

Work It Out @ Your Library
Executive Summary of
Formative Research Report

June 2023

Prepared by:

Janna F. Kook, Camille Ferguson & Lucy Nelson

Education Development Center

Submitted to:

GBH KIDS

This report is based upon work supported by the National Science Foundation under Grant No 2005975. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

For questions about this study, please contact:

Janna Kook
Research Scientist
Education Development Center
300 Fifth Ave., Waltham, MA 02451
Jkook@edc.org, (617) 618-2797

For questions about the project, please contact:

Jessica Rueter Andrews
Senior Project Director
GBH
1 Guest St., Boston, MA 02135
(617) 300-3942

Pilot Study of *Work it Out @ Your Library* *Executive Summary*

The following document presents a brief summary of results from a pilot study of *Work it Out @ Your Library*, or the *Wombats!* Library Program, conducted by Education Development Center (EDC) in collaboration with GBH. The *Wombats!* Library Program was designed for families of preschoolers in rural communities and utilizes media from *Work it Out Wombats!*, a new PBS KIDS series designed to support 3-to-6-year-olds in developing computational thinking (CT) skills and mindsets. We sought to address the following research questions:

1. What supports do parents of preschoolers in rural communities need in order to effectively engage in CT with their children at home?
2. How can libraries in rural communities support joint CT exploration in family homes?
3. How can an intervention that combines media resources, mobile technology, and library supports foster sustained joint parent/child engagement and positive attitudes around CT?

Intervention

This pilot version of the *Wombats!* Library Program was a two-week program for preschoolers and their parents/caregivers, designed to be implemented in rural libraries by library staff. The program centered on supporting families in engaging in CT learning through the use of the *Wombats!* App.

***Wombats!* App.** The app was designed to be used jointly by caregivers and children. Once downloaded, use of the app did not require a connection to the internet. The app included five CT “activity sets,” each comprised of the following:

- an **animated video** from *Work it Out Wombats!* (either an 11-minute story or a 1.5-minute song)
- a corresponding **hands-on activity** that built on the CT idea introduced in the animated video, with brief, step-by-step instructions
- “Super Says” **tips for caregivers**, embedded within activity instructions, that emphasized strategies for engaging children in CT exploration
- prompts to take a **photo** for each step of the activity
- a **music video feature** that used the photos to automatically generated a music video at the end of each activity, enhanced by music, images of the animated characters, and text to reinforce the CT skill targeted for that activity
- a **set of questions** in speech bubbles intended to provide suggestions for how families could use the music video to talk and reflect on their experience

The pilot version of the app focused on four CT skills for children:

- **Problem Decomposition** (“Break It Down”), defined as breaking down problems into smaller parts to make them easier to solve;
- **Patterns** (“Find or Make Patterns”), defined as identifying, coping, and creating patterns;

- **Cause & Effect** (“Connect the Cause to the Effect”), defined as exploring how one action or event (cause) brings about another (effect); and
- **Design Process** (“Create, Test, Improve”), defined as using a three-step process to make something new, like a work of art or an invention.

The app also emphasized four CT engagement strategies for caregivers (designed for caregivers to use to engage their children in CT):

- Let children take the lead;
- Help children communicate their ideas;
- Allow space for productive struggle; and
- Review and reflect on what you’ve done together.

Library Implementation Model. This model included multi-tiered supports for library staff and caregivers, intended to aid and encourage families in using the app at home to explore CT.

Supports for library staff included:

- **Work it Out @ Your Library printed guide**, which included background information and program implementation details
- **Slide presentations** intended to be used both as a training resource to build library staff understanding of CT, and as the basis for to use at two in-person library sessions with families
- Suggested **email and text** message reminders for families
- Suggestions for virtual office hours
- Suggestions for a **“CT Corner” display** in the library
- A **virtual meeting** with GBH to walk through materials

The *Wombats!* Library Program implementation model included two 1-hour sessions at the library for families, two weeks apart. At the **Introductory Session**, library staff introduced families to the *Work it Out Wombats!* characters, the concept of CT, and the *Wombats!* app. For the purposes of this study, families were provided with a loaner iPod that was pre-loaded with the app. Library staff walked families through how to use the app and then provided support and encouraged caregivers to use the CT engagement strategies while they did the first activity set with their children. Families were encouraged to complete the other four activity sets at home. Library staff sent families home with a **Work it Out @ Home printed guide** with more information about children’s CT learning and CT engagement strategies. They also received an **“activity tracker” with stickers** for families to document their progress towards completing all four of the remaining activity sets in the app.

Over the next two weeks, families completed the activity sets in the app at home. Library staff reached out to families to encourage them to visit the library to explore the “CT Corner”, to find out if they needed additional support, and to remind them to use the app and attend the next in-person library session.

Families returned to the library at the end of the two weeks for a final **Share & Celebrate Session** at the library. At this session, library staff encouraged families to share their experiences with the at-

home activity sets. Then, they led families in a sixth and final activity set, which had a celebratory theme.

Study Methodology

Recruitment. Three libraries in rural Mississippi were recruited to participate in this pilot study. Each library implemented the *Wombats!* program between October 2022 and January of 2023.

Library staff were asked to recruit up to ten families with preschoolers to participate in the program using provided recruitment materials, including a printable flyer and social media posts. Caregivers were invited to indicate their interest to participate in the research study using an online form. EDC then reached out to caregivers about the study and shared their contact information with library staff.

Sample. One library staff person at each of the three libraries took the lead in running the *Work it Out @ Your Library* program. Among these three, two were librarians and one was a library assistant. They ranged in experience in these roles from 6 months to 4 years. Two identified their race as White and one as Black or African American.

Fifteen caregivers participated in the program and are included in these analyses. Of these, 13 attended the *Introductory Session*, 12 attended the *Share & Celebrate Session*, and 9 attended both sessions. Among the 15 caregivers, all but one were mothers; one was a grandparent. The majority self-identified as White (11), 3 as Black or African-American, and 2 as Asian. The majority of families reported household income in the \$25,000-\$54,999 range. Participating children in these families ranged in age from 3 years and 9 months to 6 years and 7 months. Three of the children attended kindergarten. Eleven of these children were male and four were female.

Data Collection Procedures. Qualitative and quantitative data were collected from participating library staff and caregivers in the following ways:

Data Collection Method	Library Staff	Caregivers	Constructs Measured
Online pre-survey	✓	✓	Background information Understanding of CT CT self-efficacy & attitudes
Brief weekly media logs		✓	Use of the app
Online post-survey	✓	✓	Understanding of CT CT self-efficacy & attitudes Perceptions of the program
Virtual post-interview or focus group	✓	✓	Perceptions of the program Suggestions for improvement

All 3 library staff completed all data collection activities. All 15 caregivers completed the surveys, 12 participated in an interview or focus group, and 13 filled out at least one of the two weekly media logs.

Summary of Results

Library Staff Experience of Implementing the *Wombats!* Library Program

- **Resources for Library Staff.** Library staff found the guide and the slide presentation to be very **clear and helpful**. All library staff reported that, after reviewing these materials and meeting with GBH, they felt very prepared to implement the *Wombats!* Library Program.
- **Challenges.** The greatest challenge library staff faced was in **recruiting families** for the program. They were not sure why more families did not sign up, but they guessed that it was related to the many other activities competing for families' time. Library staff thought that the program might have been more appealing to families if they had known more about the content and what participation would entail. (It is important to note that *Work it Out Wombats!* had not yet aired on PBS KIDS so families were unfamiliar with the show.) In the implementation of the program, library staff reported very few challenges; one noted some difficulty in communicating with families.
- **Successes.** Library staff observed several successes of the program including:
 - a high level of **engagement** in using the app
 - **relationship-building** between families and library staff
 - **family bonding** through shared activities
 - **children's excitement** to share about what they had done at home at the in-person library sessions
 - the inclusion of **older and younger siblings** in the sessions
 - opportunity for library staff to **promote the library** and increase their educational programming
- **Adaptations.** Library staff generally followed the prescribed plans for the two in-person sessions but two felt a need to **shorten the two sessions** in order to hold children's attention. One library staff person modified the order of activities in the second session to build on children's enthusiasm to share. One library staff person created a **photo display** using families' at-home photos that garnered excitement. Library staff **did not use virtual office hours** as suggested and instead encouraged families to get in touch with them as needed via phone, text, or social media.
- **Library Staff Role in Supporting Caregivers.** Library staff felt that their enthusiasm about the *Wombats!* app may have helped to **build caregivers' enthusiasm**. They also reported that walking caregivers through how to use the app and being available to answer any questions helped to **build caregivers' confidence in using the app**.

- **Fit in Rural Community.** One library staff person emphasized that, in her rural community, it was extremely important that the app was **fully downloadable** and did not require subsequent connection to the internet. She explained that many patrons do not have access to the internet at home, so this was a **critical feature for using educational media in rural areas**.

Caregiver Perceptions of the Library Sessions & Library Staff Support

- **Library Sessions.** Overall, caregivers reported very positive feelings about the library sessions and resources. One caregiver described how the library staff person **encouraged her to use the CT engagement strategies** while doing a hands-on activity at the first session.
- **Support Between Sessions.** Although caregivers appreciated getting reminders from library staff about completing the activities and attending the sessions, they overwhelmingly reported that they did not feel a need for library staff support when using the app at home.
- **Feelings of Connection.** Survey data suggests that families may have stronger feelings of connection at their libraries after participating in the *Wombats!* Library Program.

Family Experiences Using the *Wombats!* App

- **Caregiver Appeal and Ease of Use.** All caregivers indicated that the app was **intuitive and easy to use**. Overall, caregivers reported that the instructions for the activities were clear and easy to understand. Caregivers enjoyed that the app **provided an opportunity to do something together** with their child.
- **Child Appeal.** All caregivers reported that their children **enjoyed the videos** and were **excited to do the activities**. Some caregivers reported that their child's excitement drove use of the *Wombats!* app. Several caregivers noted that they included **younger and older siblings** in using the app as well. When caregivers were asked if an activity stood out as a favorite, each activity was cited at least once across respondents, indicating that the activities were accessible and engaging.
- **Challenges & Dislikes.** Some caregivers reported that the 11-minute videos were **too long** for their child to be able to pay attention to. Many families enjoyed taking photos during the activities, but some felt that number of photos they were asked to take **disrupted the flow** of the activities and suggested that **fewer photos** be required.
- **Usefulness of App Features.** Overall, caregivers reported that their children **enjoyed watching the music video** of their photos and some watched it multiple times. Some caregivers perceived that this part of the activity was **not central to their child's learning**. Caregivers had a **mixed response to the "Super Says" tips** that encouraged parents to use the CT engagement strategies; some said they were somewhat helpful, but others did not notice that they needed to click on them, or did not pay much attention. Many caregivers **used and enjoyed the reflection questions** at the end of

the activities, although some said that their children didn't have the attention span to have an extended conversation after completing the activity.

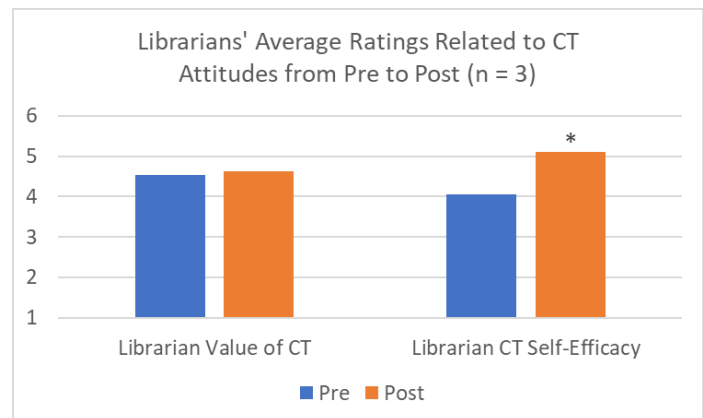
Engagement with the App

- **Sustained Engagement.** Media log data indicated that families **used the app consistently** during both weeks of the program. Based on survey and media log data, most caregivers **completed all activities**, and some did them more than once. Caregivers also indicated a **high level of co-viewing videos**.
- **Fit with Families' Lives.** All caregivers felt that the number of activities was appropriate for the two-week period, and some wanted more. Families used the app at different times but it generally seemed to fit into varying family schedules. Caregivers also reported that they had the materials needed to do the activities.
- **Supports for Engagement.** Most caregivers felt that their engagement was supported by the activity tracker and communication from library staff. Personal contact from library staff seemed to help caregivers in following through on fully engaging in the activities.

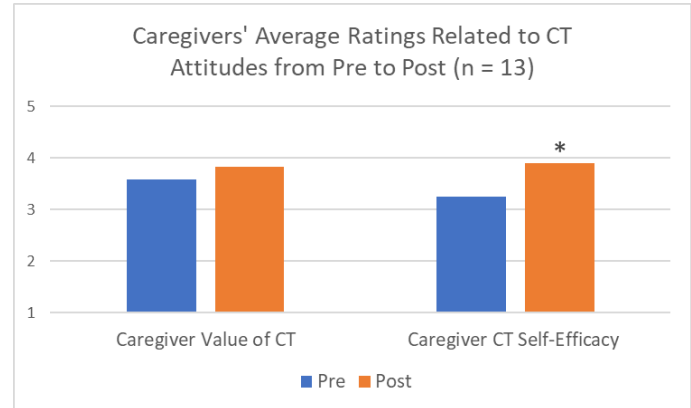
Preliminary Evidence of Change in Key Outcomes

In preparation for an upcoming summative study of the final app and library program, we piloted several survey scales for measuring attitudes, beliefs, and behaviors related to CT. Given the short duration of this pilot program, we did not expect to see substantial changes in these outcomes in the current study; however, we did look for preliminary evidence of change.

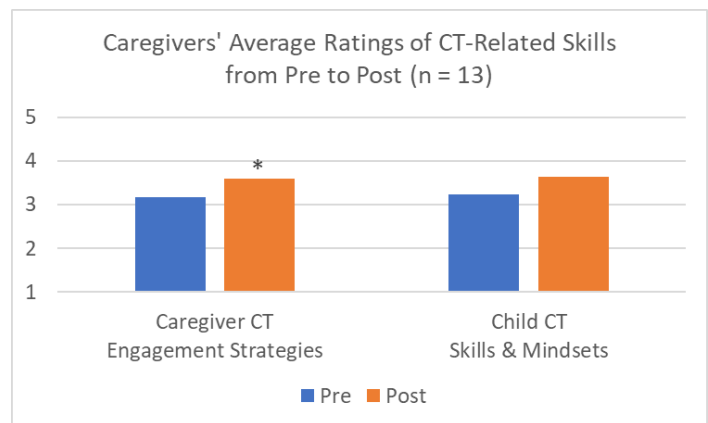
- **Library Staff CT Attitudes.** Preliminary evidence suggests that library staff had greater self-efficacy in supporting CT after using the *Wombats!* resources. We did not observe a change in library staff's attitudes about the value of CT in this preliminary analysis; this may have been because, for this very small sample, their attitudes about the value of CT were already high.



- Caregivers' CT Understanding & Attitudes.** Before and after participating in the program, parents were asked to define computational thinking in their own words. The majority of caregivers demonstrated an increased understanding that CT is related to problem solving. Preliminary evidence also suggests that caregivers had more positive attitudes about CT after participating in the program; in particular, caregivers reported significantly greater self-efficacy in supporting CT after using the *Wombats!* resources.



- Caregiver CT Engagement Strategies.** Caregivers were asked how, if at all, they had changed the way they play with their child based on anything they learned from the *Wombats!* Library Program. Four caregivers described changes related to the featured engagement strategies, such as letting their child take the lead or allowing space for productive struggle. This shift was also evidenced in caregivers' ratings on a survey scale. Caregivers were asked to imagine the last time their child solved a difficult problem, and rate items related to the use of engagement strategies to support their child; scores on caregivers' use of engagement strategies increased significantly from pre to post.



- Child CT Skills & Mindsets.** Caregivers completed a survey scale related to their child's CT skills and mindsets while solving a problem (e.g., problem decomposition, flexible thinking, persistence). Although there was not a significant change in scores, ratings of CT skills and mindsets did increase on average from pre to post. Caregivers were also asked to give an example of how their child used what they learned in the *Wombats!* Library Program in their everyday life. Two-thirds of caregivers were able to provide an example that was in line with a CT skill or mindset (e.g. looking for patterns, or showing persistence while problem solving).

	Number of related responses	Example Provided by Caregiver
CT Skill: Problem Decomposition	1	<i>She breaks down her problems more.</i>
CT Skill: Patterns	2	<i>He loved the blue, yellow, yellow song...When we go out to the store, we find new patterns and sing new lyrics with our new pattern to the same tune.</i>
CT Skill: Design Process	1	<i>[H]e enjoyed [the Inventing Toys activity] so much he wanna do it again for his other stuffies using different materials to build the slide.</i>
CT Mindset: Creative & Flexible Thinking	2	<i>He learned how to stop and think about a different way to fix something.</i>
CT Mindset: Communication	1	<i>He told me about how he found solutions.</i>
CT Mindset: Confidence, Persistence & Perseverance	3	<i>He takes time to figure things out for himself instead of giving up so easily...he finds what works for him</i>

Conclusions

Results from this study provide preliminary evidence for the following conclusions:

Digital media and mobile technology show promise for supporting family engagement in CT learning.

Overwhelmingly, caregivers reported that the *Wombats!* app was intuitive and easy to use, the videos and activities were appealing to children, and instructions for the activities were clear and easy to understand. Families enjoyed the opportunity to engage in activities together, often including other siblings. The format of watching brief videos and doing simple activities fit well into families' regular routines. The music video that was generated at the end of activities was a novel feature that many families enjoyed. Many caregivers also found the provided reflection questions to be useful for having productive conversations with their children. Caregivers did provide feedback suggesting several ways that the app could be improved to support more sustained engagement in learning, which will inform how the team revises and expands the app for public release.

Library support can be leveraged to extend families' exploration of CT across settings and over time.

Although families did not perceive a need for a great deal of ongoing support from library staff, results suggest that the library model supported families' engagement in CT learning in important ways. First, library staff encouraged families to begin using the app by endorsing it as a valuable resource and providing basic, in-person instruction on how to use it. Library staff also supported families' sustained engagement at home and over time by reminding caregivers via text and email to continue using the

app and attend events. Finally, library staff supported families in exploring CT in different settings by providing opportunities for families to share about and reflect on their experiences.

The program provided some support for high-quality family interactions around CT and has the potential to provide more. The *Wombats!* Library Program was designed to both help families engage in CT exploration and support caregivers in using CT engagement strategies that are crucial for deeper learning. Preliminary evidence from this study provides valuable feedback around challenges and successes in caregivers' use of the engagement strategies, which were first shared with caregivers in the introductory library session, reinforced via "Super Says" tips featured in the *Wombats!* app, and emphasized again at the final library session. Some caregivers were not able to attend both library sessions, so did not fully benefit from library staff support in learning about CT engagement strategies. Some caregivers found it helpful to see "Super Says" tips throughout the activities, but others did not access the tips or find that they added new information. In response to these findings, EDC and GBH are considering ways in which the library program and the app could be enhanced to provide greater support for caregivers' use of the engagement strategies.

This program model may be particularly useful for supporting families from rural, low-income communities to explore CT. As described previously, families who participated in the pilot study came from rural Mississippi communities, and the majority reported low household income. We are encouraged by the study's findings, which showed that these families were able to access, use, and enjoy the app and accompanying library support. As we make plans to revise the intervention, our team will take care to ensure that the app remains usable without a continuous connection to the internet, and that it is compatible with older and lower-end smartphones.