EDC Education Development Center

INSIGHTS+CT

Integrating Computational Thinking into
the Insights Elementary Science Curriculum

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The Original *Insights*

- Developed in the early 1990s
  - long before the Next Generation Science Standards
- Funded by NSF
- Inquiry-based science

Our Project: Insights+CT

- Update and align the curriculum to the NGSS
  - Two units each in grades 1 and 4
- Highlight science (and engineering) practices in teacher support materials
- Pay particular attention to those practices that support computational thinking
  - modeling, data analysis, and mathematics/computational thinking
- Integrate computational tools that support the science learning

Primary Goals

- Keep science at the forefront
- Consider computational thinking as a science *practice*, but…
- Treat computational thinking as a goal *in an of itself*, plus…
- Begin to build young children's ability to (re)formulate problems to leverage computational power

A Two-Pronged Approach

- NGSS includes computational thinking as a practice, yet…
- It combines it with mathematical thinking, which means…
- CT is often conflated, especially in elementary grades, with *using* mathematics…
  - When it isn't, it's often thought of as "doing a coding activity"
- Yet, digging deep down (and making *a lot* of assumptions), one can find, given a practice-focused (inquiry-based) approach to science learning, many formative CT skills

What Are Those Underlying CT Practices?

- Understanding the importance of modeling in science
- Focusing on small parts of a phenomenon, identifying key attributes
- Collecting, representing, and making sense of data
- Finding patterns and common attributes and processes

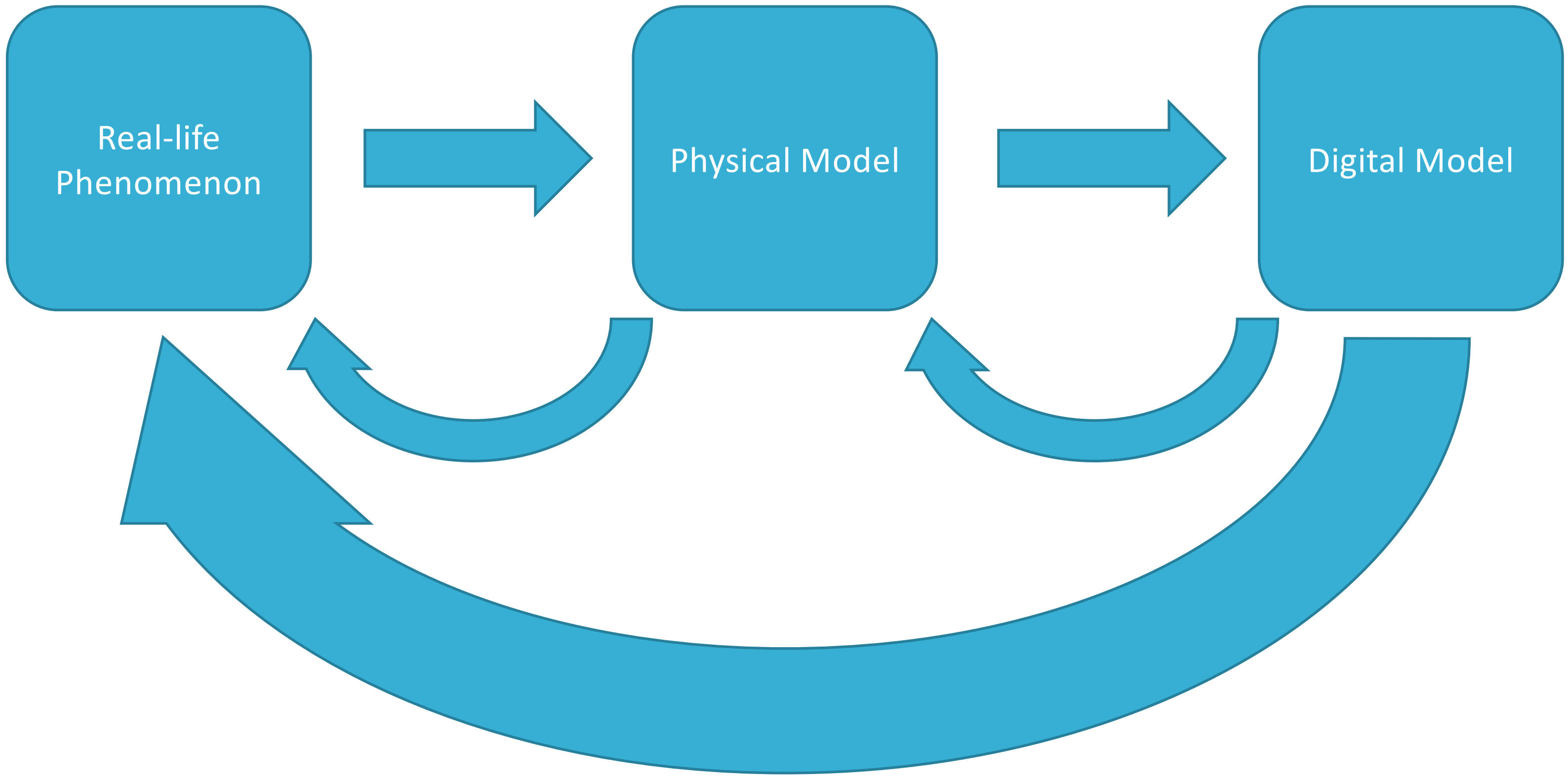
So What Is the Second Prong?

- Solving problems in a way that specifically leverages computing power.
  - How does computational power alter the process?
- But when does it make sense to leverage that power?
  - What age student? To what extent?
- Specifically, when a science activity includes a digital model, what sense can young children make of such a representation?
  - Or is it just a game to them, with its own rules?

A Development Process

- Observe a phenomenon
- Build a physical model of the phenomenon.
  - (And discuss why scientists do that…)
- Use, modify, or create (depending on age) a *digital* model.

What Connections Do Young Children Make?



Our Question, In Words…

- To what extent can (do) young children connect their work with physical models to the actual phenomenon the model represents?
- To what extent can (do) young children connect their work with digital models back to a physical model of the same phenomenon they've used?
- To what extent can (do) young children connect a digital model back to the actual phenomenon the model represents?

So What Is Our Challenge?

- How to build authentic, engaging digital models for young students...
  - to use in grade 1, and
  - to use *and modify* in grade 4 that…
- Accurately represents the complex system, closely aligning with physical experiences, either models or an actual phenomena, while…
- Not veering too far away from the underlying science concepts, and…
- Making it worthwhile for teachers to take the time to set up technology?

THANK YOU

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