

Work It Out @ Your Library ***Formative Research Report***

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Work it Out @ Your Library

Formative Research Report

The following document presents the results of a formative study of a two-week pilot version of *Work it Out @ Your Library* (which we will refer to as the *Wombats!* Library Program). This program utilizes media from *Work it Out Wombats!*, a new PBS KIDS series designed to support preschoolers' development of computational thinking (CT). 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?
 - a. How do media, hands-on activities, and mobile technology support or impede parents' effective use of CT engagement strategies?
2. How can libraries in rural communities support joint CT exploration in family homes?
 - a. How can interactions that take place between library staff and parents support or impede effective use of CT engagement strategies at home?
 - b. How do media-based professional development resources for librarians enhance their ability to promote parents' effective use of these strategies through an in-person implementation model?
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?
 - a. To what extent does the combination of media resources, mobile technology, and library supports allow sustained parent/child engagement through a sequenced set of resources for CT learning and reflection?
 - b. What evidence exists that professional development resources for librarians and a virtual implementation model support librarians' self-efficacy in their role as virtual coaches and positive attitudes around CT?
 - c. What evidence exists that this intervention promotes parents' positive attitudes around CT?
 - d. What evidence exists that this intervention promotes children's development of CT skills, as perceived by parents?

A subsequent summative study will delve more deeply into the third research question while examining the efficacy of the final eight-week *Work it Out @ Your Library* program in supporting adults' positive attitudes around CT and children's development of CT skills.

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 generate 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 five activity sets in the *Wombats!* prototype app were:

1. *Building Castles* (intended to be done at the library). This activity set includes a song in which three crab characters from *Work It Out Wombats!* create, test, and improve a sand castle that can withstand waves. In the hands-on activity, children and caregivers create a castle out of cups, make it taller, test how sturdy it is by adding a flag on top, then improve it to build an even taller and sturdier castle! The CT skill for this activity set is Design Process.
2. *Making Snacks*. This activity set includes a song in which *Wombats!* characters take the big job of making sandwiches and break it down into smaller jobs. In the hands-on activity, children and caregivers break down the big job of making multiple cracker sandwiches and break it down into smaller jobs. The CT skill for this activity set is Problem Decomposition.

3. *Planning Gardens*. This activity set leverages a video in which two *Wombats!* characters fix a patterned shell garden after the pattern is disrupted during a lively game of hide and seek. In the accompanying hands-on activity, children and caregivers make flowers out of colored tissue paper, re-create the colored pattern from the animated video, and then make their own pattern. The CT skill for this activity set is Patterns.
4. *Inventing Toys*. This activity set includes a video in which *Wombats!* Characters create a fun toy to give as a present to three baby fish. In the hands-on activity, children create a playground slide for their stuffy using a cookie sheet and a stack of books, then test and improve it. The CT skill for this activity set is Design Process.
5. *Investigating Sounds*. This activity set includes a video in which *Wombats!* characters try to discover the cause of a scary, mysterious sound. In the hands-on activity, children and caregivers take turns making sounds with “mystery objects” and try to guess what’s causing the sounds. The CT skill for this activity set is Cause & Effect.

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 to highlight the *Wombats!* Library Program and to let families know about other CT resources at 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. (This final activity set was not available in the app, as it was specifically designed to be used in library settings.)

Study Methodology

Recruitment

Three libraries in rural Mississippi were recruited to participate in this pilot study. Each library implemented the *Wombats!* Library Program between October and November of 2022. One library implemented the program a second time in January of 2023.

Library staff were asked to recruit up to ten families to participate in the program. We provided recruitment materials including a printable flyer and social media posts. One library staff person also wrote a letter that was distributed at a local preschool. Through an online form, caregivers were invited to indicate their interest. The research team then reached out to caregivers about the research study and shared their contact information with library staff.

Recruitment of families was an ongoing challenge for the study (see discussion below). We originally planned to recruit families with children who were 4 or 5 years old (48-71 months) but expanded the range of eligible ages to include some 3- and 6-year-olds when we began to encounter difficulties with recruitment. Since the intended target audience for the *Work It Out Wombats!* series is children ages 3 to 6 years, we felt this was an appropriate accommodation.

Sample

Participating Libraries and Library Staff

One library staff person at each library took the lead in running the *Wombats!* 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 had associate degrees and one had a bachelor's degree. Two identified their race as White and one as Black or African American. All three identified their gender as female. One additional library staff person was not directly involved in running the program but supervised the implementation and provided input during the interviews.

We asked library staff about their current programming and communications with families of preschoolers. Library staff reported mostly in-person interactions with families of young children, with some online communication. All library staff reported that their libraries offered in-person programming for preschoolers and their families at least once per week. None of the libraries were currently providing online or virtual programming for preschoolers and their families. All did report, however, that they regularly communicate with families via social media, and regularly provide recommendations for educational apps and other digital media resources.

Participating Families

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. One additional caregiver attended the *Introductory Session* but then declined to continue participation. Demographic information for the final sample of caregivers and their participating children is presented below. Participating children ranged in age from 3 years and 9 months to 6 years and 7 months. Although we did not formally ask about this, three caregivers mentioned that they homeschool and two library staff people shared that this was increasingly common in their communities. Two parents also noted that their children had developmental delays. All but two caregivers reported that they had other children in the home.

Demographics of Participating Caregivers and Children (n = 15 families)

Participating Caregiver (n = 15)	Number of families
Mother	14
Grandmother	1
Caregiver Race/Ethnicity (n = 15)	
White	11
Black or African American	3
Asian	1

Caregiver Education (n = 14)	
High School Diploma / GED	2
Some college, Technical or Associate Degree	8
Bachelor's Degree	3
Graduate or Professional Degree	1
Income (n = 14)	
Less than \$25,000	5
\$25,000-\$54,999	7
\$55,000-\$84,999	0
\$85,000 or more	2
Caregiver Employment (n = 15)	
A caregiver is at home full-time	10
Caregiver(s) work part- or full-time	5
Home Language (n = 15)	
English Only	15
Child Gender (n = 15)	
Male	11
Female	4
Formal Schooling (n = 15)	
Attends preschool/school outside of home	8
Does not attend preschool/school outside of home	4
Participates in homeschool PreK or K	3
Child Age (n = 15)	
	Ave (SD)
Months	57.5 (8.3)

Data Collection Procedures

Qualitative and quantitative data were collected from participating library staff and caregivers. Participating library staff completed an online survey before implementing the *Wombats!* Library Program. After the program was complete, they completed an online survey and virtual interview. All 3 library staff completed all data collection activities.

Participating caregivers completed an online survey before participating in the program. After participating in the program, they completed an online survey and virtual focus group (or one-on-one interview if no other participants were scheduled at the same time). Caregivers also filled out two brief media logs that were sent via text at the end of each week of the program. All caregivers in the final sample completed the pre-survey; one was not able to complete all questions due to a survey malfunction. At the conclusion of the 2-week program, all 15 caregivers completed the post-survey and 12 participated in an interview or focus group. Of the 15 participating families, 13 filled out at least one of the two weekly media logs and seven caregivers completed both logs.

Methods of data collection used with library staff and caregivers, as well as the constructs measured by each method, are summarized in the table below.

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

Throughout the report, we have integrated results from these different data sources in order to present more comprehensive information about constructs of interest.

Results

1. Characteristics of Participating Families

In order to explore characteristics of participating families that might influence their experience in the *Wombats!* Library Program, we asked caregivers to report on their typical learning-related routines, their use of the library, and their attitudes about the library.

Learning-Related Routines of Participating Families

Before participating in the program, caregivers generally reported a level of engagement in learning-related activities that was consistent with expectations for participating in the *Wombats!* Library Program. We asked caregivers a series of questions about how they typically engage in learning activities and use media with their children in order to understand how participating in the *Wombats!* Library program might be similar or dissimilar to their regular routines. In this two-week program, families were asked to attend two events outside of the home, watch four videos together, and do four hands-on activities together. The majority of caregivers reported that they go with their child to a place where they can learn together (including a library, children’s museum, farm, etc.) one to two times per month; three said that they had not gone somewhere like this in the past month. The majority of caregivers reported that they not only supervise their child in using screens but also watch shows along with them three or more times per week. Finally, the majority of caregivers reported that they do hands-on activities with their child to support learning (e.g. cooking, a craft, a science activity) on a

weekly basis; more than half reported that they did learning activities three or more times per week. Overall, the typical frequency of learning-related activities that caregivers reported was similar to what they were asked to do in the *Wombats!* Library Program, suggesting that the program would fit naturally into their routines. For the families who reported that they do not typically go places outside the home for learning, however, the library sessions may have been different from their typical activities.

Participating Families' Prior Experience & Feelings about the Library

Caregivers varied in their level of typical use of the library and library programming. We asked caregivers specifically about their use of the library and library programming in the past month. Six caregivers (43%) reported that they had visited the library with their child about once per week, 4 (29%) visited about once per month, and 4 (29%) had not visited with their child in the past month. Eight caregivers (57%) reported that they had participated in some kind of library programming with their child at least once in the past month.

Before participating in the program, caregivers reported an overall strong sense of belonging at the library but less personal connection to library staff. Caregivers responded to eight items related to their sense of belonging and connection at their local library before participating in the *Work it Out Wombats!* Library program (6-point scale, from “strongly disagree” to “strongly agree”). Based on this preliminary data, the *Library Connection* scale showed very good internal reliability (Cronbach’s alpha = .84); items were averaged to create an overall score. They generally reported positive feelings about the library; with a possible range of 1 to 6, the average overall score was 5.2 (SD = .7). All caregivers said they “agree” or “strongly agree” with statements about feeling welcome at the library and feeling comfortable asking library staff for help. Roughly a third of caregivers reported that they “slightly disagree” or “disagree” with a statement about library staff knowing their children personally.

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

Usefulness & Ease of Use of Library Program Resources

Library staff received program materials on a website, including the *Work it Out @ Your Library* guide and slide presentations. All library staff reviewed the slide presentations and accompanying scripts for the library sessions, and reviewed the guide, including suggestions for contacting families, holding virtual office hours, and setting up a CT Corner. All library staff met virtually with GBH to go over materials and ask any questions. During the library sessions, all library staff used the slide presentations. All library staff set up CT Corners in the library, and contacted families throughout the program, but none held virtual office hours as suggested.

Library staff found the program resources to be clear and helpful. All library staff reported that the library program materials and supports had provided everything they needed to successfully implement the *Wombats!* Library Program. When we asked about the usefulness of

the different resources they received, both in interviews and in the post-survey (see table below), the two resources that were cited as the most helpful were the *Work it Out @ Your Library* guide and the slide presentations for the library sessions.

Number of Library Staff Ratings for the Usefulness of Program Resources (n = 3)

	Not useful	Slightly useful	Moderately useful	Very Useful	Did not use
<i>Work it Out @ Your Library</i> guide				3	
Slide presentations				3	
Website to access the materials			1	2	
Virtual meeting with GBH to go over materials			1	2	
Suggested email/text messages for families			1	2	
Suggestions for virtual office hours	1		1	1	
Suggestions for the CT Corner			1	2	

All library staff reported that, after reviewing the program materials, they felt very prepared to implement the *Wombats!* Library Program. Library staff spent time ahead of their implementation reviewing the guide, preparing materials and setting up the spaces where they would meet with families. Two library staff people reported spending three to four hours reviewing the library guide and preparing for the sessions. One said that she felt “extremely prepared” by the *Work it Out @ Your Library* guide. She explained:

[I]t was extremely detailed. While it was long, it was broken down in different sections to where it wasn't overwhelming and I was able to prepare for...a couple of days beforehand. So...it had all the right information. It even...answered questions that I didn't even think to ask... So, it was a very, very good outline.

The other library staff person was not able to prepare as much due to external circumstances; another library staff person had originally planned to run the program, but became sick and so asked her to step in. Still, she felt that she was able to prepare without too much time because the presentation was so clearly scripted: “I felt pretty good about it. Once you read through the script thing...it was just pretty straightforward how they wrote the script out.” This library staff person also added that being able to try out the app ahead of time was helpful in understanding what families were expected to do.

Library staff followed suggestions for setting up a CT Corner. Library staff created CT Corners that included several of the suggested elements from the *Work it Out @ Your Library* guide. One library staff person used a *Wombats!* sign, a bulletin board of photos from the library program, a variety of puzzles for young children, and a building block station. Another library staff person said that included a variety of books related to CT, including those for older children, handouts about CT, and *Wombats!* coloring pages. She noted that she set up this display right at the entrance to the library to increase the chances that patrons would notice it.

She explained that she made an effort to talk with any parents who stopped to look at the display so that she could answer questions and explain what CT was.

Challenges with the *Wombats!* Library Program

The greatest challenge library staff faced was trying to recruit families for the program.

Library staff used the provided materials to advertise the program on Facebook and on physical bulletin boards at the library. One library staff person spent several hours writing a letter to share with families at a local preschool and sent out 60 printed copies. When we asked library staff why so few families signed up, they were unsure but had some guesses. One explained: “Fall is super busy for families. So if they have older children, it’s just a challenge to commit. Weekends are full, evenings are full.” We asked if another time of year might be better. Some thought that summer would be just as difficult because children are in camps, and winter might be easier. They also explained that more families might be able to participate if the program were open to a wider range of ages than just 4- and 5-year-olds, especially since the *Work it Out Wombats!* series was developed for 3- to 6-year-olds. In their other programming, they tend to be flexible with the ages of children participating so that families with multiple children can come.

Library staff had some ideas for making the program more appealing to families by providing more information.

Two library staff people felt that the messaging around the program may have been too vague to draw families in. Although they agreed with not using the term “computational thinking” in social media posts, they thought it may have helped to have more specific information, for example, about how the program was an opportunity to bond with your child and that it involves digital media. One explained, “Families love their devices. If they knew they would be doing device-driven things, I feel like that might be helpful.” Another felt that families didn’t quite know what to expect for the first session, so it might help to see photos or videos of other families doing fun activities.

Library staff reported very few challenges with implementing the model. One library staff person noted that she had trouble playing the video from the slide presentation. When she tried to play the videos, they did not play within the slideshow but opened on a browser. Although she wondered if it had something to do with an outdated operating system on the library laptop, she suggested it might be easier if the presentation didn’t require going back and forth between videos and slides.

One library staff person noted challenges in communication with families. For one library staff person, some families had not contacted her directly about their interest in the program and only filled out the online interest form. The research team did not immediately share their contact information with her so there was a delay in reaching out to those families. She explained that getting in touch with caregivers was also sometimes difficult with their different work schedules.

Successes with Implementing Library Model

Library staff saw that the program helped to build their relationships with families. One library staff person shared that several of the participating families did not regularly attend the library before participating in the program and the children did not personally know her. But after the first session, they started visiting the library more often and were excited to chat with the library staff person about *Wombats!* when they saw her. Another library staff person shared that children were especially excited about the dance party at the end and pulled their grown-ups up to dance with them. This seemed to be a moment of bonding with library staff as well. One library staff person laughed as she said “Maybe my dancing is not the best. But we were doing the little ‘wag your finger, jump up and down, shake it all around’ with our little cards. They picked it out, they picked the order they wanted it in and we *went* for it!”

Library staff saw that families were excited to connect with each other about their experiences. One said that children arrived at the Share & Celebrate Session very eager to share both with her and other children: “[T]he kids were very excited, so then they were telling me and we were showing each other the videos.” Another described the children as “really animated” as they talked with her about things like making snacks, and making their tissue paper gardens. Families shared how they made the activities their own; for example, one family shared that for the *Making Snacks* activity, they made Indonesian-style sandwiches that reflected part of their family’s culture.

Library staff shared that older and younger siblings were able to get involved in the sessions. All three library staff shared that siblings of the participating preschoolers wanted to join in on the *Wombats!* Library Program. One library staff person explained, “At the first meeting I had...one or two [families] that had to bring... younger siblings with them because they had nothing to do.” She had anticipated this and prepared extra materials so they could participate as well. Then, at the second session, even more siblings came; she believed this was because they had heard about how fun the session would be: “I had more kids there here, but that was perfectly fine...[T]hey were bringing their siblings too because they heard about the dance party and everything like that, the older and younger siblings. And so they joined in...”

One library staff person shared that she used the *Wombats!* Library Program as an opportunity to promote the library. Throughout the program, she heard some participating caregivers express surprise that the library had programs like this; she realized that they likely didn’t know how much the library had to offer. She made a point to let them know about the CT Corner, as well as other toys and materials that were available, and other programs they might be interested in attending.

One library staff person shared that this program helped her move towards a goal of increasing the educational programming offered at her library. She explained that she sees a need for more programs in her community to support early education, especially because of the growing number of families who are homeschooling their preschoolers. Despite this need, her library has not been providing this kind of programming since the pandemic. She explained

that doing this program was an opportunity for her own personal growth; it gave her the resources to try something new that she hopes to do again:

It took me slightly out of my comfort zone because, even though I work with the public, I don't like public speaking...but it was a good experience overall. And I want to do more programs like this...I can see a need for it in the community... I'm proud of how I did too because...I stepped out of my comfort zone to do it.

Adaptations Made in Implementation

Library staff generally followed the prescribed plans for the sessions but two felt a need to shorten the sessions in order to hold children's attention. Overall, library staff reported that they ran the sessions for about 30 to 45 minutes. Going into the sessions, two library staff people felt concerned that children would not be able to sit through the entire slide presentation and so shortened it somewhat. One said in the post-survey that she explained computational thinking to parents when they first signed up, so that she wouldn't have to spend as much time reading the full script for the slides during the session:

With my first session, I knew instantly that I wasn't going to be able to sit them down for an hour and a half while I went over the material with their parents. So I decided to give the parents information before they came and it cut down the time to about 30 min[ute]s which was perfect as the kids were getting antsy.

Another explained that she skipped the portion of the slide presentation that showed the app; instead she handed out the devices and walked families through this information as they looked at the app on their own devices to make that information more engaging. She also suggested that it would be helpful to get children started on an activity (e.g. making the castles, or coloring pictures) while she needed to explain things to the adults.

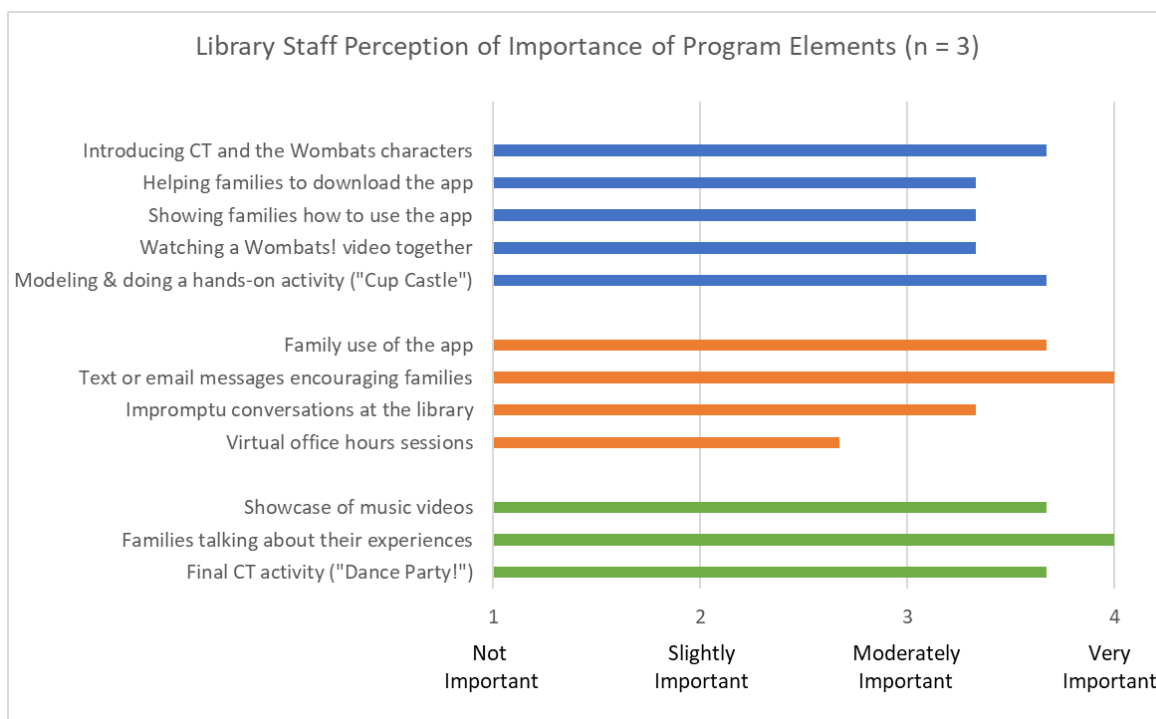
One library staff person slightly modified the "show-and-tell" during the Share & Celebrate Session based on children's enthusiasm to share. This library staff person explained that children were very excited to share about what they had done and show each other their music videos right at the start of the session. Although the script recommended to go through each video, ask questions, and use a show-and-tell format, she decided to go "with the flow" to build off of this enthusiasm and allow children to share more as a whole group. She said they still completed all parts of the session.

Library staff made themselves available for parent support but did not hold virtual office hours as suggested. Although two of the three library staff people reported that the suggestions for virtual office hours in the *Work it Out @ Your Library* guide were at least moderately useful, all three reported that they did not hold virtual office hours at a specific time. Instead, they opted to share their contact information with families and encourage them to reach out at any time. One library staff person explained that families could reach her on Facebook Messenger or by email. She said that she was able to respond quickly to any

messages and she felt that caregivers preferred this: “...It let them know that I was there whenever they had a question.”

3. Library Staff Perceptions of Their Role in Supporting Caregivers

We asked library staff to rate how important each element of the *Wombats!* Library Program was for supporting families’ learning and engagement. All three library staff people rated almost every element as being either moderately or very important. There was most consensus about the importance of sending reminders to families between sessions, and having families talk about their experiences at the *Share & Celebrate Session*. Surprisingly, library staff rated “virtual office hour sessions” as slightly or very important even though they reported not holding these sessions; they may have interpreted this item more generally to mean being available to talk to families and answer questions.



Library staff enthusiasm about the *Wombats!* app may have helped to build caregivers’ enthusiasm. One library staff person put it this way: “[W]hen you're a presenter...it's good...if you believe in...what you're selling...Once I watched the videos, I really did like the Wombats... And so I think that was helpful—that energy.” She felt that that energy communicated to families that this was an app that was worth using.

Library staff reported that it was very helpful for them to walk caregivers through how to use the app. One explained that walking parents through the app as they did the first activity together was important for building confidence in caregivers. She said that “some people thought it was going to be hard to use the app,” but after they used it together, they saw it was easy and they could do it themselves at home.

One library staff person created a photo display that garnered excitement. Based on suggestions in the *Work it Out @ Your Library* guide for a CT Corner, one library staff person created a photo display. She took photos during the first session and then asked parents to send her pictures via text or email of their experiences doing the activities at home. She used these photos to create a bulletin board that was on display at the second session. She explained that the children were delighted to see themselves on display: “they just got super excited about it.” Families were so proud to see themselves that caregivers took pictures of their children in front of the display.

4. Caregiver Perceptions of the *Wombats!* Library Program

Overall, caregivers reported very positive feelings about the library sessions and resources. The majority of caregivers gave positive ratings (either “agree” or “strongly agree”) on items related to both their enjoyment and their child’s enjoyment of the library sessions, the usefulness of the printed resources, the helpfulness of the library staff person, and their feelings of preparedness to do activities at home. One caregiver participated in a program with only two other families; she expressed that the session would have been more interactive and fun if more families had been there.

Caregiver Ratings of Library Program Components (n = 15)

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	M (SD)
My child enjoyed going to the <i>Wombats!</i> library sessions.			1	3	11	4.67 (0.62)
I enjoyed going to the <i>Wombats!</i> library sessions.			1	4	10	4.60 (0.63)
My child was excited to share about what we did at home with other families at the library.			2	6	7	4.33 (0.72)
I looked forward to talking with other parents at the library sessions.			3	6	6	4.20 (0.78)
After going to the library session, I felt ready to do the <i>Wombats!</i> activities.			1	4	10	4.60 (0.63)
The <i>Work it Out @ Home</i> printed materials helped me understand how to help my child learn CT at home.				6	9	4.60 (0.51)
My librarian helped me understand how to help my child learn CT at home.			1	4	10	4.60 (0.63)

Some evidence suggests that library staff were successful in encouraging families to use the CT engagement strategies. One caregiver cited the library staff person as being especially helpful in encouraging her to let her child take the lead:

I've got to learn to kind of let her figure it out on her own, because I always—as a mom—try to fix it for her. So I've got to learn to let her kind of take the reins and figure it out instead of me just trying to fix it for her all the time...While we were there and [my child] was struggling to make the wall with the cups, I tried to step up and help her and I'm like, 'Hold on now, I need to stop and let you do this.' And [the library staff person] was like 'Yeah you do.' So it made me really stop and think right there.

Caregivers overwhelmingly reported that they did not feel a need for library staff support while using the app at home. A few caregivers explained that it was helpful to have the library staff person walk them through using the app at the first session. But after that initial help, caregivers generally reported that they did not need additional support in using the app or doing the activities. Some felt that they did not need any support at all (see first statement below). Caregivers reported that that they would feel comfortable reaching out to their library staff person if they did need help, but no one felt a need to do so. As a result, interactions between caregivers and library staff were very limited between sessions.

Caregiver Ratings of Importance of Library Staff Supports (n = 15)

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	M (SD)
I needed the support of my librarian to be able to use the <i>Wombats!</i> resources.		4	5	2	4	3.40 (1.18)
It was easy for me to reach my librarian if I needed more help using <i>Wombats!</i> resources.			1	6	8	4.47 (0.64)
My librarian helped me stay motivated to keep using the <i>Wombats!</i> app.		1	1	7	6	4.20 (0.86)

5. Family Experiences Using the *Wombats!* App

Appeal, Ease of Use & Usefulness of App Features

All caregivers indicated that the *Wombats!* app was intuitive and easy to use. Caregivers indicated that they had no issues with navigating the app, playing the videos, or using the features of the app. One caregiver explained that although some apps she had used in the past were difficult to navigate, this one was “easy and simple”. Another parent explained that this

added to the appeal of the app: “It already explained about everything that we need to do and then what we need...So, I think for us it's pretty easy to navigate and to enjoy as well.”

Being able to use the app without access to the internet was an important feature in a rural community. According to one library staff person, some of the families at her library are not able to access publicly available resources for early learning, such as regular PBS KIDS programming, because of the extremely limited internet access in very rural areas. She explained that many patrons come to the library to access the internet because they have no access at home. For this reason, she explained that fully downloadable educational media was a critical feature for supporting early learning in rural areas: “So for them to be able to sit there on an app that they can just download...with our internet...and they can watch a full episode of it and...they know that their kid is learning...and they can do the activity... I know is going to have more of an impact than people think it will.”

Overall, caregivers reported that the instructions for the activities were clear and easy to understand. Although it didn't seem to be a major issue, a few said that they found the instructions for “Planning Gardens” a little unclear; they weren't sure about how to make the flowers.

Caregivers enjoyed that the app provided an opportunity to do something together with their child. During interviews, one caregiver said, “Me and [my child] would sit down, go to another room and do the activities and he just loved it.” Another caregiver shared that she regularly downloaded free apps for her children but this was the first one she had found that “involved parents” and she appreciated that opportunity for “family fun” very much. One caregiver suggested that their child's desire to engage in the activities helped to motivate the family to complete them. She said, “He wanted to do it... So whenever he just brought it to us, we [would] knock the activities out, you know?”

All caregivers reported that their children enjoyed the videos and were interested in the activities. Caregivers shared that children were very excited to watch the videos and often wanted to re-watch them. When asked which activities stood out as favorites, caregivers were readily able to list off several activities. Across all families, each of the six activities were cited at least once as favorites.

Caregivers often included younger and older siblings in using the *Wombats!* App. Several caregivers explained that older and younger siblings wanted to watch the videos and do the activities as well. It is important to emphasize that this parent noted that it was not only [their] child that was a part of the study that wanted to engage in the activities, but also [their] other children and they worked on the activities as a family.

Some caregivers felt that the videos were too long. Three caregivers noted in the interviews that the 11-minute stories were too long for their children. One said that her daughter “wanted to...watch a little bit of video and then get to the activity.” Another said that her son does not typically watch full TV shows so he was not used to watching a video for that long.

Families enjoyed taking photos during the activities but some felt that there should be fewer prompts for photos. Some caregivers described having fun and being silly together with their children while taking photos, which were then used to create the music video they watched together after they completed the activity. For other children, it felt like a task that was interrupting play. One caregiver explained that her child "didn't like having to stop every couple seconds" to take a picture. Another parent explained that she didn't mind taking the pictures but her son was somewhat resistant to it: "He wanted to do the activity, he just didn't want to take pictures of himself doing it." She added, "He definitely liked taking pictures of mom" but "he's very shy and timid and he doesn't like to be in front of a camera". While many caregivers said they enjoyed taking the photos, about half of those interviewed said that the number of photos was a "bit much". Specifically, some photo prompts were intended to encourage children to pause the activity and reflect on what they were doing by making a "thinking face"; families felt that these were repetitive.

Overall, caregivers reported that their children enjoyed watching the music video of their photos but some did not see this feature as central to children's learning. One caregiver explained that her son loved watching the music video with his photos: "It's very exciting for them because they feel like they are part of Wombats. They think they're one of the team." A few caregivers whose children did not want to take the photos initially did enjoy seeing the music video. One explained that seeing all the "pieces of the puzzle pieces" come together made her son feel like he had accomplished something; the music video was like "a reward at the end". A few caregivers described the music video as "entertaining" or "enjoyable" but not "particularly useful" for learning. One caregiver explained it this way:

We enjoyed watching the video that it put together at the end...[A]s far as it being useful to the overall experience, not necessarily, but it was enjoyable. And...that can be a purpose, you know?... I think that even without that component, she still would've enjoyed the activities.

Some caregivers may not have perceived the music video feature as central to learning because the engagement strategy of "Review and reflect on what you've done together" did not come across as clearly to caregivers as the other parent engagement strategies. As a result, caregivers may not have recognized the music video as a tool for reflection.

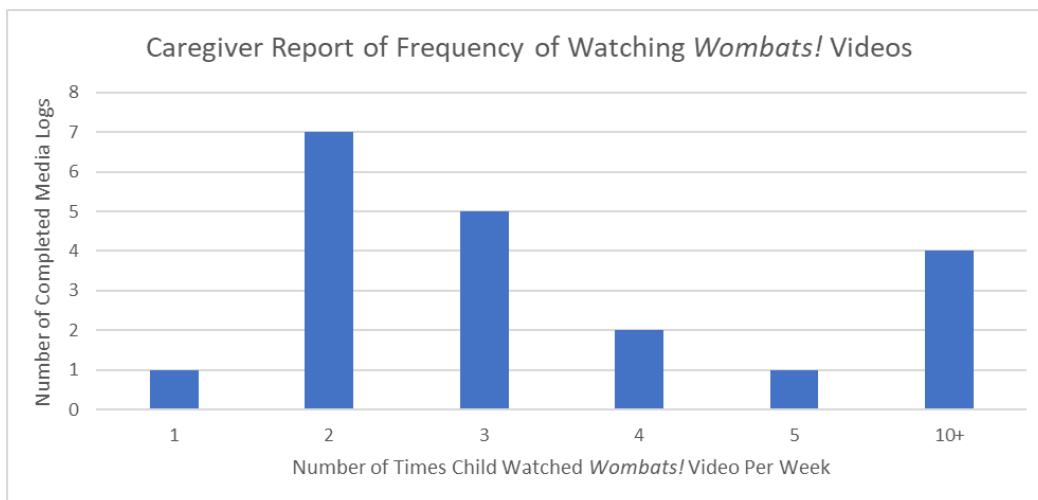
While some caregivers described the "Super Says" engagement strategy tips as being somewhat helpful, others did not pay much attention to them or notice them. Throughout the activity instructions in the *Wombats!* app, some pages included a "Grown-Ups" button. If caregivers clicked on this button, an image of Gramma Super appeared with a "Super Says" tip, encouraging them to use the CT engagement strategies. During interviews, we asked caregivers if they had noticed these "Super Says" tips and used them. Some said they were very helpful but most were not able to recall any specific tips they used. One caregiver remembered reading a tip about letting the child take the lead, and found that helpful. Others found them less useful. One caregiver responded, "I didn't really click on that a lot. Only once or twice...but I didn't remember it...It's just tips. So, you know, I didn't really...to be honest." Another parent

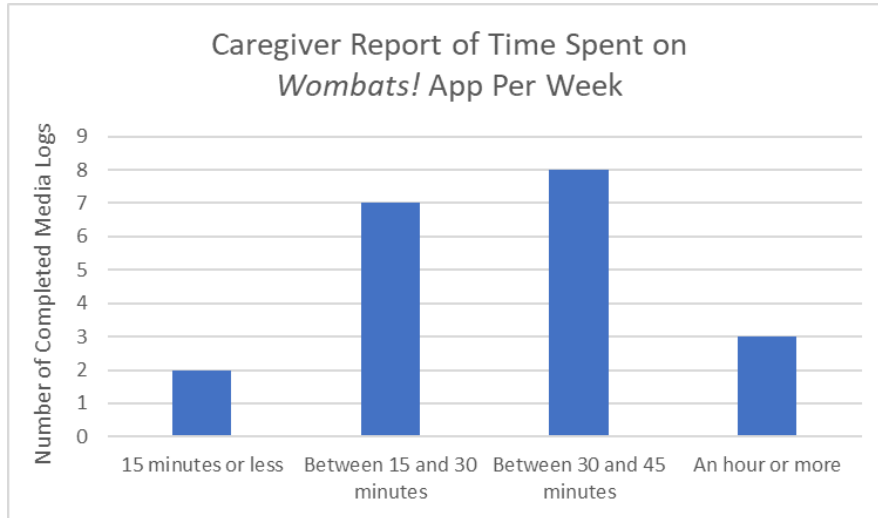
agreed and explained that she read the first few and felt that she was already doing the things that the tips were recommending so she stopped clicking on them. A few said they had not noticed the tips and so never clicked on them, or didn't notice them until later in the process.

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 for it. Overall, caregivers described the questions as useful for engaging in discussion. One caregiver said: "They seemed to be useful for us. Of course, my son likes to ask questions about everything, so asking him questions, he got to talk with me about certain things and seemed to enjoy them." Another said "They were were good little conversation starters and, and reflectors for what we've done and why and, and how..." Some caregivers explained that it was too difficult to have children "sit still" long enough to have a discussion after completing the activity: "We tried to use them but he was more distracted and ready to play and have fun after the activities."

Engagement with App

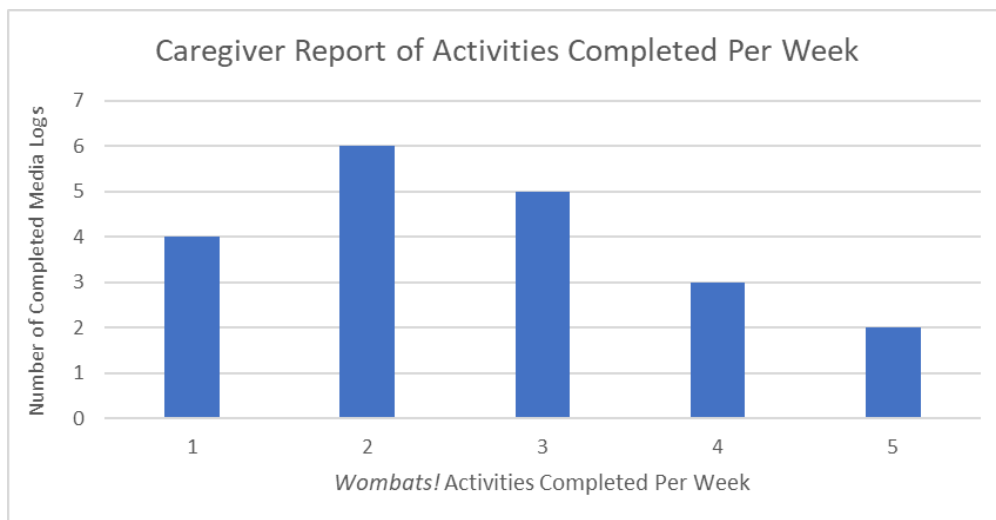
Media log data indicated that families used the app during both weeks of the program. In the 20 completed logs, all caregivers stated that they had used the *Wombats!* app with their child within the last week. Most caregivers noted that their child watched 2 or 3 *Wombats!* videos per week. Four responses indicated that children watched ten or more *Wombats!* videos in a week. The majority of caregivers reported spending between 15 and 45 minutes per week on *Wombats!* videos and activities. Three caregivers reported engaging with the materials for an hour or more. (Graphs below are based on the 20 completed logs, so include multiple responses from some caregivers.)





Caregivers indicated a high level of co-viewing *Wombats!* videos. We asked caregivers how many times they watched a *Wombats!* video with their child. Many reported watching the same number of *Wombats!* videos in a week as their child, suggesting that these caregivers and children were co-viewing each video. For example, of the seven caregivers who noted that their child watched two *Wombats!* videos in the last week, five also reported that they watched two videos with their child in the last week.

Based on survey and media log data, caregivers reported a high level of fidelity in completion of activities. Over the course of the two weeks, the majority of caregivers reported that they completed all four of the activity sets that remained to be completed in the app after families did the first activity set together at the library. One family completed three and one family completed two of the activities. Based on media log data, families most often did two activities per week. Four caregivers reported that they completed some activities more than once; two said they did *Wombats!* activities 5 times in one week.



All caregivers felt that four activities was a good amount to do in two weeks, and some wanted more. Although a few did not complete all four activities, no one thought that it was too much to do. One very enthusiastic caregiver shared in the post-survey:

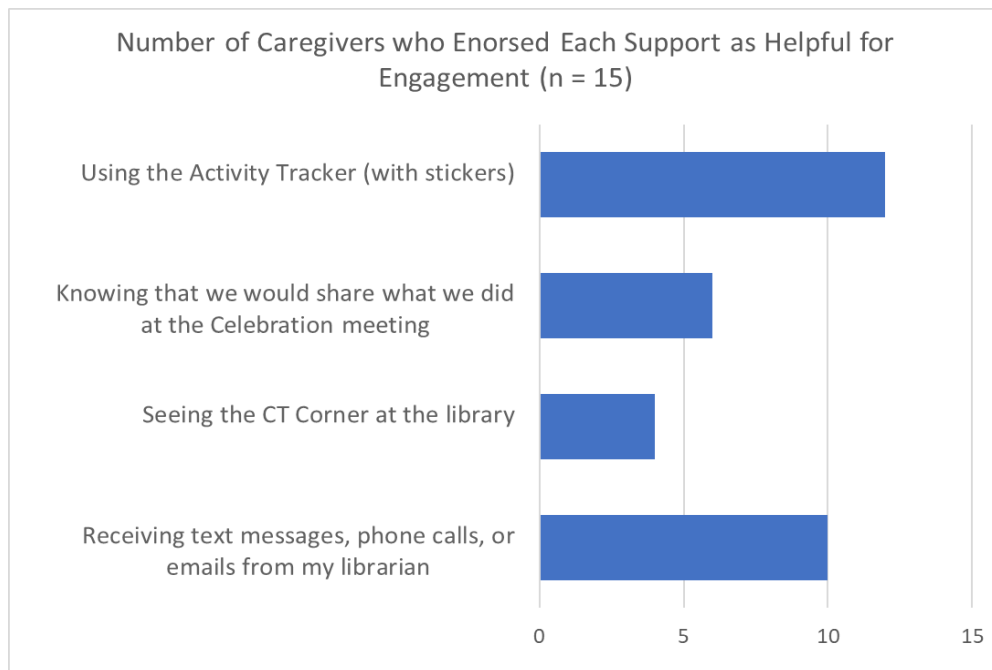
The only complaint from us is that we wish there were MORE activities! We loved it! It gave him something to look forward to and he was proud of himself to complete the activities.

For the caregivers who completed both weekly logs, their use of the app remained fairly consistent across both weeks. On average, families tended to watch similar numbers of videos in each week, and they tended to complete two activities per week.

Families used the app at different times but it seemed to fit naturally into varying family schedules. One caregiver who works full-time said that she would do the activities with her child as soon as she came home from work. Another caregiver who homeschools explained that they typically do their homeschool activities in the morning and she easily incorporated the *Wombats!* activities into that time.

Perceived Supports & Barriers to Engagement

Most caregivers felt that their engagement was supported by the activity tracker and communication from library staff. We provided caregivers with a list of supports that the program provided and asked which ones helped them to keep using the app and doing activities. Caregivers were free to endorse as many as applied. The most commonly endorsed were the activity tracker and text/email reminders from library staff. Some also said that it helped them to know that they would be meeting again and to see the “CT Corner” at the library.



Personal contact from library staff seemed to help caregivers in following through on fully engaging in the activities with their children. One caregiver explained that without the initial guidance from the library staff person and the reminders throughout the week, she “probably wouldn't have been asking all the questions” or worked with their children to complete all of the activities. Without having the app introduced by the library staff person, she explained that she would have perceived the app as something that her child could do primarily on his own: “I'd probably come help him if he needed it or just told him what to do. I wouldn't have been as engaged I guess, with him.”

Some caregivers reported that their child's excitement drove use of the app. When asked what helped them stay engaged in using the app over the two weeks, some explained that their child often asked to use it because they were so excited. These caregivers said that their child's enthusiasm made it easy to remember and fit into their schedules. Some parents described the *Wombats!* activities as something that their child looked forward to at the end of the day.

Caregivers perceived very few barriers to engagement. We also provided caregivers with a list of potential barriers to using the app at home (see table below), and asked them to endorse as many as applied. No one reported difficulties using the app or understanding instructions. No one felt that there were too many activities or that their child was not interested. Three caregivers said that it was somewhat challenging to fit the activities into their schedule, two said that the videos were too long (through a write-in option), one said that the activities took too long, and one said that their child was only interested in watching the videos and not doing the activities. One caregiver who found the activity and video length to be a challenge elaborated that their child did not have a long enough attention span both to watch the video and do the activity in one sitting.

Number of Caregivers who Endorsed Potential Barriers to App Use (n = 15)

Potential Barriers to App Use	Number of Caregivers
<i>There were too many activities for one week.</i>	<i>0</i>
<i>The activities took too much time.</i>	<i>1</i>
<i>It was hard to fit the activities into our schedule.</i>	<i>3</i>
<i>Directions for doing the activities were hard to understand.</i>	<i>0</i>
<i>The app was hard to use.</i>	<i>0</i>
<i>I was not able to watch the videos.</i>	<i>0</i>
<i>My child was not interested in the activities.</i>	<i>0</i>
<i>My child only wanted to watch the videos.</i>	<i>1</i>
<i>The videos were too long for my child. (paraphrased from write-in option)</i>	<i>2</i>

6. Evidence of Change in Key Outcomes

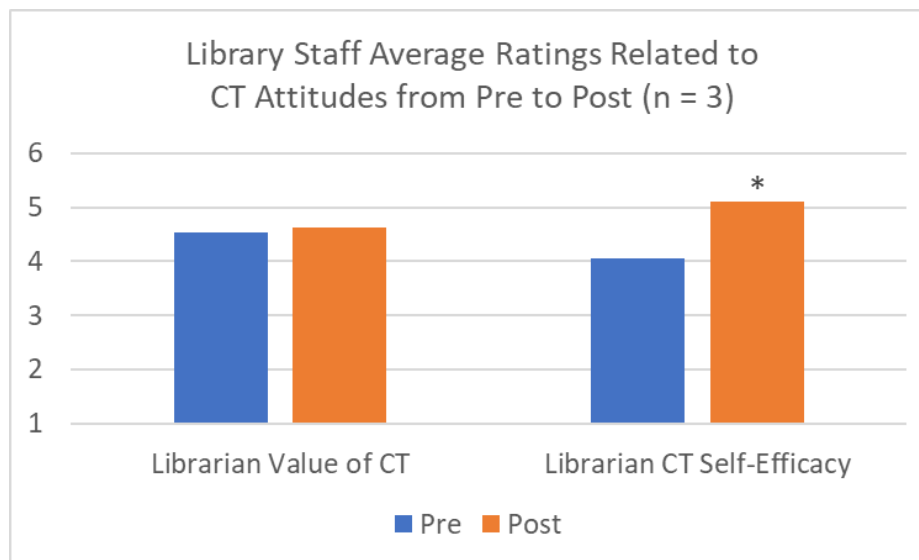
In preparation for the upcoming summative study of the final app and library program, we piloted several survey scales for measuring attitudes, beliefs, and behaviors related to CT. Given the short duration of this pilot program, we did not expect to see substantial changes in these

outcomes in the current study. We did, however, look for preliminary evidence of change; these results are presented in the following section and should be interpreted with these limitations in mind.

Preliminary Evidence of Change in Library Staff CT Attitudes

Preliminary evidence suggests that library staff had greater self-efficacy in supporting CT after using the *Wombats!* resources but their attitudes about the value of CT did not change.

Library staff rated seven items related to their perceptions of the value and appropriateness of teaching computational thinking to preschoolers and 6 items related to their sense of self-efficacy in supporting preschoolers and their parents in CT (6-point scale, from “strongly disagree” to “strongly agree”). In each scale, three items were negatively worded and so were reverse-coded for analyses. We created overall average scores of each scale at pre- and post-intervention in order to assess preliminary evidence of changes in library staff attitudes. Paired t-tests indicated that the *Librarian Value of CT* did not change ($t(2)=0.15$, $p = .893$) but the *Librarian CT Self-Efficacy* significantly increased from pre- to post-intervention ($t(2)=19.0$, $p = .003$). With such a small sample size, we would not draw strong conclusions based on a non-significant effect in the *Value of CT*. But it’s likely that library staff who were participating in this program already had positive feelings about CT, either from their previous experiences or from conversations with the study team during recruitment. The significant change in *CT Self-Efficacy*, on the other hand, is notable given such a small sample size.



* Indicates a statistically significant difference at $p < .01$.

Preliminary Evidence of Change in Caregivers’ CT Understanding & Attitudes

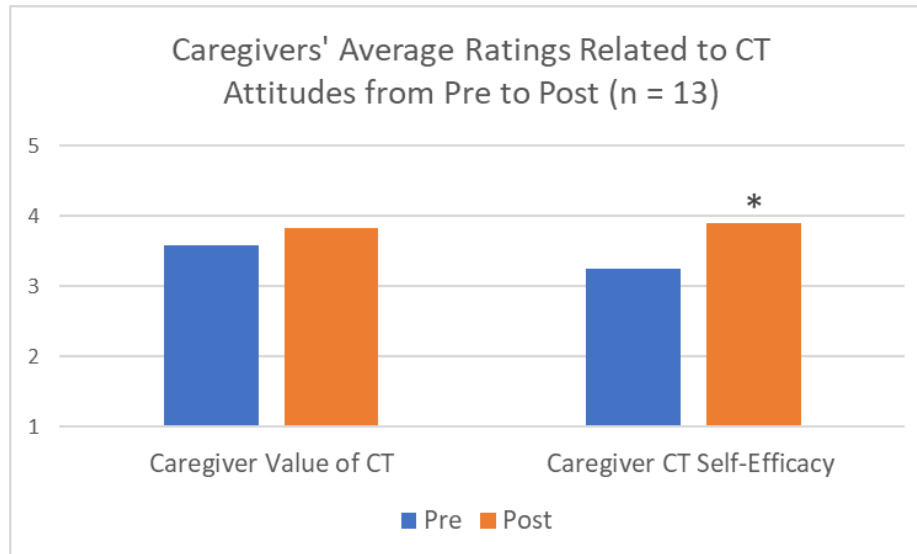
The majority of caregivers demonstrated an increased understanding of CT as being related to problem solving. We asked caregivers in the pre- and post-survey to say any words or phrases to describe what they thought *computational thinking* might mean. In the pre-survey, 12 of 14 caregivers either said they didn’t know or described something related to computers, thinking,

or information that was not clearly related to computational thinking (e.g., “learning from a computer”, “computer thinking skills”); only two said something related to problem solving. At post-test, 9 of 15 caregivers described something related to problem-solving. Two additional caregivers described components of computational thinking: breaking a larger task down into smaller tasks, and doing something step-by-step. Overall, 11 of 15 caregivers were able to accurately describe some aspect of CT. One caregiver gave a more detailed definition:

It’s the way...to solve a problem that a child [is] facing. To solve a problem sometimes they need to break it down into smaller tasks or come up with a different design or ideas.

One caregiver gave an accurate, broad definition of CT at pre-test (“Systematic working through problems”) and then described an accurate but more narrow definition at post-test (“Breaking down large tasks into smaller tasks”). Three caregivers were not able to define any aspect of CT at pre- or post-test; two of these had attended both library sessions and one had attended the first session only.

Preliminary evidence suggests that caregivers had more positive attitudes about CT after participating in the program. Caregivers rated 7 items related to their perceptions of the value and appropriateness of teaching computational thinking to preschoolers and 6 items related to their sense of self-efficacy in supporting their child’s development of CT (5-point scale, from “strongly disagree” to “strongly agree”). In each scale, three items were negatively worded and so were reverse-coded for analyses. The *Caregiver Value of CT* scale showed poor internal reliability in the pre-survey (Cronbach’s alpha = .35) and good internal reliability in the post-survey (Cronbach’s alpha = .80). Similarly, the *Caregiver CT Self-Efficacy* scale showed poor internal reliability in the pre-survey (Cronbach’s alpha = .50) and excellent internal reliability in the post-survey (Cronbach’s alpha = .90). Although these scales will likely require some revisions to improve reliability at pre-test, we created overall average scores of each scale at both pre- and post-intervention in order to assess preliminary evidence of changes in caregiver attitudes. Both scales increased from pre- to post-intervention; paired t-tests indicated a marginally significant increase in *Caregiver Value of CT* ($t(12)=1.86$, $p = .087$) and a significant increase in *Caregiver CT Self-Efficacy* ($t(12)=3.21$, $p = .007$).



* Indicates a statistically significant difference at $p < .01$.

Caregiver CT Engagement Strategies

The *Work it Out @ Home* Family Guide presented caregivers with four family engagement tips, or strategies for engaging children in CT:

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

Several caregivers described using CT engagement strategies related to child autonomy as a result of participating in the program. In the post-survey, we asked caregivers if they had changed the way they play with their child based on anything they learned in the *Wombats!* Library Program. About half either said that they had not changed the way they played or could not identify a specific change. The other half were able to identify a change in their play behavior that was related either to the CT engagement strategies or CT skills. Two caregivers talked about “breaking down” tasks to help their children. Five caregivers talked about using CT engagement strategies. Of these five, two described letting their child take the lead more, and three described allowing space for productive struggle (e.g. “let her figure out problems on her own”). In the interview, one parent explained that letting her daughter do things more independently was a way that she felt she grew as a parent as a result of the program:

We did peanut butter on crackers and I let her put the peanut butter on there and figure out how much to put and what to do... I usually do everything for her so it was different, but it was a good different.

No caregivers mentioned helping their child to communicate ideas or reviewing and reflecting. Two caregivers also talked about having fun together.

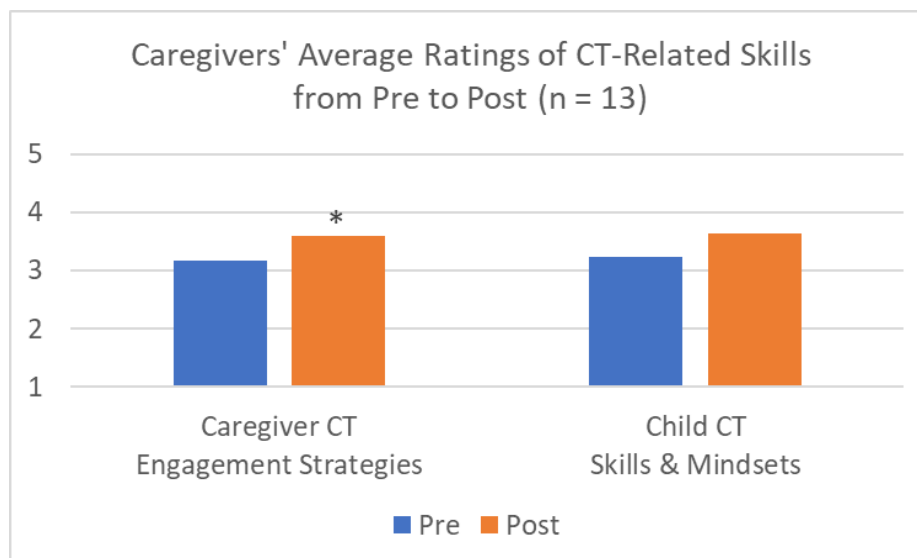
Caregivers were also asked to indicate the degree to which they agreed with statements about how the *Wombats!* Library Program helped them. All said that they “agreed” or “strongly agreed” that the program gave them ideas about how to help their child learn CT and do CT activities outside of the program. One parent explained that, through the *Wombats!* Library Program, she realized that she was already doing things with her children that supported CT. But this program enhanced that:

...with wombats, it gets even better. Because my son has something new to watch, listen and do. And I got more ideas about how to improve our daily activities through learning while playing and vice versa.

Preliminary Evidence of Change in CT Engagement Strategies and CT Skills & Mindsets

We asked caregivers to recall a recent time their child had tried to solve a problem. We then asked them to rate a series of items related to their response to their child (5 items) and their child’s behaviors (5 items) while solving that problem. This was intended to capture *caregiver CT engagement strategies* and *child CT skills and mindsets*, respectively. Items were rated on a Likert-scale from 1 to 5. Two items on each scale described behaviors that are contrary to the intended CT skills and strategies so were reverse-coded for analyses. Although further work is needed to understand if the items are working as intended, we created composite scores for each of these preliminary scales by averaging items. On average, scores on both scales increased from pre to post. Based on paired t-tests, this was not a significant increase for *child CT skills and mindsets* but it was a significant increase for *caregiver CT engagement strategies*.

	Average Pre Score (SD)	Average Post Score (SD)	t(df)	p-value
<i>Child CT skills and mindsets</i>	3.2 (0.7)	3.6 (0.6)	1.44(12)	.176
<i>Caregiver CT engagement strategies</i>	3.2 (0.5)	3.6 (0.5)	2.69(12)	.020



* Indicates a statistically significant difference at $p < .05$.

Caregiver Perceptions of Children’s CT Skills & Mindsets

As described above, the current *Wombats!* Library Program focused on four CT skills for children:

- Problem Decomposition / Break It Down
- Patterns / Find or Make Patterns
- Cause & Effect / Connect the Cause to the Effect
- Design Process / Create, Test, Improve

Work it Out Wombats! is also intended to model CT Mindsets including the following: logical and strategic thinking; creative and flexible thinking; confidence, persistence, and perseverance; collaboration; perspective taking; and communication.

We asked caregivers to give an example of how their child used what they learned in the *Wombats!* Library Program in their everyday life. Five were not sure or were not able to think of an example of learning. Ten caregivers provided examples related to the following skills and mindsets:

CT Skills & Mindsets	Number of related responses	Example
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>

No caregivers mentioned that their child used understanding of cause and effect in their everyday lives, but one did say that their child wanted to play the *Sound Detectives* game again with other family members.

Caregivers appeared to grasp the learning goals in the activities and saw evidence of their child's learning. In the parent focus groups and interviews, we asked caregivers to think about two specific activities—*Inventing Toys* and *Making Snacks*—to gauge their perceptions of what their children learned from these experiences. All of the caregivers felt that their children not only learned the concepts being taught but also recognized how those concepts might be relevant in other situations. *Inventing Toys* focused on teaching children how to “create, test and improve” by creating a slide for a stuffed animal. One caregiver explained that her son had fun changing the design; he “enjoyed finding stuff to make [the slide] taller or, slide different things.” Another caregiver pointed out that her child first tried using cardboard with blocks but the stuffed animal wouldn’t slide down; then the child shifted to using a cookie sheet and found that that worked better.

When one caregiver was asked how her child might apply what he learned from *Inventing Toys* to his life, she described development of the CT Mindsets of persistence and flexible thinking. She explained that he is a perfectionist so he was getting “flustered” when his first design of the slide wasn’t working. The caregiver took this as an opportunity to encourage him that it’s ok for something not to work on the first try, that you need to keep trying until you figure it out. Then she described how she reminded him to use these mindsets later:

...[Y]esterday actually he had a problem trying to solve something and I was explaining to him...remember Wombats? He said, ‘Just got to keep trying.’ So I think that's definitely helped him to encourage him that he doesn't have to be a perfectionist. It's okay to make the mistake and it's okay to try again to get it right.

Caregivers’ responses to *Making Snacks* were similar. Caregivers not only noticed how their children broke down the overall activity into smaller steps but they also noticed how children might “break it down” in other situations. One caregiver noticed her child clearly referencing the activity later while he and his brother were making peanut butter and jelly sandwiches:

He said... ‘I'm going to break it down like the Wombats do.’ He really said that...[H]e made both sandwiches and broke them down into, you know, you put the peanut butter on one side and the jelly on the other side for both sandwiches and he's never done that here...He definitely learned that from [the Wombats].

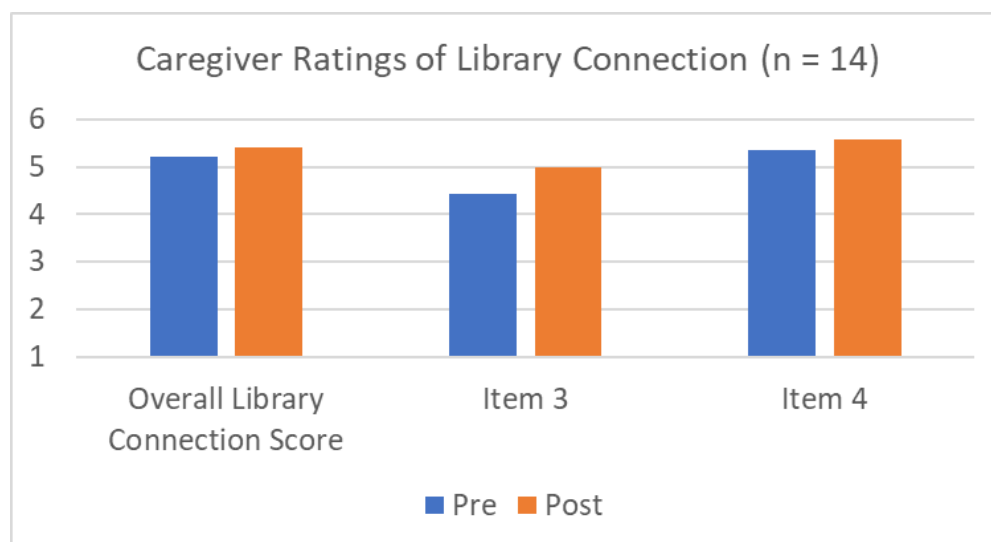
Another caregiver described how her daughter, in addition to breaking tasks down into smaller steps, made intentional choices when assigning tasks to others. She explained:

She knows that she's not allowed to use knives, so she said ‘Okay, mama, you do the peanut butter ‘cause I know, you use knives...here's your cracker and here's the chocolate.’ She understood how to designate jobs and break it down into individual pieces and everything.

Preliminary Evidence of Changes in Feelings about the Library

Survey data suggests that families may have stronger feelings of connection at their libraries after participating in the *Wombats!* Library Program. Although this was not a primary outcome of the study, we explored how caregivers' feelings of belonging at the library may have changed after participation in the program. The average overall *Library Connection* score increased somewhat after participation; not surprisingly given the small sample, this was not a significant change based on a paired-sample t-test. When examining individual items, however, two of the eight items showed marginally significant increases.

	Average Pre Score (SD)	Average Post Score (SD)	<i>t(df)</i>	<i>p</i> -value
Overall Library Connection Score	5.2 (0.7)	5.4 (0.5)	1.70(13)	.113
Item 3: The library staff know my child personally.	4.4 (1.7)	5.0 (1.2)	1.85(13)	.088
Item 4: When I walk into the library, I can see that library staff are happy to see me.	5.4 (0.8)	5.6 (0.6)	1.88(13)	.082



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. Furthermore, some caregivers did not perceive the music video feature as contributing meaningfully to their child's learning. This may have been because the CT engagement strategy of "Review and reflect on what you've done together" did not come across as clearly to caregivers as the other strategies. As a result, caregivers may not have recognized the music video as a tool for reflection. 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 above, 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.