Preschoolers as Problem Solvers: Integrating Computational Thinking with Mathematics and Science



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Background

- Build a knowledge base re:
 - which/how CT skills can be promoted in early childhood
 - whether/how CT can be integrated with mathematics and science
- Develop learning blueprints to guide the development of resources
- Design and pilot test prototype activities
 - identify design principles useful to future efforts integrating CT and mathematics/science in early childhood

Approach

Focus on underserved communities

Connect school and home learning

Integrates hands-on experiences with digital apps

Multidisciplinary team & inclusion of teachers/families → Co-Design

Co-Design/Research to date

• Who?

- Learning Scientists (CT, Math, Science, Tech)
- Developers
- Advisors
- Partner Teachers (n=3 teachers + n=1 coach)
- Partner Families (n=4)

• How?

- Brainstorming meetings to select CT content
- Series of interactive co-design sessions
 - kicked off with "seed ideas"
 - looked for natural integrations with math/science
- Pilot test in collaboration
 - researchers + partner teachers/families





CT Skills

- Problem Decomposition
 - resonated with teachers/parents but adults usually decomposed

• Algorithmic Thinking

- looping as entry point vs sequences requires significant scaffolding
- Abstraction
 - not as impossible as several initially thought

CT Skills & Math

Problem Decomposition

- shapes
- counting, cardinality, and comparison of quantities

Abstraction

- shapes
- counting, cardinality, and comparison of quantities

• Algorithmic Thinking

- visual spatial
- counting, cardinality, and comparison of quantities









CT Skills & Science

- Problem Decomposition
 - experimentation and argumentation



- Abstraction
 - observation, description and sorting





Algorithmic Thinking

Next Steps: Field Study (Fall 2019)

- PD and workshops
- 22 hands on- activities
- 2 digital apps

- Implementation data
- Observations in homes and classrooms
- Feedback interviews
- Assessments of learning (CT, math and science)

Thank you!

Questions or Suggestions? Contact us!

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