosity to be persistent or to motivate sustained investigations
STEM learning beyond the screen

Foster expert learners

• Help children connect the real and the virtual
• Explore tangible technologies
• Integrate robotics, coding, computational thinking
• Flexible participation
• Integrate technology as a UDL strategy
  – Multiple means of representation
  – Multiple means of action and expression
  – Multiple means of engagement

Advice from Kate Highfield

• What teachers need to know to get started
• How does STEM support the whole child
• Stem in the early years

Author of Stepping into STEM with Young Children: Simple Robotics and Programming as Catalysts for Early Learning
Kate’s 4 teacher takeaways

- **Teacher engagement**: As with all technologies, teacher engagement is key...Tech is a tool that teachers can co-engage with to prompt learning.

- **Language**: Teacher modeling of language is important and should expand the children’s vocabulary to include STEM concepts.

- **Play**: Make sure you get to play, engage and experiment with the toys, engaging with children as a participant and fellow learner helps generate the children’s interest in the project and hands on tasks.

- **Multiple Representations**: Encouraging children to draw (for example ‘predicting what they think the robot will do’, ‘drawing what happened’) extends learning and makes concepts visible, so others can also discuss and participate. Technologies like simple drawing Apps, digital cameras and video can be used by children to document what they’ve been doing – which can in turn act as a powerful memory aid and prompt for reflection.

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**STEM Integration**

- **Play**
- **SEL**
- **Science**
- **Math**
- **Technology**
- **Art**
- **Engineering**
- **Literacy**
Nurture curiosity

I love hearing teachers ask open-ended questions, like “I wonder what would happen if...” Remember that you don’t need answers to all the questions. When you nurture children’s curiosity, they’ll be interested in learning – by noticing, predicting, exploring, experimenting. Their discoveries might open your eyes, too, to some fascinating things about our world!

Keep the child inside you alive

The child is in me still...and sometimes not so still.

I love whimsy, don't you? If you're going to be working for children, you need to do your best not to lose your childlikeness. It's wonderful to be able to just be yourself.
Nothing will ever take the place of one person actually being with another person. There can be lots of fancy things like TV and radio and telephones and Internet, but nothing can take the place of people interacting face to face.