
Newton to Bernoulli -
Engaging Tomorrow's
Innovators
Fall.Float!Fly!

Tulsa Regional STEM Alliance

What is the TRSA?

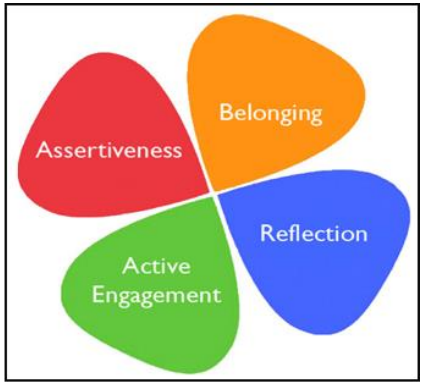
Vision: All students STEM ready! A diverse STEM workforce driving a more globally competitive northeastern Oklahoma!

Mission: Building broad, deep and innovative STEM pathways for all students to access high-impact careers.

Results:

- **4 year old STEM Ecosystem**
- **150 stakeholders in Alliance**
- **On track to impact over 130,000 students in 2018**

What is the PEAR Institute?



- **Translational center that integrates research, theory, and practice.**
- **Takes a developmental approach to the study of new models of effective school and afterschool programming.**

TRSA and PEAR Partnership

Kicking off 4th year of STEM Innovation Hub partnership with the Schusterman Family Foundation supporting diverse STEM programs in Tulsa.

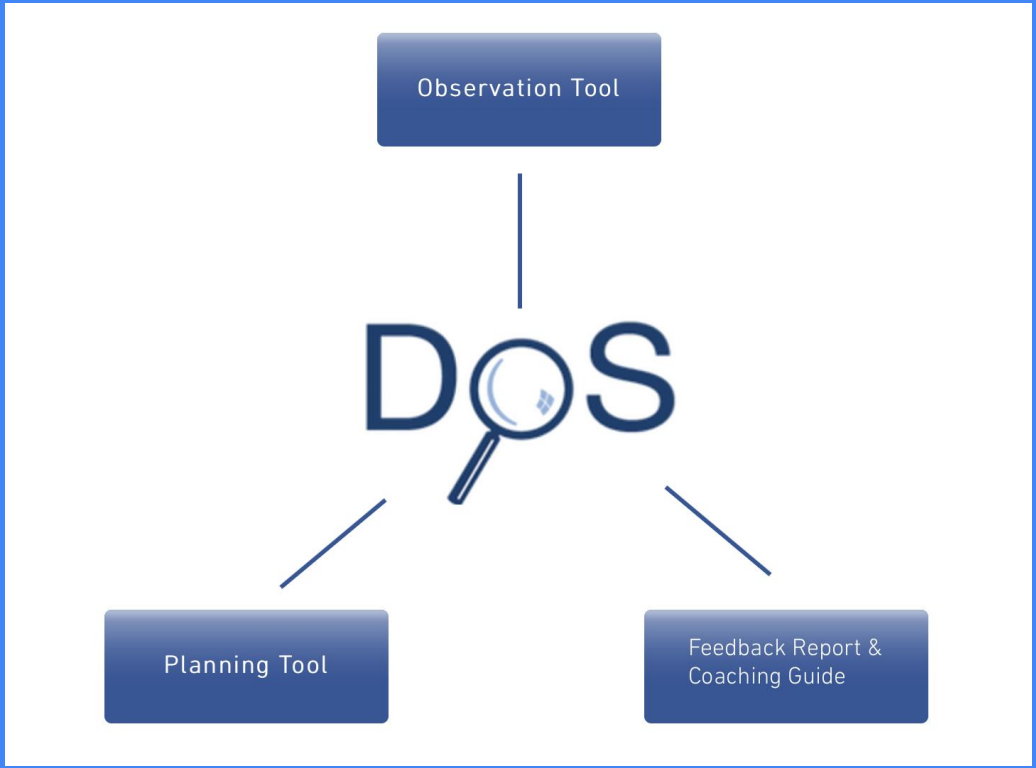
Using the PEAR Dimensions of Success suite for professional development and continuous improvement in STEM.

Partnership has expanded beyond data collection, reporting and technical assistance to co-facilitating, co-presenting and the development of a STEM Learning Ecosystem case study.

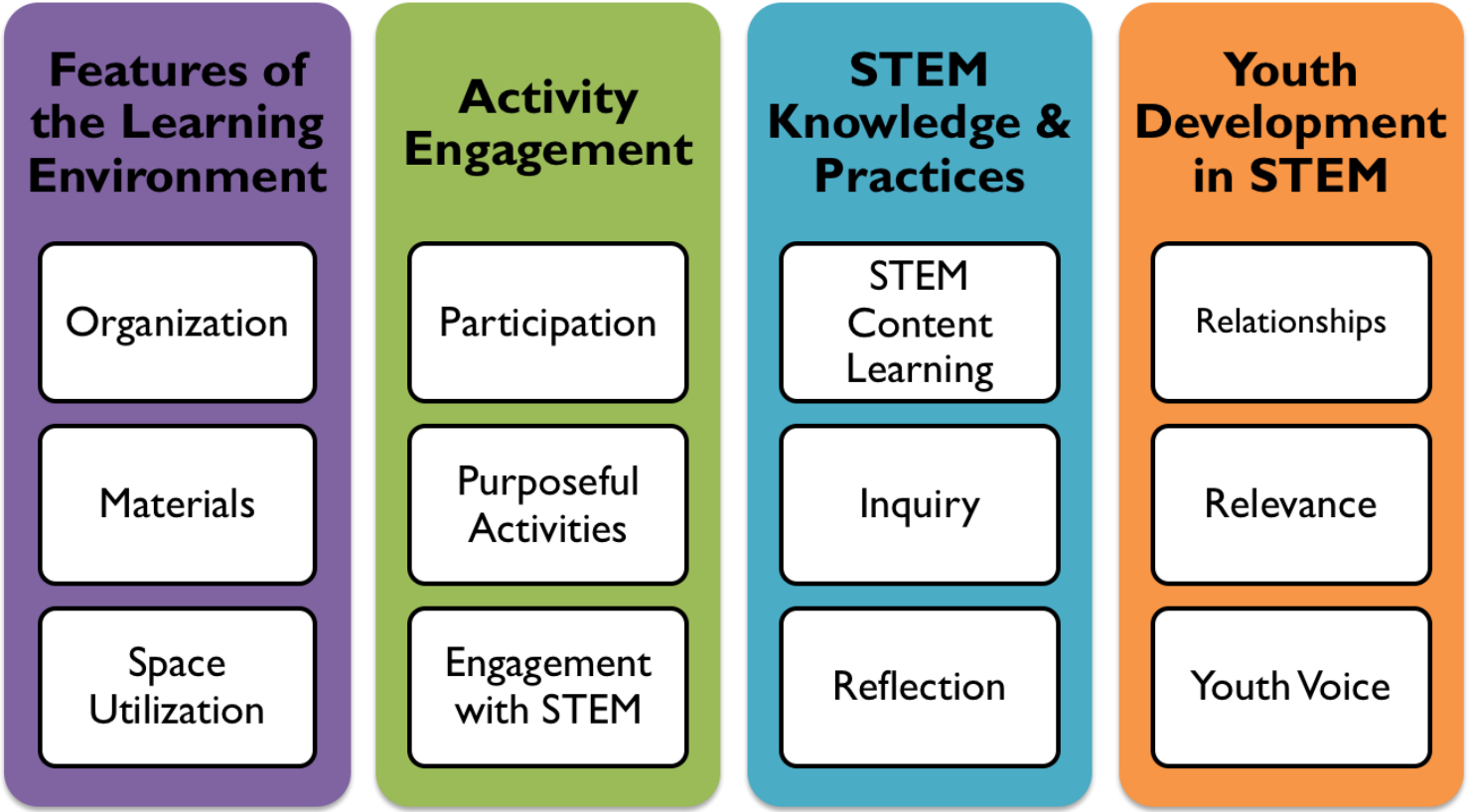
“At an early age, all children have the capacity and propensity to observe, explore, and discover the world around them (NRC 2012). These are basic abilities for science learning that can and should be encouraged and supported among children in the earliest years of their lives. The National Science Teachers Association (NSTA) affirms that learning science and engineering practices in the early years can foster children’s curiosity and enjoyment in exploring the world around them and lay the foundation for a progression of science learning in K–12 settings and throughout their entire lives.”

NSTA Position Statement: Early Childhood Science Education
http://static.nsta.org/pdfs/PositionStatement_EarlyChildhood.pdf

Dimensions of Success (DoS)



PEAR's DoS Observation Tool



PEAR's Program Planning Tool

DoS Program Planning Tool (DoS-PPT)

to prepare quality STEM learning experiences for youth

Information below is from PEAR's Program Planning Tool training, to learn more please visit: https://www.thepearinstitute.org/dos-planning-tool

Organization

Features of the Learning Environment

- Organization
- Materials
- Space Utilization

Organization

- **Prepare materials**

  – Gather (including extras) and lay out in advance

  – Run through activity and modify (especially technology/Internet)

- **Plan to use time wisely**

  – Allot time for each part

  – Announce transitions

- **Make an educational back-up plan**

Purposeful Activities

Activity Engagement

- Participation
- Purposeful Activities
- Engagement with STEM

Purposeful Activities

- **Choose your STEM learning goal**

  – Plan how each part of the activity is going to contribute to the learning goal

  – Decide how youth will know what their goal is

- **Use time purposefully**

  – Avoid time fillers like crosswords or free time

  – Minimize behavior management

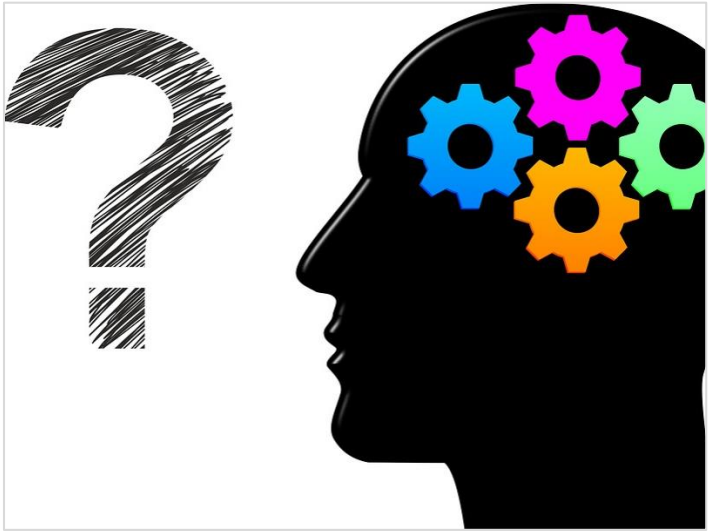
Reflection

STEM Knowledge & Practices

- STEM Content Learning
- Inquiry
- Reflection

Reflection

- **Ask age appropriate open-ended questions to help "sense-making"**
  - **– Ask how and why questions**
- **Provide opportunities to reflect throughout, not just at end**
  - **– Reflect during and after activities**
  - **– Provide opportunities for all youth to reflect at some point**



Relationships

Youth Development in STEM

- Relationships
- Relevance
- Youth Voice

Relationships

- **Build positive relationships with youth**

  – Use first names, make personal connections

  – Model enthusiasm

  – Praise effort and use positive behavior management

- **Support positive relationships between youth**

  – Provide youth with roles and ground rules

  – Address negative interactions immediately

Creating Quality Activities

Step 1: Choose a STEM Learning Goal

- What STEM concepts do I want youth to explore during this activity?

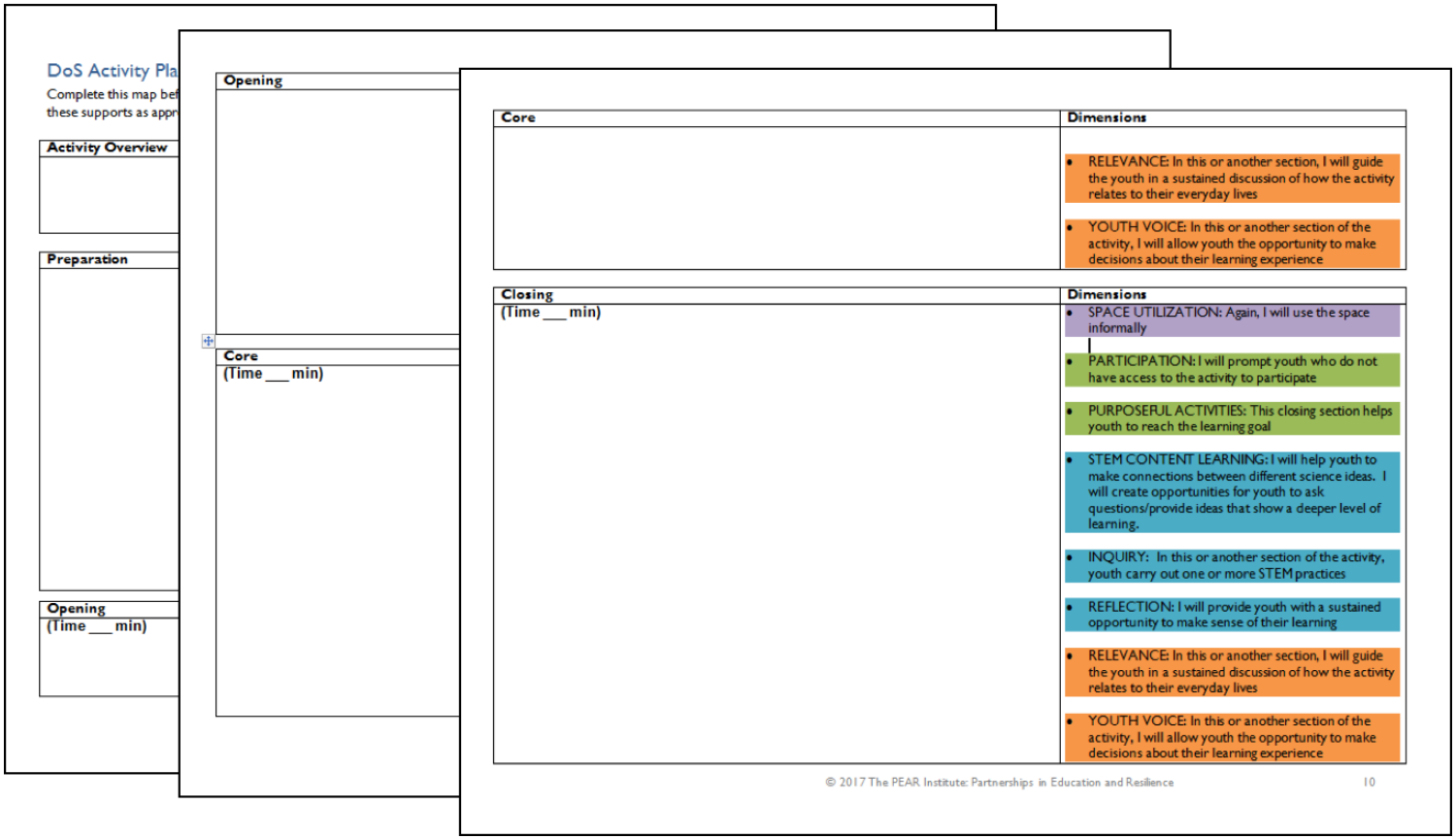
Step 2: Activity Design

- How will the STEM activity move youth toward the learning goal?

Step 3: Preparation

- What do I need to do ahead of time so that the activity runs smoothly and supports youth learning?

Activity Planning Map



Early Childhood Academic Standards

http://www.okdhs.org/OKDHS%20Publication%20Library/10-54.pdf

Mathematics:

STANDARD 4 Measurement – The child will explore the concepts of nonstandard and standard measurement.

Science:

STANDARD 1 Science Processes and Inquiry – The child will investigate and experiment with objects to discover information. nce

Reflection

What is your experience in engaging young innovators in STEM?

What worked well?

What challenges did you face?

What does organization look like in a 3 year old classroom?

Organization

TIME	ACTIVITY	SUPPLIES	LEADER
:00-:05	**Read** *Newton and Me* "Isaac newton was one of the most important scientists to every live! He spend a lot of time studying Physics which helped him understand a force that we call gravity."	-Book	Caroline
:05-:10	**Song** to reinforce vocabulary words	-Vocab cards	Xan
:10-:15	***Center Rotations****: 10 min each* Center 1- Friction ball race Rolling balls on surfaces of varying friction to determine the effect of friction on motion. 1. Graph predictions 2. Roll balls down different tunnels of friction 3. Graph and discuss outcomes	-Guttering -carpet -aluminium foil -paper	Caroline

Purposeful Activities

Are these activities adding to our students' learning of the stated STEM education goal?

Purposeful Activities

Inspiring students to begin to understand how things fly!

Reflection

What did we learn today?

So how do things fly?

Relationships

How does gravity affect my life?

What are some things that I have seen fly when I’m on the way to school?

Do I feel like I fit in with this group?

Archimedes

Building a Preschool Lesson on buoyancy and displacement

Archimedes

How do things float?

Key STEM Concepts:

Buoyancy

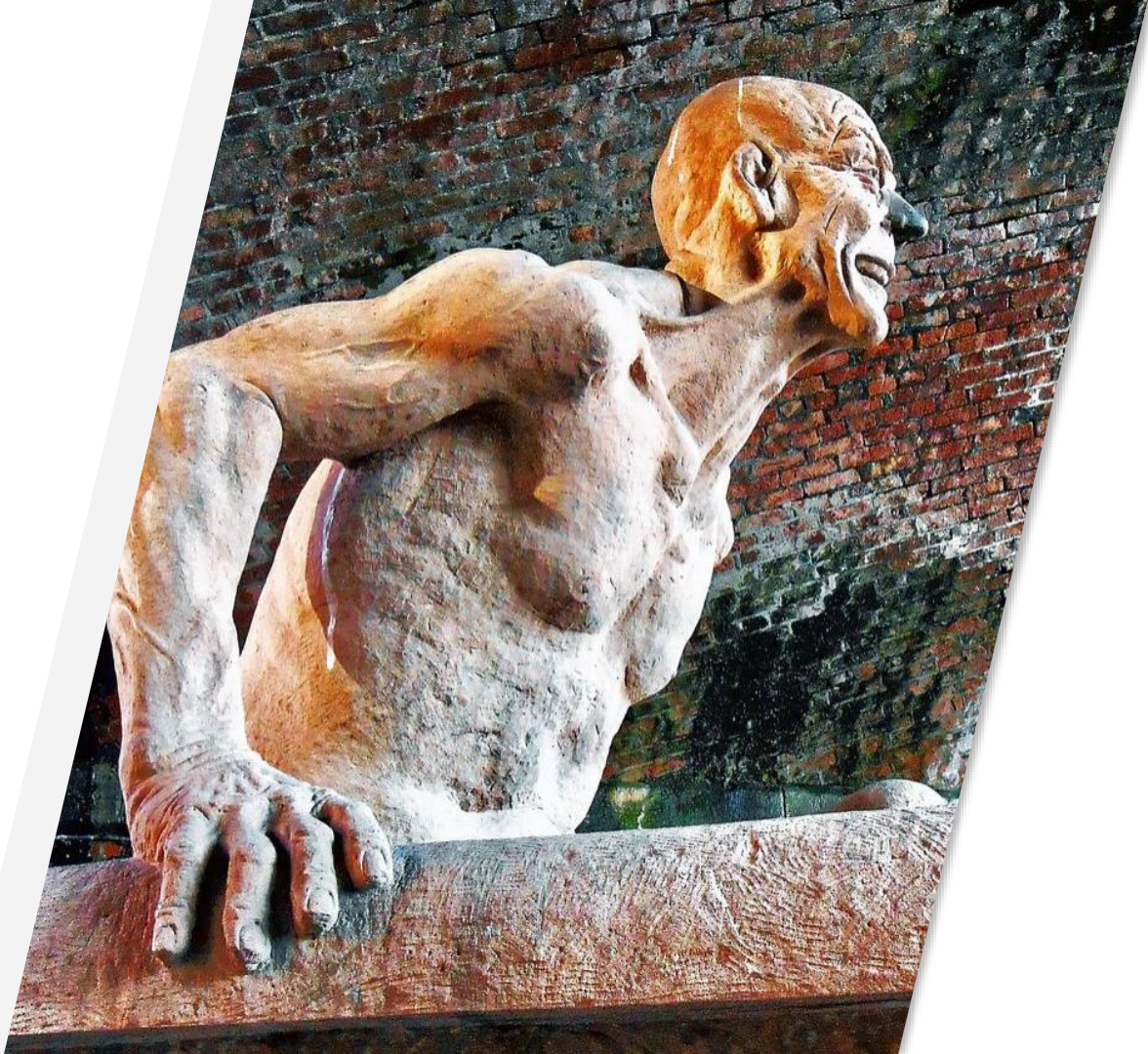
Displacement

Organization

How should we introduce Archimedes?

What materials will we need?

What will the schedule look like?



Purposeful Activities

How can we design activities that empower 3 year olds to explore:

- Buoyancy
- Displacement

Reflection

How should we invite students to think about this experience?

How do we encourage kids to talk about what they have learned?

Relationships

How do we help kids understand how the work of Archimedes affects their everyday life?

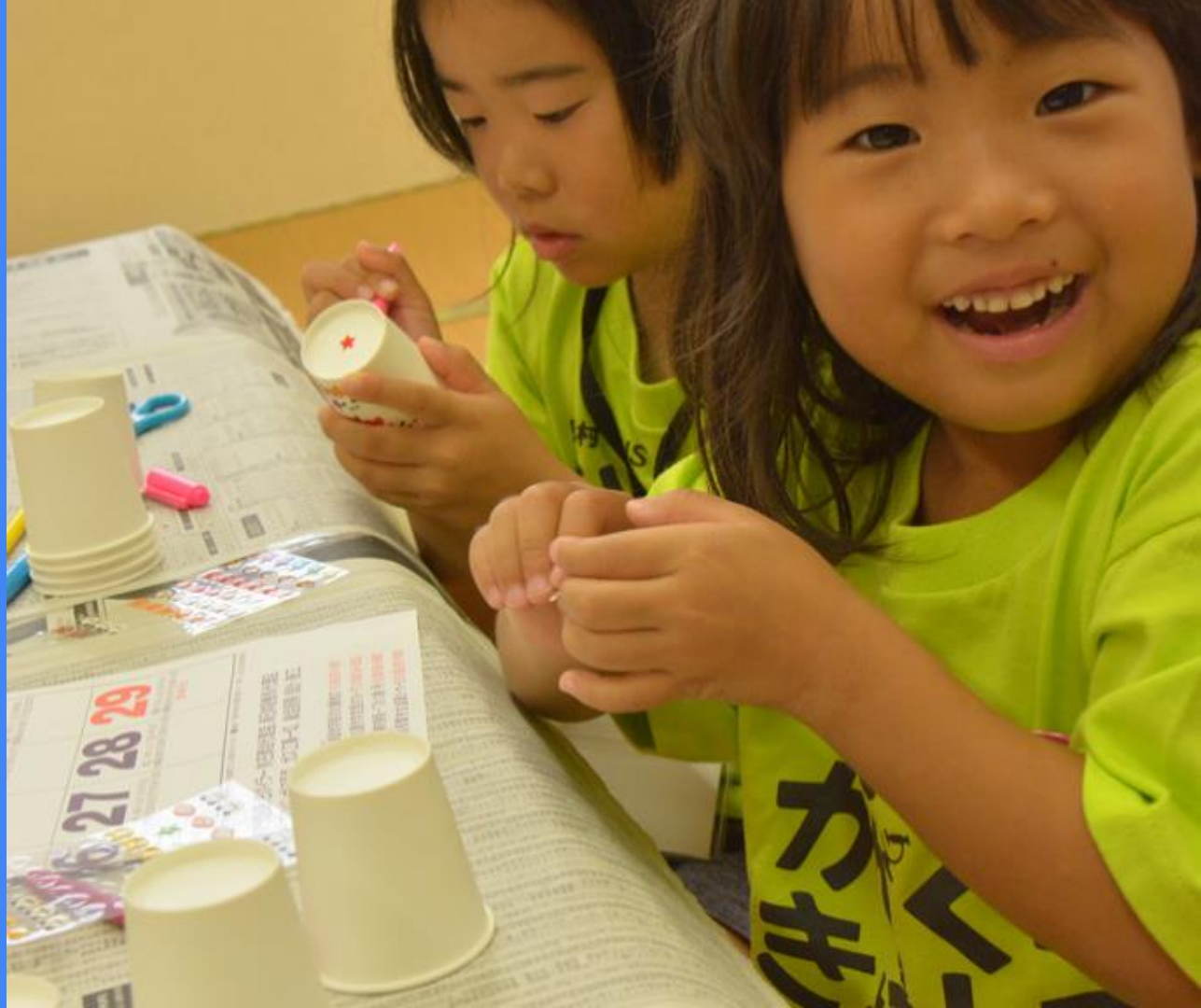
How do we build a warm, inviting and encouraging atmosphere that affirms each student?

Concept to Implementation

How do we move from creating lesson plans to effective implementation of STEM education for our youngest innovators?

What are the strengths of working with preschoolers in STEM?

What are the challenges of implementing STEM education in early childhood?



Resources

Harvard PEAR Planning Tool

Archimedes

Havard PEAR Planning Tool

http://www.afterschoolnetwork.org/post/dimensions-success-dos-program-planning-tool

Archimedes

Sample Schedule

https://docs.google.com/spreadsheets/d/14Wj1xv4i1uAQRz6flWRlG-e36rKg3fDFsKGb0vKH_5g/edit#gid=0

Song

https://docs.google.com/document/d/17_nazT9qmCdgECcfd9T0ChO_cmHMZOAsQZmAaXDetgw/edit

Powerpoint

https://docs.google.com/presentation/d/1IevkT53UU_mvv2SjT2f883qNR-ob7K6sbgX3bAm6Hs4/edit#slide=id.p3

Resources

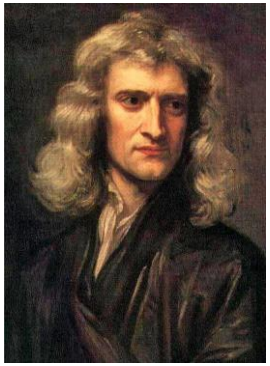
Newton

Bernoulli

Newton

Lesson Plan
https://docs.google.com/document/d/1QGoy3BEUeNbdo52WDEgDTyNTcbvQC8-EZOf1kU0KEDo/edit

Song
https://docs.google.com/document/d/1ecxArft1c3WcJ9zczDEiRCRYKrsm1jTHvQcHOqhfoWU/edit



Bernoulli

Song
https://docs.google.com/document/d/18vqAMv-yS5NC4XjzT68YESVSO3_X6hadtIG62yJ3RKE/edit

Schedule
https://docs.google.com/spreadsheets/d/15KkfyIYyLmAzemVO15JOQpIsn3fT5GzDSdkTgyfARmI/edit#gid=0

Bernoulli Principle
https://docs.google.com/document/d/1pBqH_aTokH1il2UWgXXV5jGfzOUKldeqtVk38crw3hU/edit

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