

Cyberchase: Mobile Adventures in STEM

Evaluation of a National Pilot

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Executive Summary

WNET's *Cyberchase* is an Emmy-winning PBS KIDS series that engages millions of children in the fun and challenge of math. Multiple studies have shown that *Cyberchase* improves children's knowledge, skills, and enthusiasm for problem-solving and math (Crespo et al., 2011; Fisch, 2003; Rockman et al., 2001, 2002).

Cyberchase: Mobile Adventures in STEM was designed to extend this experience to underserved children and parents by providing families with informal learning opportunities that utilize *Cyberchase* media. The *Mobile Adventures in STEM* model includes four primary components:

- Family kick-off event
- Weekly text messages with activities for families to complete, focused on environmental and math topics
- *Cyberchase* video clips that introduce and frame the week's activity
- Opportunities for families to share their results through a closed Facebook group or by texting *Cyberchase*

The *Cyberchase: Mobile Adventures in STEM* program was built upon three major tenets:

- Families are important partners in a child's growth and learning
- Media can provide important scaffolds and springboards for learning
- Text messaging can be a useful tool to engage families in informal learning

In addition, *Mobile Adventures* was developed specifically to target underserved communities, particularly low-income Latino families. To address the needs of these families, among others, materials were created in both English and Spanish, with incorporated findings from focus groups with parents from Latino communities across the country.

Between April and August 2019, researchers from Education Development Center's Center for Children and Technology (EDC|CCT) conducted research during a national pilot implementation of *Cyberchase: Mobile Adventures in STEM*. This report presents findings from that study.

Key Takeaway: Simple activities built around environmental concepts, paired with media, and sent via text message led to constructive family time, and ultimately to increased knowledge and dispositions toward caring for the environment.

Key findings

Simple hands-on STEM activities, delivered via mobile text, allowed parents to integrate educational moments with kids into their daily lives. Most parents reported completing the Mobile Adventures activities on weekday evenings, after dinner and before bedtime—often at times when children would otherwise have been watching TV or playing games on devices.

These were things that you could do in 10 minutes, 15 minutes. You have some bonding time, you've learned something, and you feel satisfied. (Parent 3105)

Parents said the weekly activities gave them what they needed to engage constructively with their kids: step-by-step directions for fun activities that could be completed with household items. The activities may have had special value for low-income Latino parents, who prior to the program were less likely than their peers to report doing discrete informal learning tasks at home with kids.

Families who completed the activities together developed new conservation knowledge, dispositions, and practices. On average, parents in the study reported statistically significant positive gains in family members' knowledge about how to care for the environment (.33 point increase on a scale of 1 to 7), as well as greater frequency of behaviors like conserving water and recycling (.20 point increase on a scale of 1 to 4). They also said they engaged in more activities like visiting museums, asking and answering questions about science or the environment, and discussing animals and plants they saw in their local environments. For some activities these gains were slightly higher for Latino parents than non-Latino parents, but the difference between groups was not statistically significant.

Cyberchase video clips engaged children, and helped families complete the activities. Parents reported that *Cyberchase* video clips gave them ideas for how to do each activity, and acted as useful introductions to each week's main idea. They said that *Cyberchase* cartoon characters captured children's attention and made them more attuned to messages about taking care of the environment. Children who were fans of *Cyberchase* were reportedly excited to be part of the virtual "CyberSquad," and doing what the characters were doing; some who had already seen the episodes on broadcast TV, however, were less interested in watching them again.

Video helped us get started on the activity. It gave the story they were going to put into practice with the activity. The video was like an IKEA manual. (Parent 2202)

Parents and kids found environmentally themed content important, relevant, and actionable. Parents responded best to activities that children were motivated to complete—and both kids and parents found the environmentally related topics engaging. Taking care of the environment was a shared value; parents said conversations about it were already happening at home and at school, but they felt it was a value they often wished they supported more. Also, environmental topics were easily actionable: Families found they could make positive changes, such as turning the faucet off when brushing their teeth, with ease.

I hope that my daughter can learn to make a difference and take care of the environment. If she has values, and knows what's right and wrong, she's going to work with others to make the world better, and to share what she's learned with others. That will help her not only when it comes to the environment, but in many other situations that might present themselves. (Parent 1221)

Receiving weekly activities and media via text message was effective in fostering family engagement. As a distribution channel, mobile texting proved convenient for families, and helped them to build new avenues for collaboration and communication. Parents said that each week's text was a convenient reminder that there was a new activity to do; at the same time, it left the timing of the activity up to them. Because their phones were ever present, the text messages acted as a persistent repository of the available videos and activities. Parents said text messages were easier to keep track of than paper, and more accessible than email.

Parents also said that children saw the weekly text messages as suggestions from “outside”—as though it was *Cyberchase*, not Mom or Dad, who was offering an activity to do. This outside origin helped parents step out of the role of the leader, dictating and delegating what their children should do, and allowed children to assume greater ownership over how the family completed the activities. As they took more ownership over the activity, they became more likely to give their opinions, and parents were more likely to interact with their children in ways that allowed them to deepen their relationships, gain new perspectives on their children, and explore new parenting roles.

The one thing that I liked was each and every one of them had their own opinion, like brainstorm wise. Everybody had a piece of paper and a pen and they gave their ideas, rather than sitting there and listening to just one person give ideas. Normally I delegate who does what and kids won't give their opinions. (Parent 3120)

Social sharing helped some families build engagement, feel they were part of something larger, and get new ideas for how to complete activities. While not all parents felt comfortable or had the desire to share the results of their activities—either by texting to *Cyberchase* or by posting in one of the closed Facebook groups—those who did felt that it allowed them to bring their activity to a close, be proud of their way of doing the activity, and gain acknowledgement of their effort. Parents got inspiration from seeing others’ posts to the Facebook group, even when they didn’t post themselves.

We didn’t post in the Facebook group, but we did enter. Some people posted really pretty examples of the activities, and you could take ideas from what they were doing. We often felt “Oh wow, I wouldn’t have thought of doing it that way!”. (Parent 1221)

The kick-off events had mixed impact on pre-post gains and participation, but helped parents decide to join the program. There were no significant differences in pre-post gains between parents who attended kick-off events and those who didn’t, and rates of participation were mixed. Parents who attended kick-off events did share their results on Facebook at higher rates, and parents in the interviews who attended the kick-off events said the events helped them understand what they were signing up for and gave them the confidence to participate. Furthermore, parents in the cohorts with kick-off events were more likely to be Latino and low-income, so it’s possible that these events helped the program recruit these families.

When we came to the event and I saw all these activities, in my head I was thinking, this is good because my kids are going to learn and I’m going to learn too. (Parent 1114)

Background

Cyberchase: Mobile Adventures in STEM is part of a growing effort to support underserved families as they engage with their children in informal learning activities at home and in the neighborhood. The design of the program and our research study responds to—and is intended to contribute to—a growing research literature about this challenge.

Informal STEM Learning for Underserved Families

Informal family learning can play a significant role in children’s development (Bronfenbrenner, 2009; Nokali, Bachman, & Votruba-Drzal, 2010). Parents, by participating in their children’s learning, can have long-term impact on children’s self-efficacy, motivations, and interests in education, as well as their participation in learning opportunities (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; El Nokali et al., 2010; Reese, 1995; Gunning et al., 2016). This is true in STEM topics in particular. Providing informal learning opportunities for children can add to skills and interest in topics like science and math (Heil, Amorose, Gurnee, & Harrison, 1999). Shared family learning activities can also build closer relationships between parents and children (Heil et al., 1999).

Underserved families, however, face barriers when it comes to fostering informal family learning (Barton et al., 2004; Lee, 2011; Orr, 2003). Many low-income and immigrant parents have less time due to work schedules, less knowledge and confidence when it comes to guiding learning or answering children’s questions, fewer resources available in their own language, and less access to cultural organizations like museums (Barton et al., 2004; Bell et al., 2009; Dierking et al., 1994).

Yet designers of informal STEM learning programs for underserved families can take advantage of promising research findings in three areas: the role of media in informal family learning; parents’ interest in environmentally themed content; and the promise of mobile texting as a channel for reaching underserved families.

Media. As media and devices become accessible almost anytime and anywhere, families have new opportunities to engage with each other with high-quality digital video, text, and audio content from public media and other sources to enhance learning with their children (Alper, 2011; Takeuchi & Stevens, 2011). When used thoughtfully, media can provide opportunities for children to develop early STEM skills, can encourage social interactions between parents and children, and can model processes in nature that wouldn’t be readily observable in families’ daily lives (Pasnik, Llorente, Hupert, & Moorthy, 2016).

Content. In reaching underserved families, content also matters. For example, in surveys Latino immigrants have expressed a very high interest in nature-based, informal science education programs, and have placed a high value on education programs about the

environment. This said, many are unaware of programs available at local parks, refuges, and other natural areas (Nesbit, 2011).

Mobile Texting. Finally, emerging research literature underscores the potential of text messaging as a tool for engaging underserved families in their children’s learning. The greatest number of studies have been done regarding literacy interventions for families with young children. These studies have found that short texts prompting parents to engage in literacy activities with their preschool-age children can have a positive impact on parents’ interactions with children, and children’s learning (Bigelow, Carta, Lefever, & Borkowski, 2013; York & Loeb, 2014). Other studies have shown that text messages to parents of school-age children can prompt parent-child interactions that have positive learning outcomes (Kraft & Rogers, 2015). Researchers have concluded that “the widespread use, low cost, and ease of scalability of text messaging make texting an attractive approach to supporting parenting practices” (York & Loeb, 2014).

Studies of texting as a method of engaging low-income Latino families are few, but a number of efforts have been made to map the needs of these families and their preferences regarding mobile devices and text messaging. On average, Latinos use mobile phones and text messaging more than other groups, completing an average of 13 more calls per day than members of any other ethnic group, and sending or receiving over 900 text messages per month (Nielsen, 2012). Second, researchers have noted that many Latino families operate with cultural norms into which mobile devices and text messaging may fit differently than in non-Latino families. For example, Latino parents tend to value direct interaction between family members, and operate with more traditional forms of parental authority (Fuller, Lizárraga, & Gray, 2015). Mobile technologies that deliver valid educational experiences for family members may enrich, but also may alter, such parenting practices. Fuller et al. (2015) suggest that producers of digital educational content work to develop greater knowledge of “the aims and practices advanced by [Latino] parents and how they conceive of the developmental niche in which they raise their children.”

Elsewhere there is evidence that low-income Latino parents find texts about their children from school and elsewhere to be a positive thing, but prefer if possible that texting is combined with the opportunity for face-to-face communication (Torres, Guerra, Caal, & Weilin, 2016). Finally, there is research consensus that texts intended for low-income immigrant communities should be short and clear, and should be in either Spanish or English as appropriate (Fuller, Lizárraga, & Gray, 2015; Torres, Guerra, Caal, & Weilin, 2016).

Overview of the Project and the Study

Cyberchase: Mobile Adventures in STEM family engagement model

Drawing on the research literature, parent focus groups, and an earlier pilot, *Cyberchase: Mobile Adventures in STEM* developed a family-engagement model designed to encourage parents and their 6- to 9-year-old children to playfully explore environmental and math concepts over six weeks. The model has the following components:

- **A six-week program.** Parents receive text messages with links to a new activity and video each week for six weeks.¹
- **Kick-off events.** Kick-off events held in local community spaces like schools and museums introduce families to *Cyberchase* and its characters and storylines, and the program's goals and activities. Parents can also sign up without the kick-off event, in a Text-Only option.
- **Weekly videos.** Each weekly video is a 2- to 4-minute edited segment from a *Cyberchase* episode in which *Cyberchase* characters and storylines introduce the week's theme. One of the weeks featured the new *Cyberchase* online game instead of a video. The videos and game were included as entry points and/or previews of what families will do in the activities.
- **Hands-on activities.** Families are given a choice of two informal learning activities related to the week's theme. The activities encourage parents and kids to work together to do simple things like observe a local habitat, build a wind-powered boat, or create wearable fashion from recycled materials. The activities can be completed in or around a family's home, using available household items. Activity sheets, which include colorful instructions and illustrations, describe the activity's big idea and point out STEM practices, such as observation and data recording.
- **Sharing opportunities.** Families are encouraged to share the results of their activities, either by sending a text message to *Cyberchase* or by posting a message or photo to a closed Facebook group. Families who share with others receive a digital badge for that week's activity.
- **Mobile text delivery.** All materials are delivered to parents' smartphones via text messages. Families receive two texts a week, the first with a link to a video and two activity options, and the second encouraging them to share the results of the activities.

¹ See Appendix B for the list of activities, with descriptions of the videos and the texts sent.



Figure 1: The Mobile Adventures Activity Cycle

About the study

In order to test the viability of the project’s family-engagement model, EDC conducted a national pilot implementation of the program between April and July 2019. The current study is the third phase of a larger two-year design-based research project.

- **Phase I: Formative research and design.** In this phase, EDC conducted 2 parent focus groups with a total of 16 Spanish-speaking parents to learn about their needs and preferences for informal learning programs. EDC also conducted formative testing on new the *Cyberchase Space Waste Odyssey* special and on the new *Cyberchase* interactive game.
- **Phase II: NYC Pilot (Summer 2018).** EDC and WNET conducted an initial pilot of the kick-off event and the texting program, with 19 parents completing the research component of the pilot. Findings from this pilot were used to inform the national expansion pilot.
- **Phase III: National Pilot (Spring 2019).** During Phase III, WNET redesigned program materials and processes based on the Phase II findings, and we conducted the national expansion pilot reported in this document.

During Phase III, we examined four questions:

1. What goals and aspirations do low-income Latino parents have regarding STEM learning, family interactions about the environment and math, and the use of media for learning with their 6- to 9-year-old children?

2. What did family members gain or learn from participating in Mobile Adventures? In what ways were family interactions different during the program than before it? To what extent did the program increase parent-child/STEM interactions and their awareness of environmental topics?
3. What program features most supported family STEM interactions? Which features and formats made participation more challenging or less appealing?
4. To what extent does a text-only campaign, without an initial family workshop, succeed in prompting parents to sign up for and participate in the program?

Participants

Ninety-five families participated in the study, representing three cohorts. Families in Houston (47) and San Antonio (18), were recruited via face-to-face *Cyberchase* launch events in those cities. Families in a third “text-only” cohort (30) lived in the Tampa and NYC metropolitan regions; they were recruited through online and broadcast messages by public media stations, and did not attend a launch event. Participants received a \$25 gift card for completing the pre-survey and a \$75 gift card for completing the post-survey. Parents who agreed to be interviewed received an additional \$50 gift card.

Study recruitment focused on low-income families, including Spanish-speaking families. Seventy-two percent of parents who completed the pre-survey identified as Hispanic or Latino/a; 39% spoke Spanish as their primary language; 76% of families were considered low-income, with annual household incomes less than \$51,000; and 56% were both low-income and Latino (See Appendix A for a full demographic breakdown).

Methods

Parents shared their experiences with us through three primary instruments: a pre-survey at the beginning of the program (completed by 124 parents), a post-survey at the end of the six weeks (completed by 95 parents), and through hour-long telephone interviews conducted with 17 parents at the end of the program’s six weeks. The pre- and post-surveys asked parents to answer questions about conservation beliefs, conservation actions, educational beliefs, and educational activities. Completion rates for the pre- and post-surveys were 78% for Houston, 72% for San Antonio, and 85% for the text-only participants. Parents completed the surveys on their phones in either Spanish or English, and interviews were conducted in English or Spanish (four of the interviews were conducted in Spanish). In addition to these primary data instruments, we also interviewed community partners after each of the two kick-off events, and three of the parents who attended the San Antonio kick-off event, to learn about this experience.

Analysis

Survey responses were analyzed in SPSS to measure change from pre to post using a matched T-test to examine change in mean scores on the four subscales. The open-ended survey responses were coded along with the other qualitative data in Atlas.ti to identify prominent themes.

Interviews were audio-recorded, and the transcripts were coded first for research question and then thematically. Some quotes presented in this report have been edited to correct grammatical errors or make them more readable.

Family participation rates

The primary measure we used to gauge family participation in the Mobile Adventures program was the frequency with which families clicked on the weekly links sent to them. This was measured in two ways, via backend data and via parent self-reporting in the post-survey.

The backend data suggest that participation was well above the 10%–15% response rate that is often seen with texting interventions (Marlar, 2017). All told, 48% of the families participating in the study clicked on at least half of the links sent to them. That is, almost half of the families accessed three or more of the weekly links to the video and activity sent to them over six weeks. (We deemed completing three or more activities to be “full participation.”)

Interestingly, parents *reported* much higher participation than the back-end data suggest. For example, 82% said on the post-survey that they watched all or most of the videos. How do we account for the discrepancy? While it may be partly due to imperfect backend data, and even more so to subjects’ desire to appear compliant, this discrepancy may also be an indication of parents’ genuine enthusiasm about the program—as evidenced by their positive evaluations in the open-ended survey questions and the interviews.

Participation rates varied across the three cohorts. Different sample sizes and demographics make direct comparisons difficult, however.

The San Antonio cohort, with 18 families, had the highest participation; 13 of these families (72%) clicked on three or more of the weekly links to activities and videos. These families were recruited to attend a kick-off event by public media station KLRN and included numerous parents who had participated in other KLRN-hosted events. The makeup of the group was primarily Latino (14/18), primarily English speaking (16/18), and a little more than half of the families were low-income (11/18).

The Houston cohort had 47 families; 17 of these (36%) clicked on three or more weekly links. These families were recruited for a kick-off event primarily by a parent coordinator at their child’s school. This group was primarily Latino (44/47), had the highest percentage of Spanish-speaking parents (32/47), and the greatest concentration of low-income parents (42/47).

Finally, the text-only group had 30 families; 16 of which (53%) clicked on three or more links. A third of this group was Latino, three of the 30 parents were Spanish speaking, and a little more than half of the parents were low-income (17/30).

Findings from the Research

Finding: Families developed conservation knowledge and dispositions.

As participants in Mobile Adventures, families engaged with a range of media and activities related to taking care of the environment, such as recycling and reducing waste, conserving water, and increasing awareness of local habitats and environments. As one parent described:

Our walk lasted more than twice as long than it normally does, because we were having so much fun exploring! We were specifically on the lookout for animals and birds and any evidence of their habitats. (Parent 3114)

To better understand the impact of these activities, the pre- and post-surveys asked parents to report on their attitudes and knowledge of the environment, and the frequency of their conservation-related behaviors. Survey respondents (n=93) showed statistically significant growth on a subscale of items that measured conservation beliefs, from a mean of 4.96 on the pre-survey to 5.29 on the post-survey ($t=-3.88$, $p=.00$) on a scale of 1 to 7 (Strongly Disagree to Strongly Agree). Respondents also showed statistically significant growth on a subscale of items that measured the frequency of conservation activities, from a mean of 2.83 on the pre-survey to 3.03 on the post-survey ($t=-4.15$, $p=.00$) on a scale of 1 to 4 (Never to Always).

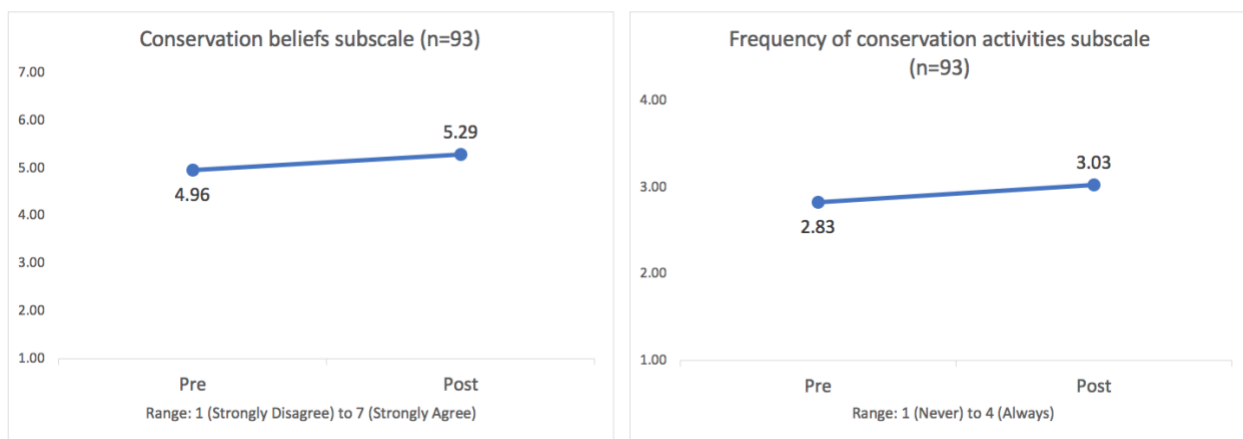


Figure 2: Pre- to post-survey change in parents' conservation attitudes, knowledge, and behaviors

Latino families reported slightly greater change than non-Latino families in both conservation beliefs (mean change from pre- to post-survey=.34 for Latino families and .28 for non-Latino families) and activities (mean change from pre- to post-survey=.20 for Latino families and .19 for non-Latino families), but the difference between groups was not statistically significant.

After completing the program, parents were more likely to report that family members knew how to conserve water ($t=4.80, p=.00$) as well as which items could be recycled, and which couldn't ($t=2.77, p=.01$). They were also more likely to report that they were engaging in conservation-related activities with their children, such as turning off the water while brushing teeth ($t=2.48, p=.01$), and reducing their use of plastic water bottles ($t=3.12, p=.00$).

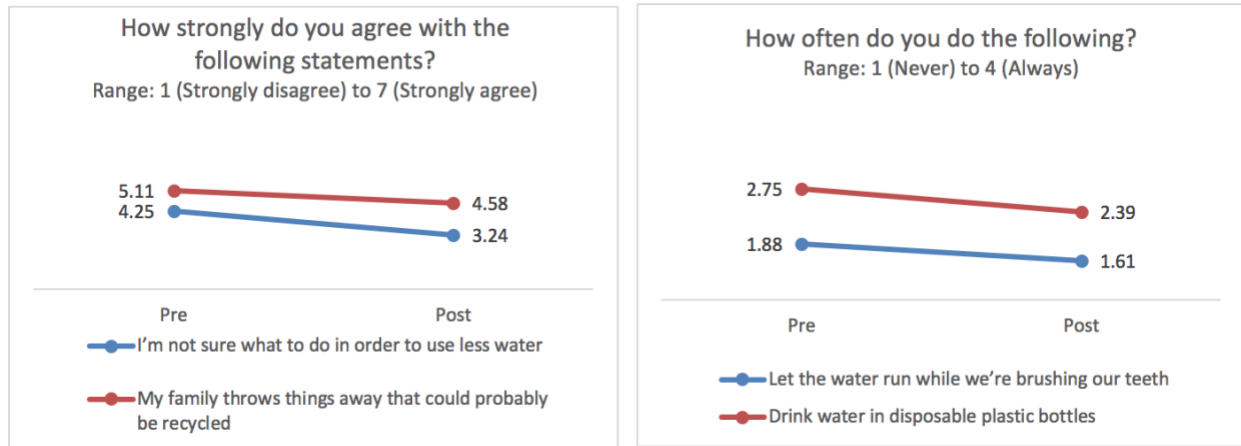


Figure 3: Pre- to post-survey change in reported conservation knowledge & behavior

Children developed conservation knowledge and orientations

In interviews, parents said they were excited their kids were learning to recycle and to take care of the environment. These goals often overlapped with parents' views about the values they wanted to instill in their children, such as "cooperating and making the world better" (1221) or "respecting people and things wherever you go" (1228). Some parents said they had already started these conversations with their children, but many felt they didn't know what to say or how to explain these topics at an "appropriate level" (3105). Parents appreciated that having these messages delivered by *Cyberchase* characters helped their children understand that taking care of the environment was "everybody's responsibility and not just another one of mom's crazy ideas" (1114).

Many parents in the interviews were able to recount specific instances of their children taking action informed by what they had learned. For example, one parent described how, after doing the Trash Audit activity, her son took charge of making sure the family was properly recycling items (3105), and another said that after doing the Tooth Brushing Experiment her son said he didn't want them to buy a pool because it would waste too much water (2120).

My parents wanted to buy us an above ground pool, and my oldest wasn't having it. He told my parents that he had learned that little brother wastes 11 cups of water just by running the faucet while he brushes teeth, and that it must take like a million cups of water to fill a pool. He made a whole argument about what would the fish do etc. I saw that he really took what he learned to heart, and I gained a new respect for how he could put together this logical argument and stand up to grandma and grandpa. (Parent 2120)

Finding: Families spent increased time on educational and science-related activities.

In addition to questions about conservation, the surveys asked parents to report how often they did different educational and science-related activities with their children, such as reading science-related books, doing activities such as planting seeds, or visiting spaces like museums or zoos. Similar to the scales related to conservation, respondents showed statistically significant growth on a subscale measuring the frequency of engagement in science-related activities, from a mean of 2.48 on the pre-survey to a mean of 2.77 on the post-survey ($t=-5.17$, $p=.00$).

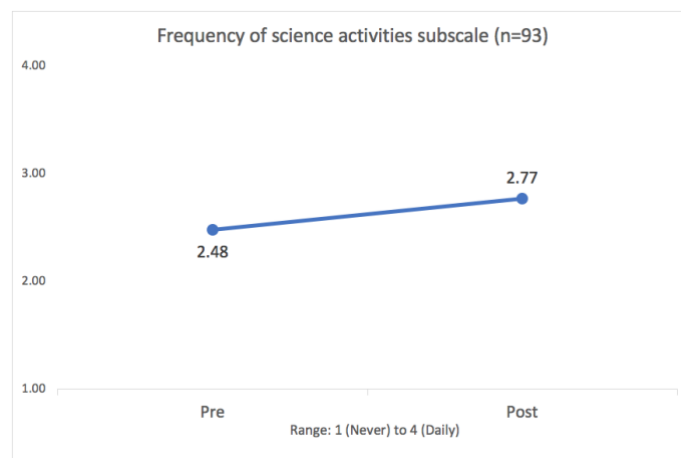


Figure 4: Pre- to post-survey change in frequency of science activities

Latino families reported slightly higher gains than non-Latino families (mean change from pre- to post-survey=.30 for Latino families and .26 for non-Latino families) but the difference between groups was not statistically significant.

This extra time spent with their children, and the learning that came as a result, was what parents in the post-survey and the interviews said that they valued most about participating in the program. In open-ended responses on the post-survey, 24 parents mentioned the time they spent with their family as the thing they liked most about participating in the program, 18 mentioned things they or their children learned, and 24 mentioned both family time and learning. For example, parents wrote about valuing opportunities to collaborate with their

children, such as “working on a specific project/task with the kids to accomplish a goal” (2112). Other parents said they appreciated the opportunities to have “different conversations” with their children, and to be surprised by the extent of their children’s knowledge (2101).

Parents in the interviews echoed these themes—focusing particularly on social and behavioral skills their children learned, and often positioning those as a result of the time they spent together as a family. Parents put a premium on spending quality time with their children, but lamented at how they often slipped into autopilot in their daily lives—reading books while thinking about what they would cook for dinner, or rushing to finish a worksheet their child got for homework.

Homework has become like a routine. You have to do homework, you do it, you finish it, and on to the next thing. But when we did the activity, my daughter was asking all these questions, and I had to give her more time. I feel like the activity demanded that we slowed down, and because we weren’t rushed, we ended up communicating more with each other. (Parent 1221)

Parents said these activities helped them “get down to [their children’s] level and be really engaged with them” (1110), and said that it strengthened children’s confidence to know their parents genuinely wanted to spend time with them. As one parent explained, “When she sees that we’re there for her, that’s going to give her confidence that she can take to school or out into the world with her. She’ll know that if she has to make a decision about something that she can always come home and talk about it with mom and dad” (2203).

Finding: Parents gained perspective about their children, and explored new roles for themselves.

Children weren’t the only ones to learn. Nine out of 10 parents on the post-survey agreed or strongly agreed that as a result of participating in Mobile Adventures they felt more comfortable doing educational activities with their children. Respondents also showed statistically significant growth from pre- to post-survey on several items related to their comfort with and interest in science (see Figure 5), including the recognition that they have the materials at home to help their child learn about science or the environment (pre-survey mean=5.40, post-survey mean=5.79; $t=-2.14$, $p=.04$), that they know the science skills their child should be learning (pre-survey mean=4.92, post-survey mean=5.30; $t=-2.63$, $p=.01$) and that they want to help their child take better care of the environment (pre-survey mean=6.66, post-survey mean=6.83; $t=-2.10$, $p=.04$).

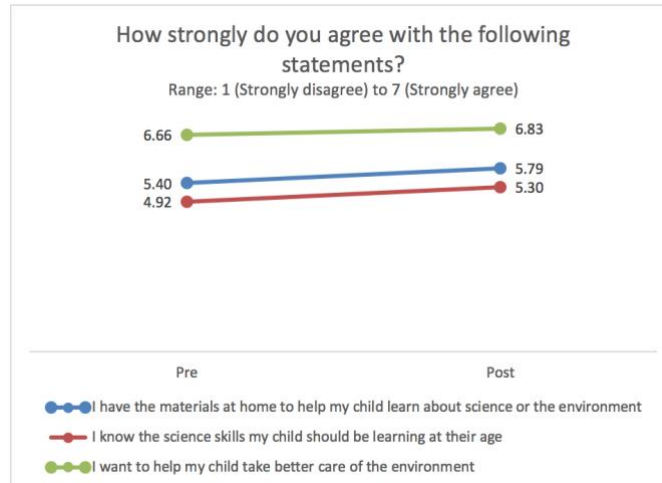


Figure 5: Pre- to post-survey change in parents' comfort and interest in doing activities with their children

Importantly, low-income parents ($n=68$) experienced more significant growth than the overall group on two of those items, “*I have the materials at home to help my child learn about science or the environment*” (pre-survey mean=5.33, post-survey mean=5.93; $t=-2.73$, $p=.01$), and “*I want to help my child take better care of the environment*” (pre-survey mean=6.58, post-survey mean=6.82; $t=-2.39$, $p=.02$).

Parents in the interviews discussed new roles they explored with their children and what they learned about their children in the process.

Parents gained new insight and perspective on their children

Families who came together through the activities, and built moments where they were *really engaged*, found a new quality to their interactions. Their children spoke up, offered their opinions, shared new information about themselves, and took control over the activities. Some parents talked about getting glimpses of the learners that their children are at school. One parent was “fascinated” to see how, when she started doing the activities, her kids started “asking a bunch of questions” and “actually knowing so much already” (1110). She felt that “you put them in school and of course, they’re learning, but you don’t see it. You don’t see how engaged they are in their subjects. So then being a part of some of these activities, it opened my eyes to what I didn’t notice. I like that they enjoy learning.”

Her teachers are always talking about how engaged she is, and how well-spoken she is, and how she’s so good with the other kids. And I’m like okay, well I’m teaching her right. She’s obviously going out in the world and doing these things. She’s just different with me. I try to be her teacher about stuff, but normally she’s not into it. So it was great to see her go through and complete the activity, feel proud about what she did, and be excited to share what we did. (Parent 3101)

Other parents talked about how they “gained a new respect” for “how caring” their kids were (3105), and were “moved” when they saw the attention their daughter gave to the activity, and

the sadness she felt toward “how humans are harming the planet” (1221). One mom felt that the new lines of communication that came through while doing the activities got her daughters talking about their interests—like “where they want to go to college,” which was “kind of a shock to [her and her husband]” (3120).

Families explored new roles for themselves

Parents reported that since the activities and videos arrived on their phone—rather than the parent finding them—kids were more open to doing the activity because it didn’t feel like another thing “mommy was telling them to do” (3101). Since parents weren’t in charge in this way, it was easier for them to step aside and let their children take control. One mom told a story of how she had messed up while building a bird feeder for one of the projects. Her son took over and started directing her, saying, “The string goes in through here, and then you put the toothpick in, and then you put the cereal full” (1108). She said her son loved taking this role and that after that activity she would read the instructions, but he was the one who was doing the activity.

In addition to children taking on new leadership in the activities, parents reported that they too found opportunities to push themselves. One mother said she regularly took her daughters to educational programs hosted by community organizations, but at those events they always had someone that would lead her children through activities. Participating in Mobile Adventures was the first time she was facilitating these activities at home by herself. She shared that “At first, when they explained the program at the event, I was like no, I don’t know how I would do that without someone else there to explain it” (2202). She eventually did the activities anyway though and felt proud. As she explained it:

I wanted to show my kids that it was also something new for me, that I can do this too, and that they shouldn’t see me just as the mom who works or the mom who cleans the house—that they should see this other facet of me, that maybe I had forgotten a long time ago, but which brings back memories of when I was a little girl, or of building things with my dad. (Parent 2202)

Since this mother spoke Spanish as her primary language, it was “big” that the program was in Spanish—something that she hadn’t found before. It allowed her to participate more, but it also helped her in her goal of ensuring that her kids can speak Spanish (*que el español prevalezca*).

Finding: Most parents found activities easy to complete and integrated them into their evenings after dinner and before bed.

Parents appreciated when activities were easy to complete, fit in to their regular schedules, and could be completed with household items

Most parents reported having “down time,” after they had returned from work, and before their child went to bed. This was a discretionary window of time, when kids were often watching TV, reading, or playing with their toys. It was time that parents could repurpose without much effort—as long as the activities weren’t too complex and didn’t require them to purchase anything. They liked the idea of using this time to keep their children’s minds “stimulated outside of school” (2107). Parents made it clear though that the activities needed to be fun, because when their kids got home from school they had “no interest in talking about learning” (2107).

Completing activities and doing crafts with my children made me feel like number one mom. I’m not a crafty person, but we made it work. (Parent 2120)

Parents liked that step-by-step instructions helped them to easily figure out what they were supposed to do and how they would do it

Most parents reported they didn’t have lots of time to figure out how to do activities. For this reason, they appreciated having step-by-step instructions, which included examples and pictures. One parent explained she usually took her children to dance classes and sports, but if she was going to do “craft activities” (2120) in Mobile Adventures, such as building a sailboat or a bird feeder, she needed explicit guidance.

Parents liked that they had a choice of activities

Some parents reported times during their participation when for one reason or another they couldn’t do a specific activity, or when their children just weren’t interested in an activity. Parents liked that there were options, because as one parent in the post-survey explained, “Sometimes one activity was more time consuming, so having another option was great” (2118). This parent also liked that if they had extra time they could “continue building on the ideas and do both.”

Some parents lamented that they did have to purchase items

While most parents felt the activities could be completed with items around the house, some found that they didn’t have the required materials. One parent said that she had to skip the bird feeder activity because she couldn’t find anything to build it with (1114). Another mom said that some of the activities called for plastic cups or toothpicks, things she didn’t have around her house. She bought these items because she knew her son really wanted to do the activity, but she “didn’t have much money at the time,” so it felt like “that was taken away from her” (1108).

Parents discussed a range of other challenges they had with the activities

Aside from materials, families listed a number of things that stopped them from doing activities. Some of the activities didn't work for families because of one or more contextual issues. For example, one family said they couldn't do the wind activity because it wasn't windy (1228) or because they didn't have a bathtub where they could launch the boat (2120), while others said they couldn't do the bird feeder activity because they didn't have birds around them (1108). One parent said that she didn't do the habitat walk activity because she didn't feel comfortable walking in nature without her husband because they have lots of snakes (2202). Finally, one parent felt that it would have "helped develop engagement" if the "activities built up to a final end activity" (3127). This parent also wished that the activities would provide more disciplinary-specific vocabulary that she could use with her kids. She used the example of the word heliocentric: "You're probably not going to say that to a five-year-old. But if I go to a museum and we're looking at an exhibit that talks about the solar system being heliocentric" that could give them "different ways of having a conversation."

Finding: Videos helped foster and sustain engagement.

Cyberchase videos helped parents know what to do in the activities, and made the activities more accessible to parents with a range of literacy levels

Numerous parents spoke of how the videos "clarified" (1221) what they should be doing in the activity, or gave them "ideas" (2203) for how to do the activity. Some parents reported that when they didn't watch the videos, "they had a hard time putting the pieces together" (2107). One parent said that she spoke with a parent who she knew was also doing the activities. This parent had a lower level of literacy, and said that it was much easier for them to watch the videos than it was to make sense of the activity's instructions (1228).

Videos helped parents frame the activities for kids

Parents said they used the videos to "give the story they would put into practice" in the activity (2202), or to "introduce the lesson before you do your experiment" (3101). Parents talked about how the videos helped their children "pay more attention" (1114), and said that they were "motivators," especially for those kids who enjoyed *Cyberchase* and who therefore connected to the characters.

The video was like an introduction. It gave you the lesson before you go and do your own experiment. I feel like it was a really good motivator to lead her into doing the activity. (Parent 3101)

Different families watched the videos in different ways

Some parents reported regularly watching the videos before they did the activities, sitting with their children, and discussing as they watched the videos (2202). Some parents watched the videos with some of their children, but not others (1110)—often because of the children's age differences led to varying levels of attention and engagement. Some parents said their youngest child sat on their lap while they did the activities with their other children (3119), while others said their older children came and went while they watched the video with their younger child (2202). Other parents first watched the videos by themselves so they would know what to do when they did the activities with their children

(1228), or used the videos to keep their kids busy while they finished tasks around the house (2107). Finally, some families felt more connected with the activities, and said that when they got busy, the videos were the first thing to go (2203).

My ultimate goal is just to spend time with my kiddo. I like to hear him talk, I like to hear him be involved. I know the videos were short, but sometimes videos felt like they were taking away from that time of me and him just talking. So he would watch the video while I finished whatever I needed to take care of, and then we'd come together and do the activity. (Parent 2107)

Finding: Receiving resources via text message was easy, accessible, and supported family learning.

Receiving activities via text message was easy, accessible, and engaging

Parents were consistently positive about the experience of receiving the activities via text message—even those parents who said they tried to limit the time their kids were on devices. They felt text messages were convenient, because “everybody has their phone stuck to them” (2107), because texts were “easy and immediate” (2203) and “flowed with how we normally do things” (3119), because they’re “notorious about losing paper” (2104), and because they were less connected via email (2107). For some parents, the arrival of a text message was a reminder of the activity they had to finish (2104) or share (1110).

I always have my phone, and if we're doing an activity I found on Pinterest, I'll pull Pinterest up on my phone. So getting the activities on my phone flowed with how we normally do things. (Parent 3119)

In addition to the practicality of text messages, several parents said their children enjoyed getting the text messages. One said that her kids “felt like they were receiving a text message,” and since they didn’t have phones “that was a cool aspect for them” (3105). A parent whose children “loved *Cyberchase*,” said they particularly enjoyed getting texts they felt were coming from the show (3101).

Delivering activities to parents’ phones led to “surprise guidance”

Some families had a sense that the activities and videos arrived—at what sometimes felt like unexpected moments—like suggestions from the outside. One parent called the arrival of an activity “surprise guidance” (3127) and said it shared some of the “magic” of when their new issue of *Highlights* magazine arrived in the mail. Her son had “no idea when the magazine is going to show up,” and when it did, it felt like “something special for him.” This mom wished that text messages “would have been directed to [her son], like it was a present to open...with an activity to discover and do with their parent.” She felt that this would create more “ownership” for her son, saying that it “impacted kids differently” if the message about recycling came from a cartoon character rather than their parent.

Finding: Recognition via badges, texts from *Cyberchase*, and Facebook posts provided ideas, inspiration, and encouragement to some families.

As mentioned in the introduction, parents received two text messages each week. The first included a link to the week’s video and a choice of two activities, and the second was an encouragement to share the results of their projects, either by sending a text message back to *Cyberchase* or by joining their cohort’s closed Facebook group.

Message 1:

ACTIVITY: Learning about the environment with your kids is a great way to encourage them to take care of the Earth. Watch this *Cyberchase* clip to learn about “habitats” and how people can protect them. Take a habitat walk and/or make a bird feeder to explore further.

<https://www.wnet.org/education/week-3-habitat/>

Message 2:

EARN A BADGE: Describe or send us a picture of something you observed on your walk or your recycled bird feeder to earn your Habitat Explorer badge. Share by responding to this text or in our closed Facebook group.

Figure 6: Sample text messages from week 3 of Mobile Adventures

Sharing and receiving badges helped families achieve a sense of accomplishment

When families sent a share text or posted to the Facebook group, they received a digital badge. Each week had a new badge related to the theme—such as the Eco Star badge families received for completing activities in the Reduce, Reuse, Recycle week. Across the three cohorts, 43% of families earned at least one badge, and on average, parents who earned badges earned about four of the six badges.



Figure 7: Mobile Adventures badges

While not all parents shared the results of their activities, most parents reported that they, or their kids, liked the idea of sharing. Parents said that their kids felt accomplished when they shared—and particularly when they got a badge or a response from *Cyberchase*. One parent said the badges were one of her family’s favorite things about the program. Her kids loved knowing that there was “somebody on the other side of the phone giving them a badge,” that they “weren’t alone in these activities,” and she felt the badges “kept them looking forward to the next week” (3107). Other parents echoed that they “loved being acknowledged” (2102), that it “felt good when a real person actually responded” (1110), and that they were proud to share the way “our family did it” (2107).



Figure 8: Picture sent in via text message showing how a family saved water

More families shared through text messages than on Facebook

While there was some confusion over why one would share via one method or the other, considerably more parents shared via text than via the Facebook group. For example, while seven families posted 18 times on the Houston Facebook group, 16 families shared 67 times via text message. Like the Facebook posts, most of the texts that parents sent were explaining what they did in the week’s activity, and they often included pictures. One parent explained that they had “saved water using a rain barrel” and used it to water their plants (2110), while another said they built their sailboat a second time because it didn’t float the first (2105). Parents also talked about what they had learned, such as the parent who said that after doing the Water Saving experiment, they had started turning the water off in the shower while they put on soap (1212).

A handful of share texts were from parents asking for help, such as whether they could still get badges if they sent activities late (1110), or gave explanations for not having completed an activity, such as the parent who said they had to postpone their walk for the Habitat activity because of rain and power outages (2120).

Participation varied across the three Facebook groups

The Facebook groups were designed as places where parents could share their experiences in the program, see how other families did their activities, and interact with one another. Participation in the three groups varied. The San Antonio group had the most robust participation (see Figure 9), with Houston behind it. The text-only group, which had the most parents join, had the least number of posts. It is likely that attending a face-to-face launch event where they met other families increased the likelihood that participants would post to a Facebook group. This suggests that absent a face-to-face event, the text-only participants will need greater incentives to share online.

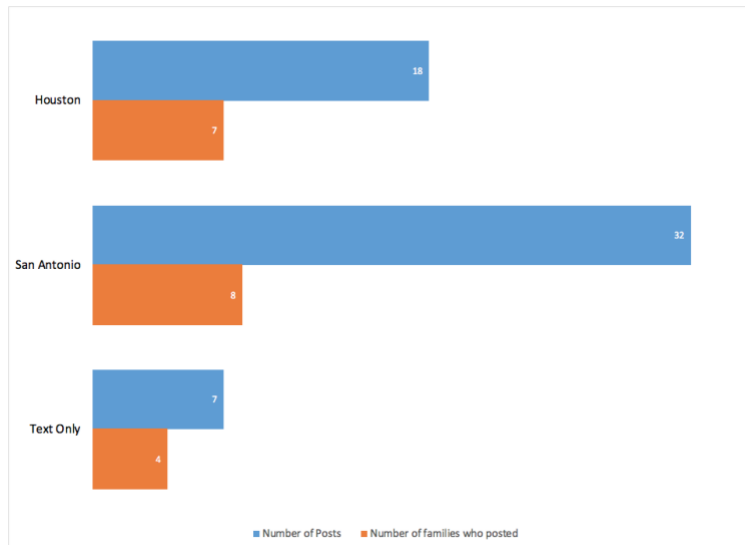


Figure 9: Number of posts in Mobile Adventures Facebook groups

Parents got ideas and inspiration by looking at others' Facebook posts

Aside from a sense of accomplishment from posting or sharing, parents talked about getting ideas for how to do the activity (1228), what it should look like when they're done (2120), or confidence to do the activities (2202). They thought it was "intriguing to see how others did their projects" (2107), and remarked, "Oh! I wouldn't have thought to do the activity that way" (1221). Some families saw parents or kids they knew from school and thought, it was "cool to see they're doing this too" (1110).

I liked seeing others' posts on the Facebook group because it gave you ideas. I might have done the bird feeder in one way, but someone else posted a totally different way. I said, wow, that there are lots of ways to make things with trash! (Parent 1228)

Finding: Some parents struggled to use the Facebook group, and many had reservations about social media and their children's privacy.

Parents experienced problems accessing the closed Facebook group

Parents reported facing numerous technical challenges when attempting to join or use the Facebook group. In order to keep it a closed group, WNET created two screener questions to assess whether or not someone was subscribed to Mobile Adventures. Parents would request to join the group, and someone from WNET had to approve them if they correctly answered the screener questions. These groups were something new for the whole team, and it showed in how many parents talked about technical difficulties, including:

Numerous parents reported technical difficulties with the Facebook group that stopped them from posting. Some parents didn't know what they were supposed to do to join. Some parents reported that they tried to join, but that they were never approved (1114, 3119, 3120), while another said they were accepted, but didn't know it because they were never notified they had been accepted (3127).

I joined the Facebook group, but never got a notification that I had been accepted. I've gotten those before in other groups. I didn't realize I was in until like three weeks later, and by then I wasn't going to post anymore. (Parent 3127)

Parents shared a range of additional challenges they had with the Facebook group. Several parents said there wasn't enough activity on the Facebook group to make it useful or interesting (3101)—or that the rate of posts declined as the program went on. One San Antonio parent said she saw the group was in English, and wondered if she could post in Spanish (“Would they understand me?”) (2202). She did post, but said she didn't get a response. Since she had seen the *Cyberchase* group respond to other families, she wondered whether her family had done it wrong. Another parent got behind on completing the activities and wondered whether she could still get a badge, or whether it was still OK to post (1110).

Finally, one mom felt that the Facebook group “didn't know who it was geared towards—parents or children” (3127). She had privacy concerns about using social media with her son, but would have liked the group had it been geared toward providing parents with support—a place where they could post and say “I'm having trouble with this, how do I do it?”

Parents felt reservations toward social media

The biggest problem some parents had with the sharing—and particularly with the Facebook group—were their perspectives on social media use and particularly privacy. Some parents just didn't use social media and therefore didn't participate (2120, 3120). Other parents were trying not to use social media, because they didn't want to “let their kids see them” on Facebook or Instagram, because they “wanted to set a good example” (3105). Some parents felt that they weren't the types to say “hey look, this is what we did” (2103) or to use social media to “make other people, who aren't doing things with their kids, feel bad” (3103). Finally, several parents had stronger concerns about privacy when it came to posting information about their children on social media. Some of these parents felt they might share “information, but not pictures,” (2203), while others knew they “were never going to post on the Facebook group,” and even “felt uncomfortable seeing others post pictures of their kids” (3127).

Finding: The impact of the kick-off event on gains and participation was mixed, but attendees felt the events were important factors in their decision to participate.

Our analysis showed no significant differences in pre-post change between the cohorts of parents who attended kick-off events and those who didn't, and participation metrics—such as the clickthrough rate—show mixed results: parents in San Antonio clicked on more links than the text-only group, and parents in Houston clicked on fewer.

Two metrics of participation that do show a clear distinction are the participation rates on the closed Facebook groups and the number of badges earned by families. As seen in the previous section, both the San Antonio and the Houston Facebook groups had significantly higher participation rates than the text-only group. In addition to the rates of posting on Facebook, parents in the kick-off cohorts who earned badges earned on average twice as many badges as those in the text-only group (Figure 10).

	Houston	San Antonio	Text Only
Percentage of parents who received badges	34%	56%	47%
Average number of badges earned	4.1	4.8	2.4

Figure 10: Percentage of parents who received badges in the three cohorts

When parents talked about the kick-off events, they generally spoke of the activities their children completed and how doing those activities got their children excited to participate in the program. One parent said that her kids “loved” the event and that she had to pull them away when it was time to go (2120), and another said that after the event her daughter saw the *Cyberchase* character Digit in one of the videos and was excited because she had met him during the kick-off event (1221).



Figure 11: Message posted to one of the Mobile Adventures Facebook groups

Some parents said the kick-off event was important for their decision to participate in Mobile Adventures, because they saw how fun the activities were and that they weren’t too difficult. They said the event helped them to know what they were signing up for, and that had they just seen a flyer for the event, they probably would have “brushed it off” and not signed up (1110). One parent in Houston said they felt more comfortable attending the event because it was put on by the Children’s Museum, which was a trusted source (1221). One parent—who said she hadn’t previously done activities like these at home with her kids—said the event helped her feel confident she could do the activities and that she definitely wouldn’t have signed up had they not attended the event (2202).

I think the kick-off event was great. Since the activities were hands on, it was exciting for my kids and for me too, because I got to help them with something. I liked that we could see exactly what it was we were getting involved in, and that I saw how simple it was—that it was something I could do. (Parent 1110)

While the kick-off event created excitement, and helped some parents feel more comfortable, parents didn’t feel they learned strategies to support these activities or the use of media, and they reported that

the kick-off event generally didn't affect the *ways* they participated. As one parent at the Houston event put it, "Since there were lots of kids there, the event felt like it was more for them than for the parents as well" (1228).

Conclusion & Implications

Study findings support several conclusions. First, mobile texting can be an effective medium for engaging low-income families, including Spanish-speakers, and helping them make informal STEM learning activities and media part of their regular family routines. Participating families liked getting weekly *Cyberchase* videos and activities via text because they were readily available and did not require much commitment, planning, or preparation.

From a programmatic standpoint, delivering quality educational materials via smartphone meant that parents had an accessible and persistent repository of program activities. They could easily draw from this repository when they had a moment in the evening to do an activity. Paper, and even email, would not have been as accessible. The weekly arrival of a new activity also served as a reminder that families had activities to complete. As one parent said, knowing that the next activity would arrive gave them a “deadline.”

But parents also said that text delivery contributed to the “magic” of the program. They said that receiving text messages was a draw in itself for the children who loved things on the phone, and that the texts contributed to parents’ ability to build moments of quality family time through the activities. Finally, it is also possible that the text messages contributed to parents’ sense that they were participating at higher rates than they actually were. Each time they received a message, it may have felt like they were part of something, regardless of whether they watched the video or did the activity.

Smartphone and data access was not a significant barrier for the mostly urban low-income families in the study. Overall, 90% of the respondents said they could access the internet on their phone from anywhere and without limits. Connectivity would likely be a bigger issue in more rural areas.

Second, the study underscores the value of combining well-made media with hands-on learning activities. Parents said the videos helped them engage their children, motivated them to do the activities, and helped them see that they too could be part of solutions to improve their communities and their planet. Equally important, parents said that the videos helped *them* develop a better understanding of how to complete the activities, and it was suggested that the videos were particularly helpful for lower-literate parents.

Third, a major conclusion is that low-income English- and Spanish-speaking Latino families can benefit from informal STEM interactions at home just as much—if not more—than wealthier families. While in pre/post surveys, families across the board showed positive gains in conservation knowledge, dispositions, and actions as well as the frequency with which they pursued educational activities, low-income Latino families reported slightly higher gains than other families.

Spanish-speaking parents appreciated that the program was presented in both English and Spanish. These parents reported that it was difficult to find good resources in Spanish, and that a lot of similar programs, or PBS materials, were only in English. Having resources in Spanish helped them participate more with their children, and it helped them work toward important goals they had related to passing along their cultural heritage.

Fourth and finally, the study suggests the value of creating informal STEM family learning activities around topics like taking care of the environment, which are perceived by families as important, relevant, and actionable. Having activities that dealt with environmental topics like recycling, water conservation, and habitat preservation helped parents continue lessons they had already started with their kids, but which they were struggling to make stick. It helped children build confidence, because they were able to contribute to ongoing conversations in and outside of school. And it helped families not just learn together, but also act together.

Challenges and Recommendations

Make sure that program materials are accessible to parents with a range of literacy levels

Two of the Spanish-speaking Houston parents told us in their interviews that they had spoken with other parents who had signed up for the program, but who had trouble understanding the activities because of literacy challenges. One of these parents decided not to do the activities, while the other said they had to use the video to help them understand the activity. In future iterations of Mobile Adventures, the project should explore new ways to make the activity sheets, and other materials, more accessible to parents with a range of literacy levels.

Help parents print and email activities

The project might also make sure that parents can print the activity sheets or email them to other devices. While most parents did not want these options, some did, and these are likely easy solutions to provide.

Streamline the process of participating in the Facebook groups

Numerous parents reported challenges related to signing up for, or participating in, the Facebook groups. The project should test new ways to screen parents and ensure that parents receive notifications when they have been accepted in the group. The project should consider ways to make both English- and Spanish-speaking families welcome; it might make it clearer to parents whether they can post pictures from a previous week's activities, and it might try to clarify the distinction between the Facebook and texting options for sharing. While the Facebook group will likely not be for all families—as some families had strong concerns about privacy—it did provide real value for those parents who participated in the project. Future iterations of the project should explore new ways to help parents feel secure (and to ensure that they're secure).

Explore clearer distinctions between the two activity options

Parents were clear that they liked that they could choose between activities. In future iterations of the project, it might be useful to explore clearer distinctions between the two activities, such as potentially providing a shorter and a longer activity, an indoor and an outdoor activity, or a crafts activity and an experiment. Making these types of distinctions might help parents decide between the activities, and it would also allow the project to test formats and gain a better understanding of which types of activities parents like most.

Test new models for the kick-off events that include a greater emphasis on parent-workshops

While parents who attended kick-off events had positive experiences, most did not feel that they learned strategies they could use while completing the activities, nor did they report getting new strategies to integrate and build off of media. Parents generally did not feel that they needed this information, but if the project hopes to support parental growth and greater comfort in completing these types of activities, it is likely worth exploring new models for the workshop. The kick-off events held in both pilots included children. This had its advantages both for logistical and pedagogical

reasons, but it also presented limitations, as parents' attention were often distracted by managing their children, and the messaging of the event had to be split between kids and parents. In the future, the program might explore conducting workshops that do not include children, so they can focus more heavily on strategies parents can use to facilitate these types of activities and more general anytime, anywhere learning.

Explore integrating new sensemaking and STEM-related skills

The Mobile Adventures activities focused on environmental “big ideas” and STEM-related skills, such as observing and recording data, but when asked to describe them, parents generally characterized the activities as taking care of the environment, or doing crafts, rather than as science or math-related activities. There are likely advantages to this “under the radar” STEM learning, just as there are advantages to families learning to feel comfortable doing activities they think of as explicitly STEM-related. In the future, Mobile Adventures might want to explore new ways to make the STEM aspects of these activities more explicit. They might incorporate new skills, such as talk moves (Tuttle et al., 2017), they might explore adopting a new framework, such as the modified 5-E model adopted by Strickler-Eppard, Czerniak, & Kaderavek (2019), and they might be more targeted about offering disciplinary-specific vocabulary that parents could use in conversations with their children. That said, if the program were to adopt frameworks like these, it would be important to be attentive to the accessibility for parents with a range of backgrounds and literacy levels, and its implications.

Take more advantage of the digital medium

The activity sheets were static, and one parent wished that if she were going to be online with her child, that it would be more interactive. The project might explore whether there are ways to make the activities more interactive in order to improve parents' experiences, and possibly their accessibility.

Take more advantage of the engaging narrative of *Cyberchase*

Two parents in the interviews said they wished that the messages were more directed to their children. One of them wished that the activities would have built toward a larger final project. They liked the idea of *Cyberchase* characters speaking to their children, and felt that speaking to their children, rather than through their parents, would be more engaging and would help their children take greater ownership over the activities. The project might choose to take advantage of the immersive nature of media, and build upon steps taken in the San Antonio kick-off event designed to make children official partners, such as the Cybersquad badges that were distributed.

Put children in the driver's seat

Numerous parents discussed moments where their children took ownership over the activity and started to contribute ideas and opinions about how they should complete an activity. Parents felt that these moments in particular—where the usual parent-child power dynamics were reversed or evened—were when their children came alive, when conversations flowed more freely, and when the family interacted in new and deeper ways. Future iterations of the program might take measures to help put children in the driver's seat so that they are directing the activity, while parents support them by asking questions, making observations, and completing the activities with them.

Explore the possibility of *Cyberchase: Mobile Adventures in STEM* for the four seasons

After the six weeks had finished, parents often reported that they wanted more—even those parents who only completed a few activities (sometimes especially those parents). At the same time, one of the values of the program was that it felt different, that it allowed families to break from their usual routines, and that it even allowed some families to make commitments to complete the activities. As we previously noted, the topics related to taking care of the environment, such as recycling or saving water, were useful because families found them important, relevant, and actionable. *Cyberchase* might explore offering the program several times a year—maybe quarterly—each time with activities built around a new unifying theme that families consider important, relevant, and actionable.

Broader Implications

Develop a better understanding of what we should consider a good level of participation for an informal program like this

There is a lack of published information on response rates to educational text message campaigns. Because of this, programs such as Mobile Adventures need to collect and share their findings with the growing community of educators seeking to use mobile texting as a medium. In addition, collecting back-end data as well as self-reporting is important. Our study found a significant discrepancy between the two. It would be useful to have more examples from informal learning programs that utilize backend data to measure participation, in order to develop a more relevant baseline of participation rates.

Plan programs that fit into the *after dinner and before bedtime* block of time

The vast majority of parents interviewed said they primarily completed activities during weekday evenings. Only a few families—those with kids too young for school and one parent as the primary caretaker—were not focused on this after dinner and before bedtime slot. Parents often considered this free time in which their kids were hanging out doing what they wanted, but which could be repurposed for educational activities. Programs that hope to easily fit into families' schedules with little prior planning should develop simple activities that don't require families to buy materials or spend too much time figuring out what they're supposed to be doing, and which fit into this evening period.

Aspirational framework for approaching families and parents' roles in their children's lives and growth

Parents in this study, regardless of socioeconomic or demographic characteristics, reported being engaged in supporting their children's growth, just as they reported aspiring for greater and deeper involvement. They saw themselves as their children's first teachers, and felt they occupied a role that was different from, or which complemented, what school provided. Parents were particularly interested in supporting their children to develop social and emotional skills, such as confidence, perseverance, and respect for others. Parents were generally more focused on these goals than they were on academic learning—and they were clear that they wanted fun things to do with their children that didn't feel like more school. Informal STEM programs that seek to build off what parents are already doing, and which are built to help parents live up to their parental aspirations, should be thoughtful about how they not only help families integrate STEM learning, perspectives, and skills, but also help them become stronger and wiser together.

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Appendix A: Participant Demographics

This table includes demographic information for the 95 participants who completed both the pre- and post-surveys.²

Caregiver and Family Characteristics	Houston (N=47)	San Antonio (N=18)	Text-Only (N=30)
Caregiver's Ethnicity			
Hispanic/Latino/a	94%	78%	33%
White	4%	11%	33%
Black/African American	2%	11%	20%
Asian	0%	0%	10%
American Indian or Alaska Native	0%	0%	3%
Caregiver's Primary Language			
English	30%	89%	90%
Spanish	68%	11%	10%
Other	2%	0%	0%
Families' Annual Household Income			
Less than \$26,000	64%	11%	40%
\$26,000–\$50,999	26%	50%	17%
\$51,000–\$75,999	9%	11%	10%
\$76,000–\$100,999	2%	11%	10%
\$101,000–\$150,999	0%	0%	10%
More than \$151,000	0%	11%	7%
Missing	0%	6%	7%
Caregivers' Education			
8th grade or less	17%	0%	3%
Some high school	11%	0%	3%
High school diploma or GED	26%	17%	23%
Some college or technical school classes (no degree)	34%	39%	27%
Associate's degree (AA, AS) or technical degree	2%	11%	7%
Bachelor's Degree (BA, BS)	6%	28%	23%
Graduate or professional degree	4%	6%	13%

² Percentages may not add up to 100% due to rounding.

Appendix B: Weekly Videos and Activities

Week	Topic	Media	Activity A	Activity B
1	Reduce, Reuse, Recycle	<i>Video Clip from Space Waste Odyssey</i> The CyberSquad explores what objects can be recycled, reused, or thrown away.	Trash Audit: Keep track of everything that you recycle or throw away for one day and make a chart.	Recycled Hats: Create a hat using recycled/reused materials around your house.
2	Water Conservation	<i>Video clip from Back to Canalia's Future</i> Jaden and Bianca explore water saving tips at home.	Tooth Brushing Experiment: Experiment to see how much water can be saved by turning off the faucet while brushing your teeth.	Water-Saving Plan: Pick water-saving tips to follow as a family. Make reminders to put up around the house.
3	Habitats	<i>Video clip from Creech's Creature Quandary</i> A bike path is cutting through animals' habitats in Tikiville. The CyberSquad builds bridges and tunnels to help the animals access their full habitat.	Habitat Walk: Take a walk around your neighborhood and look out for plants and animals that live in your habitat. Think about the ways that the humans who live here have an impact on the animals.	Recycled Bird Feeder: Create a bird feeder out of recycled materials for birds living in habitats near your home.
4	Wind Power	<i>Video clip from A Reboot Eve to Remember</i> The CyberSquad designs a windmill to create wind-power.	Wind Gauge Experiment: Make a wind gauge and do an experiment to find the windiest places near you.	Wind-Powered Boats: Use the engineering design process to build and test different materials for a wind-powered boat.


5	Trash and Litter	<p><i>Space Waste Odyssey</i> <i>online interactive game</i> Players collect “trash” and sort it into categories (landfill, compost, reuse, or recycle).</p>	<p>“I Spy...Trash!”: Play a real-world space race “I Spy” as you go about your day. Point out objects you see and ask, “Landfill, Compost, Reuse, or Recycle?” Keep track of how many things you find for each category throughout the day.</p>	<p>Community Clean Up: Clean up a public area, like a nearby park, by collecting litter and properly throwing away or recycling it.</p>
6	Physical Activity	<p><i>Video clip from Fit to Be Heroes</i> Jackie makes a chart to keep track of her minutes of activity each day.</p>	<p>Activity Tracker: Use simple tips to add more exercise to your day. Make a chart to track if you get 60 minutes every day.</p>	<p>Dance Pattern Party: Take turns adding dance moves to a pattern to create a routine.</p>

Appendix C: Activity Sheets

Each week parents received a choice of two activities. Each activity was detailed in an activity sheet that explained the *Big Idea*, and which gave step-by-step instructions while calling out the related STEM practices, such as recording data, exploring, and observing. The activity sheets also included *tips for grown-ups* designed to help parents support their children’s learning. Below we’ve included the activity sheets for activities A and B of week 3 focused on habitats.

Cyberchase
ACTIVITY A

Habitat Walk



Big Idea:

All plants and animals live in habitats. Habitats are places that contain the food, water, and shelter or space that plants and animals need to live.

Explore:

Explore together a habitat near you and think about the plants and animals that live there. Take a walk around your block or in a local park. Look carefully at the environment and talk about the plants and animals that you see along the way.

Consider:

Notice and talk about the places where animals find food, water, and shelter or space in this habitat. How many of those places can you find on your walk?





Record:

Take pictures with your phone or bring a pencil and paper to draw the plants and animals that you find.

Tip for Grown Ups: Recording observations is a critical scientific skill. Look over your child's notes, drawings, and photos together to find patterns and connections.

Share:

Send us your photos or drawings of plants or animals that live in the environment you explored. How are people changing the habitats near you?

Cyberchase
ACTIVITY B

Recycled Bird Feeder

Big Idea:

People change the habitats around them with things that they build or remove from the area. This can change how animals get food, water, and shelter.

Explore:




Help out the birds that live in your neighborhood by adding a bird feeder to their habitat.

Tip for Grown Ups: Follow your child's interests by learning more about a favorite animal's habitat. Research together online or at the library.

Create:

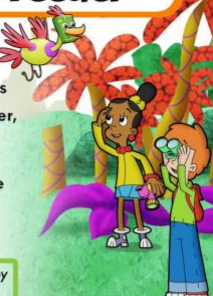

Create your own bird feeder by recycling things you might usually throw away.

- 1 Collect these materials from around your house:
 - Paper cup, empty water bottle, empty tissue box, or any other recyclable container.
 - Food like unsweetened cereal, raisins, crackers, or grapes
 - Markers or crayons to decorate the container
 - A tool to make a hole (like a hole punch or pencil)
 - String, yarn, pipe cleaner, or ribbon
 - Optional: a stick, chopstick, or pencil
- 2 Decorate your cup and make three holes spread out from each other near the rim of the cup.

(Optional: cut another two holes across from each other underneath these holes. Push a stick through both holes to make a place for birds to stand.)
- 3 Tie each end of the string to the holes in the cup to hang it up.
 
- 4 Fill the cup with cereal pieces or other foods
 
- 5 Hang your bird feeder from a tree branch or in another central location in your neighborhood. Check back to see if the birds eat the food you left. When all the food is gone, make sure to recycle or throw away your bird feeder or add more food.
 

Share:

Send us a description or a photo of your bird feeder.

Appendix D: Post-Interview Protocol

Notes about the protocol

This is a semi-structured interview protocol. The probes listed are designed to be used by the researcher to build off what participants say, and to steer the conversation towards our target concepts.

When the protocol says child, it refers to any children in the care of the interviewee.

Thank you for taking the time to talk to me today, and for sharing your experience participating in Mobile Adventures in STEM. This interview should take 1 hour to complete. Do you have an hour to talk to me?

We are conducting these interviews to learn about families' experiences with the program, and to help improve the program and others like it. We know that most parents didn't complete the activities, or watch the videos, each week, and many only did so only a few times. That's fine, and we hope you don't feel you're supposed to have done more than you did. We're interested in learning about how you participated, and what did and didn't work for you and your family.

Finally, I will be recording this interview to make sure we remember correctly what you've said. Do you have any questions for me before I start recording? With your permission, I'm going to start the recording now.

1. How many children do you care for?
 - a. *[if more than one]* Did you participate in this program with all of them?
2. Could you tell me one thing that you liked about participating in the program?
 - i. *[If they mention a feature of the program]* Tell me more about that. Why do you think you liked that? What did you like about that? Can you think of an example? Can you think of a specific moment when that happened?
 - ii. *[If they say something about wanting their kids to take care of the environment]* Why is it important to you that they learn this?
- b. Are there any specific moments or interactions you had with your child, or things they said to you, that stand out in your mind?
 - i. Why does that moment stand out for you?
 - ii. Is that different from what you normally do with your child? Is that different from what they normally do/say?
3. Each week you received a link to a video and two activities. Some people watched the videos, and some didn't. Did you watch any of the videos?
 - a. Was that something you did together with your child, or was that something your child mostly did on their own?

- b. Could you describe a moment when you were watching the video?
- c. Did your child like the videos? What did they say or do that makes you say that?
- d. Do you generally watch TV with your child?
- e. Did watching this video feel different than how you normally spend time with your child?

Each week, you received a choice of two activities, I'm going to read the names of the activities you received, just to help you remember.

	Activity A	Activity B
Week 1	Trash Audit Experiment	Recycled Hats
Week 2	Tooth Brushing Experiment	Water-Saving Plan
Week 3	Habitat Walk	Recycled Bird Feeder
Week 4	How Windy is It? (Wind gauge activity)	Wind-Powered Boat
Week 5	I Spy...Trash!	Community Cleanup
Week 6	60-minute challenge/ Activity Tracker	Dance Party

- 4. Is there an activity you particularly liked? Can you tell me about what you did?
 - a. Why do you think this activity sticks out in your mind?
 - i. *[if they don't describe what the activity was about]* What was the activity about? What was the goal? What did it ask you to do?
 - ii. *[if they don't describe what they did with much detail]* As much as you remember, can you walk me through what you did in this activity?
 - b. Do you remember who decided to do the activity at this time? Was it you saying to your child, hey it's time to do the activity, or was it your child saying, hey mom we have an activity to do?
 - i. *[If it was the parent]* Were you generally the one reminding them they had activities to complete? Who generally decided to do the activities? Did your child talk about the program, the activities, or the videos at all?

- ii. Was it generally this way when you completed other activities?
- c. Do you remember when you did the activity (E.G. What day of the week and what time of the day)?
 - i. Was that a normal day/time you did other activities, or did it vary?
 - ii. *[If they don't provide a rationale for why that time]* Is there a reason why you chose to do the activity at this time?
 - iii. What would you normally be doing at that time if hadn't been doing this activity? Did it feel like you were doing something different or similar to what you would normally be doing?
- d. Was your child interested in the activity? Were they having fun?
 - i. Did they generally like the activities? Tell me more about that. What did they say or do that makes you say they liked the activity?
- e. Do you remember whether you watched the **video** related to that activity?
 - i. *If yes*, did you watch it before or after completing the activity?
 - 1. Did you normally watch the videos?
 - 2. Did you or your child like the videos?
 - 3. Do you think watching the videos affected how you did the activities?
 - ii. *If no*, is there a reason you didn't watch the videos?
 - iii. Did your child know about Cyberchase before you started the program? Did they know who the characters were?
- f. How was this interaction different, if at all, from the typical things you do with your kids? (Were you and your child talking, or doing things, or just being together, in ways different than you usually do?)
 - i. Do you ever do activities like these with your kids? If so, how often?
 - ii. *[Skip unless they couldn't come up with a description of a way they interacted with their child]*. In the post survey, one of the questions asked you to describe a moment where you and your child were exploring together in fun ways. You wrote _____. Could you describe this moment/what you meant by that?
- g. What do you think your child was getting from these activities or watching the videos? Do you think they were learning anything? What did you notice that tells you that?
- h. Do you think that doing activities like this can help your child in any way related to school?
- i. Did you share what you did in the activity, either by sending a text to the 30644 number, or by posting to the Mobile Chase Facebook group?
 - i. *[If they shared]* Could you describe what you shared?
 - 1. Why did you share? Did you think you were supposed to share?

2. Did you get a badge?
 - a. Did you and your child discuss the badges? Did you get any badges?
 - b. To what extent, or in what ways, were the badges something you or your child wanted to get? What did they say or do that makes you say that?
 - c. Do you think getting a badge affected your participation in the program or how you did the activities at all?
 - i. *[If they wanted badges]* Why do you think you wanted the badges?
 - ii. *[If they didn't wanted badges]* Why do you think you didn't care about the badges? Is there something that could have made them more appealing?
 - ii. *[If they didn't share]* Is there a reason why you didn't share what you did in the activities?
 1. Is there anything that stopped you from sharing? Any specific reason why you didn't share?
 - j. Did you join the Facebook Group?
 - i. *[If they joined the FB group]* Did you and your child both look at the FB page? What was that like? Did you see like seeing what other people were posting, and doing? What did you like about that? Do you think joining the Facebook group affected your participation in the program at all?
 - ii. *[If they didn't join the FB group]* Is there any reason why you didn't join the Facebook group?
5. Taken as a whole, what was the value of this program for you and your child?
 - a. We've heard parents talk about two major types of value they've gotten out of this program:
 - i. Quality time spent with their kid (ie rather than just sitting around watching TV or playing on their phone)
 - ii. That their child learned something (such as recycling or saving water)
 - b. Do either of these categories feel important to you? If you had to choose which was more important, which would it be? Why?
 - c. Do you think your kids learned something from this program?
 6. Can you think of any activities that you didn't like or didn't look interesting to you?
 - a. Can you explain what you didn't like, or why you think the activity looked interesting?
 - b. Was there anything about any of the activities that made them difficult to complete?
 7. *[For Online only parents]* How did you find out about Mobile Adventures?
 - a. Did you see an ad on TV? Did you talk to someone?

8. *[For online only parents]* What did you think the program was going to be like when you signed up?
- What did you hope you would get out of participating?
 - To what extent was your experience what you were hoping for?
9. Since you stopped receiving the activities from Mobile Adventures, have you continued to have similar conversations around these topics?
- Have you done anything more related to these activities?
 - Have you noticed your children asking more questions or noticing more things than they did before the program?
 - Do you think you're more comfortable supporting these types of interactions now than you were before participating in Mobile Adventures?
 - If so, in what way? Can you give me an example?
10. As you spend time with your kids this summer, what do you think you're going to take away from this program?
11. *[If interviewee attended a kick-off event]* Is there anything that you remember, or that sticks out about that event? Was there any part that you or your child particularly liked?
- Was there anything that stuck with you from the kick-off event as you completed activities or watched the videos? Anything you heard or did in the event that you think affected how you experienced the program?
12. *[For San Antonio parents]* Did you use the activity tracker?
- If so, can you describe how you used the tracker?
 - Was it helpful? If so, in what way was it helpful?
 - Who decided whether you were going to use the activity tracker? parent or child?
 - If you didn't, is there any reason why you didn't use it?
13. What did you think about the length of the 6-week program? Was it too short? Just right? Too long? What length would be ideal? 8 weeks, 10 weeks, other? Did you feel like you had committed to doing activities for six weeks? Did it ever feel like a burden?
14. The program materials included cartoons, real people on the screen, and an online game. If you tried them, did your child or you especially like one or another of these formats?
15. During the 6-weeks, did you go online for other Cyberchase videos, games, apps, and/or visit the Cyberchase website?

16. If we were to do this program again, what time of year would be best? Spring / Summer / Winter / Fall
17. Finally, do you have any suggestions for the creators of this program about how they might change or improve it in the future?
- a. In the post-survey, in response to a question that asked you to describe ways Mobile Adventures could be improved, you wrote _____. Could you explain that?

Appendix E: Pre-Survey

Thank you for taking our survey, and being a Cyberchase VIP! This survey should take about 10 minutes to complete.

Your answers here will help us understand more about your experience with the *Cyberchase: Mobile Adventures in STEM* program. We will keep your answers private: only our research team will know your name, and we will never use your name in our reports.

It is your choice if you want to complete this survey. If you feel uncomfortable about answering any of the questions, you may skip them, and you are free to stop the survey at any point.

Note: In this survey when we refer to 'your child', we mean any children you take care of between 6-9 years old.

Please provide the following information:

First Name:	
Last Name:	
Phone Number:	

Part 1: Introduction

1. What do you hope you and your child will get from participating in Cyberchase Mobile Adventures?

2. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
I've enjoyed today's event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My children have enjoyed today's event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This event has made me feel confident about doing educational activities with my child	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a clear understanding of the types of activities that will be sent to my phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 2: Conservation and the Environment

3. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
Humans have a responsibility to take care of the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recycling is important to my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm not always sure which items should be recycled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My family throws things away that could probably be recycled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It's important to not waste water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I'm not sure what to do in order to use less water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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4. How often does your family do the following things?

	Never	Sometimes	Most of the time	Always
Turn off the lights when we leave a room	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep the AC running when we're not at home if it's hot outside	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bring our own shopping bags to the grocery store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turn the TV or computers off when we're not using them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Let the water run while we're brushing our teeth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drink water in disposable plastic bottles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 3: Education and Science

These questions ask about your experiences and comfort with topics related to science and the environment, and with educational activities. Note: When we refer to 'your child', we mean any children you have between 6-10 years old.

5. In the past month how often did you do these things with your child?

	Never	Once or twice	Once or twice a week	Daily
We read about science or the environment in a book, a magazine, or on the Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We did a activity related to science or the environment, like planting seeds, making a bridge, or counting windows on a building	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We watched a science or nature TV show or video together	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We played with science apps or online games together	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We visited a zoo, science museum, and/or nature center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We discussed the animals and plants we saw while spending time outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I asked my child questions about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child asked me a question about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
I am comfortable doing activities to help my child learn about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have the materials at home to help my child learn about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know the science skills my child should be learning at their age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have time to do educational activities with my child	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I want to help my child take better care of the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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7. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
My child likes to do hands-on learning activities with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child likes doing art projects with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child is interested in nature, animals and plants, and how the world works	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child asks a lot of questions about what is happening in the world around them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 4: Family Information

8. Which of the following **best** describes you?

- White
- Hispanic or Latino/a
- Black or African American
- Asian
- American Indian or Alaskan Native
- Native Hawaiian or other Pacific Islander
- Other (please specify): _____

9. What is the **primary** language you speak at home?

- English
- Spanish
- Other (please specify): _____

10. What technology devices are in your child's home? (Check all that apply):

- Laptop or desktop computer
- Tablet (such as an iPad, Galaxy Tab, Nexus 7, Microsoft Surface, or Kindle)
- Cell phone
- Television set
- iPod Touch or other type of video-playing iPod

11. What **best** describes how you access the internet on your phone

- I can access the internet on my phone as much as I want and wherever I want
- I need wifi in a place like my home or the library in order to connect to the internet on my phone
- I am not able to use the internet on my phone

12. What **best** describes the reason you chose to sign up for this program

- I want my child to conduct activities related to science or the environment
- I want to help my child learn the skills they need for school
- I want to do fun activities with my child

13. Please indicate the **highest** level of education you have completed:

- 8th grade or less
- Some high school
- High school diploma or GED
- Some college or technical school classes (no degree)
- Associate's degree (AA, AS) or technical degree
- Bachelor's degree (BA, BS)
- Graduate or professional degree

14. Please indicate your child's household income before taxes:

- Less than \$26,000
- \$26,000 - \$50,999

- \$51,000 - \$75,999
- \$76,000- \$100,999
- \$101,000 - \$125,999
- \$126,000 - \$150,999
- \$151,000 +

Appendix F: Post-Survey

Thank you for taking our survey, and being a Cyberchase VIP! This survey should take about 10 minutes to complete.

Your answers here will help us understand more about your experience with the Cyberchase Family Texting Program. We will keep your answers private: only our research team will know your name, and we will never use your name in our reports.

This survey is intended for participants in the *Cyberchase: Mobile Adventures in STEM* program who already completed a pre-survey.

It is your choice if you want to complete this survey. If you feel uncomfortable about answering any of the questions, you may skip them, and you are free to stop the survey at any point.

Note: In this survey when we refer to 'your child', we mean any children you have, or take care of, between 6-9 years old.

Please provide the following information:

First Name:	
Last Name:	
Phone Number:	

Part 1: Introduction

1. How much do you agree or disagree with the following statements? Note: if you didn't watch any of the videos or do activities, please answer N/A.

	Strongly disagree	Disagree	Somewh at disagree	Neither agree nor disagree	Somewh at Agree	Agree	Strongly agree	N/A
We enjoyed being a part of Mobile Adventures in STEM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We liked watching the videos that were sent to us	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We had fun doing the activities that were sent to us	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2. Please describe what you liked most about the Mobile Adventures program

3. Please describe ways Mobile Adventures could be improved

Part 2: Conservation and the Environment

4. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
Humans have a responsibility to take care of the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recycling is important to my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm not always sure which items should be recycled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My family throws things away that could probably be recycled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

It's important to not waste water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm not sure what to do in order to use less water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. How often does your family do the following things?

	Never	Sometimes	Most of the time	Always
Turn off the lights when we leave a room	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep the AC running when we're not at home if it's hot outside	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bring our own shopping bags to the grocery store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turn the TV or computers off when we're not using them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Let the water run while we're brushing our teeth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drink water in disposable plastic bottles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 3: Education and Science

These questions ask about your experiences and comfort with topics related to science and the environment, and with educational activities.

6. In the past month how often did you do these things with your children?

	Never	Once or twice	Once or twice a week	Daily
We read about science or the environment in a book, a magazine, or on the Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We did an activity related to science or the environment, like planting seeds, making a bridge, or counting windows on a building	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We watched a science or nature TV show or video together	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We played with science apps or online games together	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We visited a zoo, science museum, and/or nature center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We discussed the animals and plants we saw while spending time outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I asked my child questions about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child asked me a question about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
I am comfortable doing activities to help my child learn about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have the materials at home to help my child learn about science or the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know the science skills my child should be learning at their age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have time to do educational activities with my child	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I want to help my child take better care of the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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8. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
My child likes to do hands-on learning activities with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child likes doing art projects with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child is interested in nature, animals and plants, and how the world works	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child asks a lot of questions about what is happening in the world around them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 4: Your Experience with Mobile Adventures in STEM

The following questions ask about your experience participating in Mobile Adventures in STEM. Please answer as honestly as possible about your experience and how much you did.

9. Each week for six weeks you received a video with two accompanying activities, and then a text message asking you to share what you did. How often did you....

	Never	Sometimes	Most of the time	Always
Watch the videos that were sent to you?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complete the activities that you received?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Share what you did with Mobile Adventures by texting back a picture or information?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share what you did by posting on the Mobile Adventures Facebook group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
My child learned from doing the activities sent to us	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Completing the activities allowed us to share quality family time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a result of participating in this program, I feel more comfortable doing educational activities with my children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to continue receiving videos and activities from Cyberchase	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Mobile Adventures was designed to get you and your child exploring together in fun ways.

Describe any moment like this:

12. You probably did some activities and didn't do others. To what extent did the each of the following influence your decision to do an activity?

	Extremely Important	Very Important	Moderately Important	Slightly important	Not at all important
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The activity didn't take long to complete	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We cared about the topic of the activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child was excited to complete the activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We wanted to earn a badge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We wanted to share what we were doing with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Who did you complete the activities with? (Check all that apply)

- My child who is younger than 5
- My child who is 5-8 years old
- My child who is 9-10 years old
- My child who is older than 10
- My friends
- My spouse/partner
- My child's teacher
- Other

13b. What language did you watch the videos in?

- We watched them in English
- We watched them in Spanish
- We watched them in both English and Spanish
- I watched them in Spanish, and my child watched them in English
- other

14. For the weeks you didn't complete an activity, please select the main reason why

- I didn't understand how to complete the activity
- I never got the activity
- I didn't know how to open the activity on my phone or computer
- I didn't think the activity looked interesting

- My child didn't think the activity looked interesting
- I didn't have time
- We completed at least one of the activities each week
- Other

15. How did you access activities? (select all that apply)

- I clicked the link on my phone
- I forwarded the link to another phone and opened it there
- I opened the link on a computer or tablet
- I completed the task with a friend, and they opened the link for me
- Other

16. For videos you didn't watch, please select the main reason why you didn't watch them

- I didn't understand how to watch the video
- I never got the video
- I didn't know how to open the video on my phone or computer
- I didn't think the video looked interesting
- My child didn't think the video looked interesting
- I don't want my child watching videos or TV
- I didn't have time
- We watched all the videos
- Other

17. (SAN ANTONIO ONLY) You received an Activity Tracker at the kick off event. Did you use that?

- Yes, we used it to mark each of the activities we completed
- Yes, we used it to mark some of the activities we completed
- No, we didn't feel like using the activity tracker
- No, we didn't understand what the activity tracker was for
- No, we lost the activity tracker
- Other

Display logic Generated by the answer to Q9

18a. Please select the main reason why you posted on the Mobile Adventures in STEM Facebook group

- Yes, we shared because it made us feel part of a community of families participating in this program
- Yes, we shared because it was fun to get comments or likes on the pictures we shared
- Yes, we shared because we wanted to interact with Cyberchase
- Yes, we shared because we wanted to get a badge
- We didn't post on the Mobile Adventures Facebook group
- Other

Display logic: No, didn't share the results

18b. Please select the main reason why you didn't share on the Mobile Adventures in STEM Facebook group

- I don't have a Facebook account
- I don't feel comfortable sharing information or pictures with people I don't know on Facebook
- I didn't know how access the Mobile Adventures in STEM Facebook group
- I didn't see any reason to share on Facebook
- I did share on the Mobile Adventures in STEM Facebook group
- Other

19. Is there anything else about your experience with Cyberchase Mobile Adventures in STEM that you would like to share?