Engineering an Engineering Experience: A Museum-University Partnership

7 Design Strategies to Increase STEM Learning

Questions for Fine Tuning a Tinkering Experience

1. Challenge Specificity

- How open-ended or specific is the hands-on experience for visitors?
- Is there a goal that leaves room for creativity?
- Can visitors make a unique project that does something?

2. Deliberately-Chosen Materials

- Do the materials allow visitors to make something that works?
- Do the materials leave room for both failure and success?
- Are problems solved in multiple ways?
- Do projects end up looking different?

3. Opportunities for Testing

- Are there legible and fun ways to see how projects are working?
- Is there a way to measure incremental success or small changes?
- Does testing motivate visitors to improve what they made and retest it?
- Do visitors use testing during their making process—to see what's working or to check on a strategy?

4. Challenge Difficulty

- Is the challenge too easy or too hard to engage a wide range of visitors in tinkering?
- How long does it take to make something that can be tested or modified?

5. Activate Knowledge

- What prior knowledge or experiences do visitors have that might be useful?
- What information would help visitors be successful?
- What vocabulary will help them make connections later?
- What are strategies for sharing information in an engaging, hands-on way?

6. On-going Staff Training

- What are ways to support collaborative learning by scaffolding for caregivers and interacting with families?
- How can you integrate a layered approach to training that clarifies staff's critical role while building on their experiences?
- How can reflection enable staff to fine tune the tinkering experience including their own facilitation role?

7. Opportunities for Reflection

- Are there times during the experience to chat about what visitors have tried so far?
- Can visitors make things that they can take home to show others?
- Do staff ask visitors to share what they made and explain their process?

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Role of Staff

- **Introduce the challenge:** *We're making things that roll.*
- **Be a guide to the space:** Point out tools, materials, and testing stations.
- **Activate (background) information**: Offer an orientation with an advanced organizer. Call out prior knowledge: *What do you know about swing sets?*
- **Be an active and appreciative presence:** Circulate and check in often. *Show me what you're up to. Wow. Look what you did!*
- **Offer support and expertise:** *How can I help? Would you like to try a different tool*?
- **Promote observation:** Focus attention on what's happening with the object*. What are the wheels doing?*
- **Boost the engineering process***: Did you try it yet? What happened? Let's watch it together.*
- **Model a way of interacting:** Do with--not for. *Let's try this together. What do you want to try next?*
- **Support reflection**: *Wow! How'd you do this? What did you learn?*

CHICAGO CHILDREN'S MUSEUM

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