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Summary Report

Work It Out Wombats! Teaches Sequencing Skills

Ready To Learn **Research**

August 2026

This report shares the results of a large research study of whether and what children learned from *Work It Out Wombats!* content and resources. These resources include videos, games, and activities designed to help children ages 3-6 learn important skills—computational thinking, problem solving, and persistence when faced with a difficult or challenging task. These skills are essential for future school and occupational success.

What is Computational Thinking?

Computational thinking (CT) is the process of framing and solving problems in systematic ways that can be carried out by people and machines. These skills provide the foundation children need to learn coding and computer programming as they get older.

Some examples of CT skills are:

- Algorithms and sequencing (putting steps in order)
- Problem decomposition (breaking down problems into parts)
- Debugging (finding and fixing errors)
- Design process (creating, testing, and improving)
- Control structures (rules that determine the order of steps)
- Representation and abstraction (using symbols and simplifying patterns)

About

The Importance of Computational Thinking and Related Skills

CT skills can extend beyond computer science to support

- problem solving, executive function (such as attention), and persistence;
- other areas of learning such as math and reading; and
- children's academic success and future career readiness.

About *Work It Out Wombats!*

Work It Out Wombats! is Designed to Teach Computational Thinking Skills

Work It Out Wombats! (Wombats!) is a multiplatform series produced by GBH Kids and Pipeline Studios for PBS KIDS, with major funding from the Corporation for Public Broadcasting (CPB) and the U.S. Department of Education's Ready To Learn program.[1]

The series is designed to support critical thinking, computational thinking, problem solving, and persistence when faced with difficult or challenging tasks in children ages 3–6. In each episode, the wombats face a challenge or situation that they tackle together using a blend of CT, problem solving, creativity, collaboration, and persistence.

In this report, EDC and SRI present their research about the effect of *Work It Out Wombats!* on children's computational thinking and related skills.

[1] Additional funding is provided by the National Science Foundation, the United Engineering Foundation, Siegel Family Endowment, The Arthur Vining Davis Foundations, and the GBH Kids Catalyst Fund.

→ Researching the Impact

Although CT skills are becoming increasingly important in children's education, many children still lack access to CT learning opportunities. Educational media can help bridge this gap as studies show that media can effectively support learning in areas like math and literacy.

To understand whether access to *Wombats!* resources supported children's CT and related skills, we conducted an 8-week study with 458 4- and 5-year-old children in seven U.S. metro areas.

This study examined whether providing children from low-income households access to *Wombats!* resources, including videos from the series, digital games, and hands-on activities, supported children's CT and related skills.

Who Participated in the Study?

458

Children ages 4 and 5 living in low-income households

Researchers recruited families living in seven metro areas.

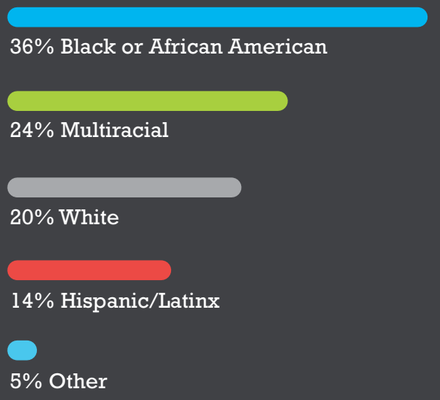
Children

51% girls

49% boys

29% spoke a language other than English at home

17% had an IEP or received other special education services



Parents & Caregivers

17% HS diploma

41% some college or associate's degree

42% BA or higher

44% reported an annual household income of $50,000 or less

Research Design

We conducted an eight-week randomized controlled trial.

A randomized controlled trial is a rigorous study design used to test whether an intervention (watching *Wombats!* videos and playing *Wombats!* digital games) caused an outcome (an improvement in children's CT or related skills). This study design allows researchers to rule out other potential explanations for changes in the outcome, such as children's typical growth over time.

We gave all participants data-enabled tablets, and we randomly assigned them to one of two groups:

1 Treatment group

- Tablets for participants were pre-loaded with researcher-selected *Wombats!* resources.
- An app on the tablets released new resources each week.

2 Control group

- Tablets for participants were not pre-loaded with any resources.
- Participants were instructed to select and use educational media each week.

3 Tablets for both groups

Tablets for both groups blocked access to the PBS KIDS website, the PBS KIDS Games app, and PBS KIDS Video app. We blocked access to these resources so that the control group could not use *Wombats!* content on the study tablet. We blocked access to them in the treatment group to create an equivalent comparison.

Families Received...	Control Group (n = 224)	Treatment Group (n = 234)
Samsung Galaxy A7 Lite tablet with a data plan	✓	✓
Instructions to use *Wombats!* resources (treatment group) or other educational media (control group) on the tablet for about 1.5 hours per week	✓	✓
Text message reminders and surveys	✓	✓
Family guide to the study	✓	✓
Wombats! resources: Videos, digital games, and hands-on activities		✓
Two links to *Wombats!* parent videos describing computational thinking skills and ways to support them		✓
Third-party software to block inappropriate content	✓	✓
PBS KIDS video and games apps and all PBS KIDS web pages blocked	✓	✓
At study end: Full access to PBS KIDS website and app, including links to *Wombats!* resources	✓	✓

What resources did families receive?

Families in the **treatment group** received the following *Wombats!* resources on their tablets:

- 56 videos (1.5 or 11 minutes each)
- 4 digital games
- 5 hands-on, real-world activities, printed and as PDFs on the tablet

40 11-minute stories

4 digital games

16 90-second short videos

5 hands-on activities

A new set of videos were released each week for 8 weeks. Sets of videos focused on the following CT skills, or combinations of these skills:

- Algorithms and sequencing
- Problem decomposition
- Debugging
- Design process
- Control structures
- Representation and abstraction

How Much Did Children Use the *Wombats!* Resources?

On average, families in the treatment group used the *Wombats!* resources more than the recommended 1.5 hours per week in each week of the study.

Engagement decreased over time, consistent with patterns observed in prior studies, but on average remained above the researcher-recommended amount.

Vertical gray lines represent standard errors.

During the study, the treatment group:

- Watched *Wombats!* videos and played *Wombats!* digital games on their tablets for an average of 2.5 hours per week (1205 minutes average total over 8 weeks);
- Accessed on average 32 videos and/or games at least once.

How Did We Measure Impact?

The research team used existing measures for some outcomes and created new measures where needed.

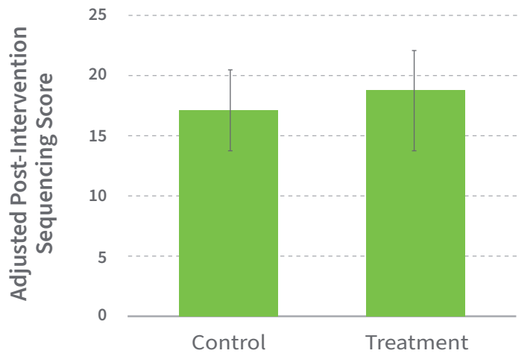
Outcome Measure	Construct	Timing	Type
STEM+C Child assessment	**CT:** Multiple constructs	Pre- and post-test	Existing; Closed- and open-ended responses
Design process Child assessment	**CT:** Ability to use the design process to solve problems	Post-test (50% of sample)*	Developed for this study; Open-ended response
Picture sequencing Child assessment	**CT:** Sequencing	Post-test (50% of sample)*	Adapted for this study; Closed-ended response
Picture problem solving Child assessment	**Problem solving**	Post-test	Existing; Open-ended response
PROMIS EC Parent survey	**Persistence:** Engagement and task persistence	Pre- and post-test	Existing; parent-report Likert rating scale
Interviews Parent interview	**All:** CT, problem solving, persistence	Post-test	Developed for this study; Open-ended response

We also measured children's baseline executive functioning skills, like working memory and flexible thinking, using the Minnesota Executive Function Scale (MEFS), because those skills might affect children's performance on our outcome measures as well as their ability to engage in computational thinking content.

* To reduce post-test administration time, we administered the design process assessment to half of our sample (randomly selected) and the sequencing assessment to the other half of our sample.

What Did Children Learn?

→ Children in the treatment group who completed the sequencing assessment had significantly higher scores on sequencing skills than children in the no-*Wombats!* group. They scored 5% higher (1.5 of 27 points higher).

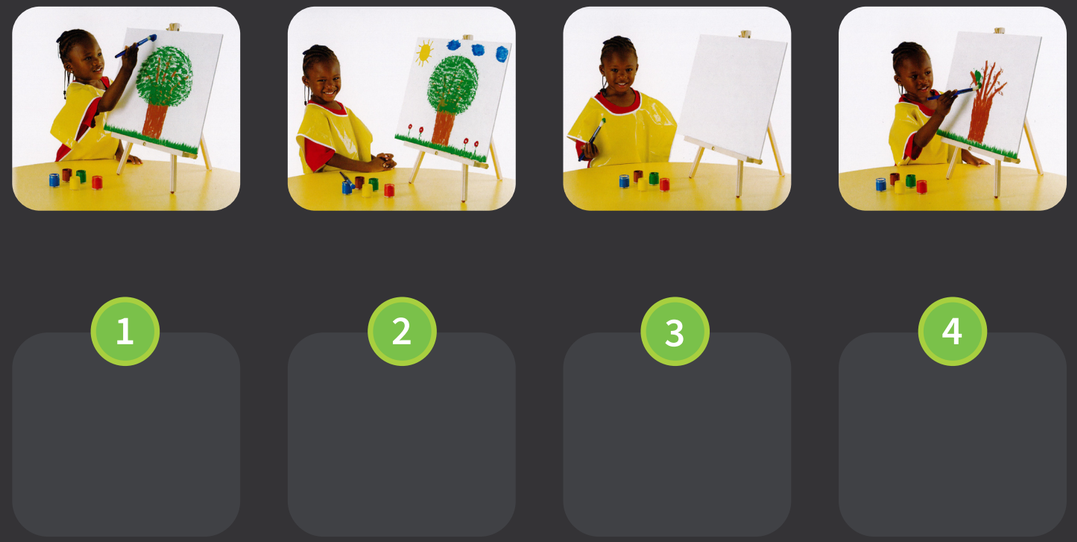


→ The size of the effect of Wombats! access on sequencing was .22 SD. An effect size of .20 SD or greater is considered substantial in education research.

Vertical gray lines represent standard errors.

We did not find statistically significant differences between treatment and control group scores on the other assessments of children's CT skills, or on problem-solving skills or task persistence.

→ The sequencing task measures children's ability to put events in order (first, second, third, fourth). Children arrange cards to tell a story. Sequencing is foundational to computational thinking.



Used with permission from Carson Dellosa Education 140089 Carson-Dellosa Learning to Sequence 4-Scene

What Parents Said About *Wombats!*

→ We interviewed a subset of parents in the study to understand their perspectives on the *Wombats!* resources, their children's engagement with the *Wombats!* resources, and what their children learned from the resources.

"And I actually watched it with her, too. So it was, it was a good experience... I would let her watch it in her spare time. But I would just overhear what's going on. And then, when I'm interested, I tell her, come sit next to me. Watch it together." - Parent

Many parents enjoyed co-using the *Wombats!* content with their children.

Most parents reported that during the study, they saw growth in children's problem-solving and organizational skills and positive changes in children's attitudes toward challenging situations.

"I could just see him practicing what he would learn, like in everyday life. I would hear him go like this, "Step it out," and he'd be, like, "Oh, well, we have to break it down into smaller steps" in regards to like cleaning his room or if he had to get his clothes ready. It's for his age. If he didn't do it right the first couple of times, he would get frustrated. But I think it was good at teaching him how to just try again and essentially figure out which way would work best for you." - Parent

Why Are These Findings important?

This research is the first to show that digital media can improve children's sequencing skills, a sub-component of computational thinking. CT skills support learning in a range of areas, including math and reading.

This study provides further evidence that young children can learn from high-quality digital media at home. This is particularly meaningful for children who may have less access to high-quality learning opportunities.

The effect size we detected is considered substantial, particularly for a short-term intervention with a relatively low cost to deliver per child. Quite often, educational interventions rely on intensive, year-long instruction to achieve similar effects.

We found significant, positive effects on sequencing, but not on other measures of CT skills, problem-solving skills, or task persistence. Compared to sequencing, these other skills may develop later, may be more challenging to teach and assess, or may require more time, practice, and scaffolding to develop.

Acknowledgements

We would like to thank the families who participated in our study. We would like to thank our partners at **CPB and PBS KIDS** for their assistance and support of this work: Kea Anderson, Michael Fragale, Pam Johnson, Mona Leigh Guha, David Lowenstein, Silvia Lovato, Anne Lund, Jeremy Roberts, Jeci Younger, Cosimo Felline, Kelly Corrado, and Sharon Philippart. Thank you to the producers at **GBH and Pipeline Studios,** namely Marisa Wolsky, Jessica Andrews, Marcy Gunther, Jillian Orr, Melissa Carlson, Joshua Littenberg-Tobias, Angel Forbes, and Georgina Gauthie, as well as their advisor, Marina Bers, for creating *Wombats!* media and providing access to it for the purposes of this study.

We would like to acknowledge the dedicated members of the **EDC and SRI research team,** who helped make this study possible: Naomi Hupert, Shelley Pasnik, Lucy Nelson, Alice Kaiser, Marcia Bueno, Amanda Cardarelli, Michelle Cerrone, Hannah Cheever, Madeline Cincebeaux, Madeline Coole, Geneva Dischinger-Smedes, Amanda Emsais, Jebeze Alexander, Kate Ferguson, Todd Grindal, Meagan Henry, Cindy Hoisington, Fiona Joffroy, Ben Kim, Hannah Kumbroch, Erica Mandell, Maricela Morales, Jennifer Nakamura, Christopher Ortiz, Christen Park, Annie Partika, Vanessa Perez Marquez, Ilana Plotkin, Jenna Rush, Erin Smith, Morgan Solender, Gullnar Syed, Angelina Williams, the late John Parris, and Bronwyn Taggart. Special thanks to Qican (Sunny) Cao, Bladimir Lopez-Prado, and Arif Rachmatullah for analytic leadership and support.

Design: EDC Digital Design Group

Photo credit: Ready to Learn Hartford/Burt Granofsky

About EDC

Education Development Center (EDC), works with partners worldwide to advance every person's journey to learn, work, and be well. Since 1958, we have been a catalyst for community-led initiatives that promote sustainable change and advance solutions to the world's most pressing challenges.

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The contents of this research report were developed under a grant from the U.S. Department of Education. However, those contents do not necessarily represent the policy of the U.S. Department of Education, and you should not assume endorsement by the federal government. [PR/Award No. S295A200004, CFDA No. 84.295A]

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