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Tinkering with STEM

Presented by

LiteBrite
Illuminating Educational Pathways

CK0-7440

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Welcome!

- Please silence cell phones.
- Please be ready to share ideas and questions.
- Please remember we are professionals; feel free to take care of personal needs.

2

Welcome!

- Please explore the items on your table.
- What can you do with them?

3

Let's Talk…

- In your table groups discuss the following questions:
- *Why did you select the materials you selected?*
- *How did it feel to work with the materials you were working with?*
- *Was your final project the same as your original concept? Why or why not?*

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Objectives

1. List a variety of developmentally appropriate activities that support children's exploration of STEM.
2. Identify props and materials that support children's play and learning related to STEM education.
3. Describe strategies to implement STEM activities based on the ongoing assessment of each child's abilities, interests, and learning styles.

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Key Idea

A little confidence in creativity leads to a lot of confidence in everything else.

David Kelley,
Creative Confidence:
Unleashing the Creative Potential Within Us All

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What is Making and Tinkering?

7

[redacted]

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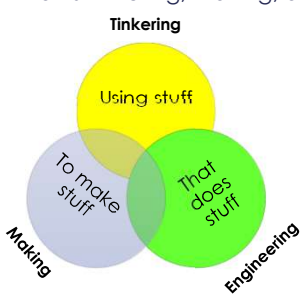
What is Tinkering, Making, and Engineering?



- **Deconstruction** is the process of taking stuff apart
- **Process**
- **Time consuming and not to be rushed!**

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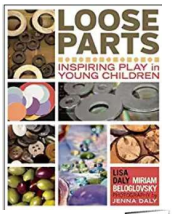
What are **Loose Parts**?

They

- are beautiful and engaging items.
- come in a variety of materials, and they are inviting.
- are open-ended
- do not use glue
- are for exploring, arranging, taking apart and rearranging again



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What to think about when selecting Loose Parts

- Sensory Appeal
- Function
- Accessibility
- Quantity
- Space
- Texture
- Color
- Dual Language Learners

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Images from Pinterest

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What children can learn from Making and Tinkering?

Social and Emotional	Physical	Cognitive
• Working well with others • Sharing • Respecting the rights and work of others • Regulating emotions • Following directions	• Fine motor skills – eye-hand coordination, dexterity • Gross motor skills – balance, stability, traveling, manipulating objects	• Problem solving • Reasoning • Creativeness and inventiveness • Flexible thinking • Logical thinking • Persistence (grit)

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What children can learn from Making and Tinkering?

Language and Literacy	Math	Science and Engineering
• Listening and comprehension • Expressing oneself • Asking questions • Vocabulary	• Numeracy • Comparing and measuring • Using data • Geometry and spatial sense • patterns	• Observing and making predictions • Scientific inquiry • Physical science • Life science • Earth and the environment • Engineering

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What children can learn from Making and Tinkering?

Social Studies	The Arts	Technology
• Jobs in the community • Economics • How people live	• Visual arts (painting, drawing, sketching, modeling, building, weaving, etc.)	• Tool use • Basic technology skills • How people use technology

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Images from Pinterest

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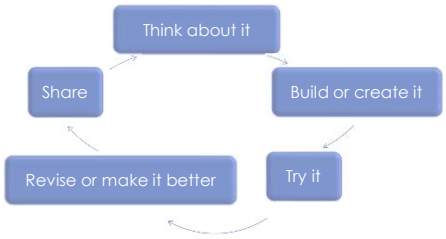
The Engineering Process



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The Learning Environment

- Flexible room arrangement is key
- Dedicated makerspace is nice but not necessary
- Plenty of open-ended materials and loose parts must be available –
  - *Tinkering Trays*
  - *Authentic materials*
- Attitude

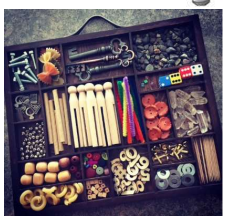
Image from Pinterest

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Safety

- Child-sized real tools
- Clearly teach proper use of tools
- Establish clear rules and expectations
- Provide safe space for use of tools
- Monitor tool use

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taken from *Making and Tinkering with STEM* by Cate Haromen

Webinar: Making and Tinkering with STEM
https://www.youtube.com/watch?v=65X2bEYCAIs

Engineering Challenges

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Baby Bear's Chair – *Goldilocks and the Three Bears*

- What could the bears do about the broken chair?
- How do you think they could have fixed it?
- Have you ever fixed something that you broke at home or at school?
- How did you do it?

Tinker with Materials
- Look at broken materials
- Look at tools and materials
- What can you fix?
- What are connectors – things that hold things together?

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Baby Bear's Chair – *Goldilocks and the Three Bears* – **The Design Challenge**

Making:

Engineering:

Materials

- **Reusable Resources**
- **Connectors**
- **Tools**
- **Broken items**
- Balance scale and 5 lb. weight
- Paper, markers, crayons, or pencils

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Baby Bear's Chair – *Goldilocks and the Three Bears* – **The Design Challenge**

- Think about it:
- Build it or create it:
- Try it:
- Revise it:
- Share:

Questions and Comments:

- What do you think will happen if?
- Tell me about your chair.
- What part do you think is the weakest?
- Why do you think Baby Bear's chair broke, but not the others?
- How do you think your chair compares with Baby Bear's chair?

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Build a Bridge - *The Three Billy Goats Gruff*

- How do the goats use their brains and their strength to outsmart the troll?
- What's another way the goats could get to the hillside without crossing the troll's bridge?

Tinker with Materials

- Make bridges out of different materials
- How will you hold the materials together?
- Which materials seem stronger than the others?

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Build a Bridge -
The Three Billy Goats Gruff – **The Design Challenge**

Making:

Engineering:

Materials

- **Reusable Resources**
- **Connectors**
- **Tools**
- Photos of different bridge designs
- Balance scale and 5 lb. weight
- Paper, markers, crayons, or pencils

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Your Turn

Making: Make a paper bridge between 2 chairs.

Engineering: Make a paper bridge between 2 chairs that will support a pen or a pencil.

Materials

- Paper, pens, or pencils

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A House for the Three Little Pigs –
The Three Little Pigs

- Why was the wolf able to blow down the straw house and the sick house but not the brick house?
- What could the first 2 pigs have done to keep their houses safe from the wolf?

Tinker with Materials

- Explore the materials in an open area
- Which materials are stronger than the others?
- How can you use the connectors to attach the materials securely?

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A House for the Three Little Pigs – The Three Little Pigs – **The Design Challenge**

Making:

Materials

- **Reusable Resources**
- **Connectors**
- **Tools**
- **Building toys**
- A small fan, or magazine or newspaper to wave
- Paper, markers, crayons, or pencils

Engineering:

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Repurpose It! – *The Most Magnificent Thing*, Ashley Spires

- Have you ever been frustrated when you are unable to make or do what you planned?
- What did you do?

Tinker with Materials

- Take apart an old toy
- How is the toy put together?
- Think about some of the things that you can do with parts and pieces to create something new

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Repurpose It! – *The Most Magnificent Thing* – **The Design Challenge**

Making:

Materials

- **Reusable Resources**
- **Connectors**
- **Tools**
- Old toys to take apart
- Paper, markers, crayons, or pencils

Engineering:

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Involving Families

They can

- Help locate and gather resources
- Translate stories into home languages
- Assist children with the design process
- Serve as an expert resource person for the class
- Demonstrate a skill or how to use a tool
- Be an audience for children to share their ideas and processes

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Including All Children in Making and Tinkering

- Dual Language Learners
- Sharing Cultures
- Including All Abilities

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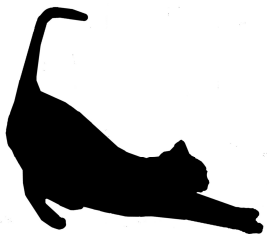
Stretch Time – See You Soon!



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Ramps and Pathways

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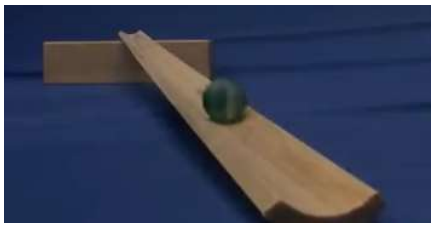

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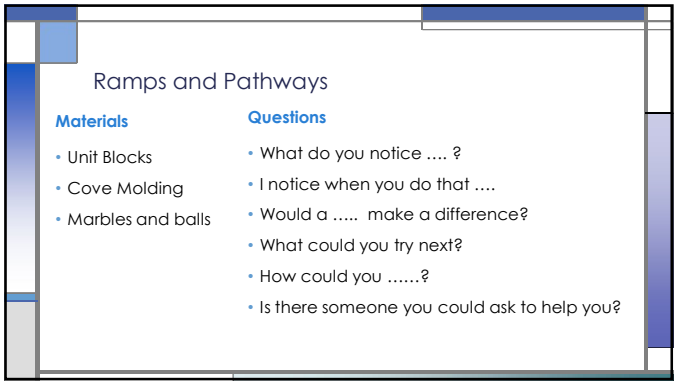
Ramps and Pathways
Materials
• Unit Blocks
• Cove Molding
• Marbles and balls
Questions
• What do you notice …. ?
• I notice when you do that ….
• Would a ….. make a difference?
• What could you try next?
• How could you ……?
• Is there someone you could ask to help you?

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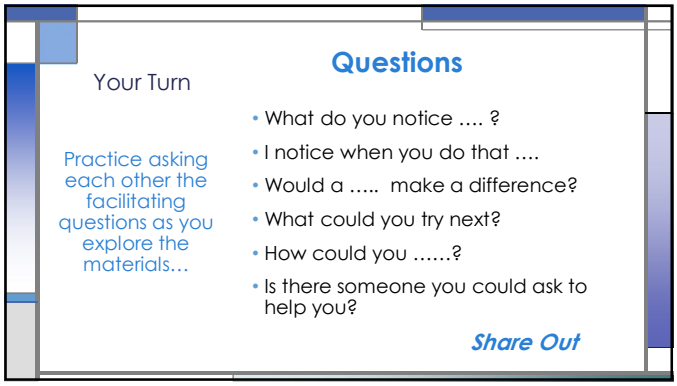
Your Turn
Practice asking each other the facilitating questions as you explore the materials…
Questions
• What do you notice …. ?
• I notice when you do that ….
• Would a ….. make a difference?
• What could you try next?
• How could you ……?
• Is there someone you could ask to help you?
Share Out

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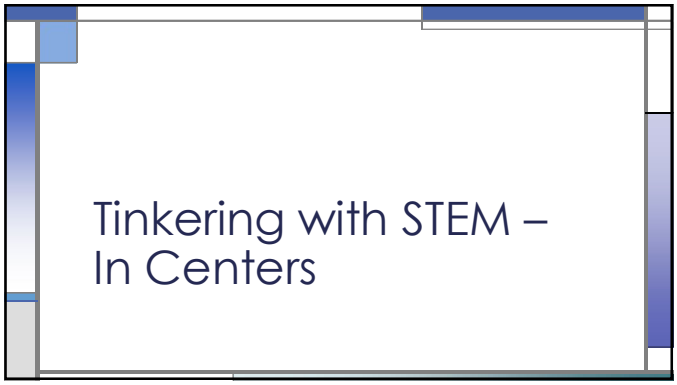
Tinkering with STEM – In Centers

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Why Centers? It's *DAP*

Photo taken by Globe Toters

Children don't separate content into different areas; they naturally see and integrate learning in a holistic way as they play.

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Loose Parts and Learning Centers

- Dramatic Play
- Art
- Sensory
- Music and Movement
- Blocks

From *Teaching Mama.org*

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Your Turn

Talk in your Table Groups

- What are some specific ideas that you can come up with to integrate Tinkering or STEM into centers in your classroom or program? ***Take about 10 minutes.***
- Share Out

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Some Specific Center Ideas

STEM Play: Integrating Inquiry into Learning Centers
By Deirdre Englehart

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Why Tinkering and Making

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Creative Confidence

- Believing in your ability to influence the world around you.
- Conviction that you can achieve what you set out to do.

- *Is this something you would like to see your students develop?*

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What is Creative Thinking?

- Fluency
  - many ideas
- Flexibility
  - move from one idea to another
- Elaboration
  - extend ideas
- Originality
  - unique ideas or combinations

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Why is Creative Thinking Critical?

It is part of the 4 C's

- ***Creativity***
- ***Communication***
- ***Collaboration***
- ***Critical Thinking (Problem Solving)***

21st Century Skills

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Final Thoughts

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Start Anywhere – Just Start

- Start with Loose Parts
- Engineering does not require tools
- Remember the 4C's
- Open-ended materials, open-ended time, space, and support

Questions and Comments…

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Tinkering with STEM

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Please complete your assessment and evaluation.

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Resources

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