



# An In-home Evaluation of a Joint Media Engagement Ocean Science App for Families with Young Children



March 2021

## **SUBMITTED TO**

THE JIM HENSON COMPANY

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### *Suggested Citation*

Paulsen, C.A., Carroll, S. & Carroll, E. (2021). *An In-home Evaluation of a Joint Media Engagement Ocean Science App for Families with Young Children*. Concord, MA: Concord Evaluation Group.

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#### **About Concord Evaluation Group (CEG)**

CEG is a woman-owned, small business in the Boston area.

We use a variety of evaluation research methods to assess the impact of educational programs and media.

Our mission is to use our evaluation expertise to help improve learning outcomes and enhance the quality of life, especially for underserved communities.

CEG works with a range of audiences--from preschoolers through adults--within the US and abroad.

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## Acknowledgements

This evaluation was conducted with support from the National Science Foundation (Grant number NSF DRL 1612840). We would like to thank Dr. Cynthia Williams for her excellent assistance in collecting data from families and Elizabeth Paulsen for her expert editing skills. We would also like to thank the project's Principal Investigator, Stephanie Wise of The Jim Henson Company, and co-Principal Investigators, Ximena Dominguez of Digital Promise and Phil Balisciano of Curious Media, for their guidance and support.



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# Background

## The *Splash!* App

This paper reports on a new media-based tool designed to develop new knowledge about joint parent-child participation in science talk and practices using a second screen app synced with a television program, called *Splash! Ask-Me: Ocean Adventures (Splash!)*.<sup>1</sup> With funding from the National Science Foundation, *Splash!* is an app designed to work in conjunction with a marine science-focused television program, *Splash and Bubbles*, for children 2-8 years old that premiered nationally on PBS Kids in fall of 2016.

The free app includes a variety of "conversation catalysts" tied to the television episodes to help parents support children's ocean science learning at home and in other venues such as aquariums and science centers. The project aims to support children's conceptual understanding of science concepts and practices, empower parents and caregivers to facilitate learning during media engagement, and contribute to the research literature on joint engagement with media.

Over the last several years, content developers from the Jim Henson Company and researchers from SRI International and Digital Promise used a co-design process, during which the project team went through multiple cycles of implementation and revision, to create the family app and its related hands-on activities. In 2020, Concord Evaluation Group (CEG) conducted an independent "out-of-the-box" evaluation of the *Splash!* app. The evaluation included a self-directed, in-home study in which families were provided with very little direction or instruction on how to use the app as a way of gathering data on what a "typical" out-of-the-box experience may be like for families using *Splash!* for the first time.

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<sup>1</sup> A "second screen app" refers to a system whereby a family can watch a video or TV episode on one screen and simultaneously connect to a second device with the two screens providing related or interactive content.



# Methods

## Study Objectives

CEG conducted a mixed-methods, out-of-the-box evaluation of the *Splash!* app in the spring of 2020. The evaluation was designed to assess the extent to which the experience of using the *Splash!* app:

- Was user-friendly and manageable for parents without support (usability),
- Led parents to have more positive attitudes about their children’s technology and media use at home,
- Led parents to have more positive attitudes about science and about doing science exploration at home,
- Was viewed positively by children and parents, and
- Was feasible to use (and evaluate) during a highly unusual time such as the pandemic emergency we are experiencing as of the writing of this report.

## Study Design

The study was designed to collect data from a sample of 32 families with children aged four to five years who used the *Splash!* app over a period of two to four weeks. Upon enrollment in the study, each group of one parent and one child (family) participated in a video conference call with a senior researcher who conducted an interview with both the child and the parent. After conducting the pre-test interview, CEG instructed families to download and explore the *Splash!* app, without any specific instructions about which functions, activities, or media to use. Families were simply encouraged to explore as much or as little as they liked—whatever they would normally do when they download a new app for family use.

One week after the pre-test interview, CEG reached out to families to ask whether they had used the Sync feature of the app (The Sync feature activates the second screen functionality of the app). Those who had not were then instructed how to access it and provided with a link to the in-app instructions on how to use the Sync feature. We recorded the number of families who found and used Sync on their own and the number who only did so after we guided them to it.

After a period of two to three weeks families emailed CEG to report that they were done trying out the *Splash!* app. At this point, parents scheduled their final family interviews. The final family interview enabled CEG to look for trends over time in the key variables noted above. In addition, the final interview enabled CEG to gather evaluative feedback on the *Splash!* resources.

### The Study Took Place during the COVID-19 Pandemic

We should note that the study took place at the start of the stay-at-home orders issued to address the COVID-19 pandemic. Thus, it is possible that some activity levels reported may not be typical of family behaviors before the pandemic struck.

## Recruitment

CEG reached out to over 2,000 families nationwide who have previously indicated an interest in participating in a research study with CEG to let them know about the upcoming study. Families that were interested in participating completed a screening survey online to determine their eligibility. Participants were qualified for the study if they had: (1) at least one child between the ages of four and five years old, (2) access to the internet, and, (3) the ability to communicate in English for the purposes of participating in video conference interviews. Families were offered an incentive of \$100 to participate in the study.





# Participants

## Demographic and Background Characteristics

We recruited 32 families for the study and six dropped out due to the pandemic and virtual schooling demands placed on families, leaving us with 26 families in the study. Among the families participating in the study, 58% of the children participating were four years old and 42% were five years old. Slightly more than half (54%) of the children identified as female and 46% identified themselves as male.

Almost two-thirds of the children identified as White or Caucasian (65%), 19% were Black or African American, 7% were Latinx, 4% were Indian or Middle Eastern, and 4% preferred not to answer. Slightly less than three-quarters of parents identified as White or Caucasian (73%), 15% were Black or African American, 8% were Latinx, and 4% were Indian or Middle Eastern.

Parents were asked to self-report their household income status. Half of the families (50%) reported their status as middle income, 39% as low to middle income, and 12% as low income. Families lived in the following states: Massachusetts (27%), Florida (19%), California (12%), New York (12%), Virginia (8%), Alabama (4%), Illinois (4%), Maryland (4%), Michigan (4%), North Carolina (4%), and Ohio (4%).

Sixteen of the 26 children in the study were enrolled in pre-school before the study began and 12 of those 16 were continuing school online during the pandemic.

**Table 1:**  
**Family Background and Demographic Characteristics**  
**(N = 26)**

Characteristics	Count and Percent
<i>Child Age</i>	
4 years old	15 (57.7%)
5 years old	11 (42.3%)

Characteristics	Count and Percent
<i>Child Gender</i>	
Female	14 (53.8%)
Male	12 (46.2%)
<i>Child Race/Ethnicity</i>	
White or Caucasian	17 (65.4%)
Black or African-American	5 (19.2%)
Latinx	2 (7.7%)
Indian or Middle Eastern	1 (3.8%)
Prefer not to respond	1 (3.8%)
<i>Parent Race/Ethnicity</i>	
White or Caucasian	19 (73.1%)
Black or African-American	4 (15.4%)
Latinx	2 (7.7%)
Indian or Middle Eastern	1 (3.8%)
Prefer not to respond	0 (0.0%)
<i>Self-reported Household Income Status</i>	
Middle income	13 (50.0%)
Low to middle income	10 (38.5%)
Low income	3 (11.5%)
<i>State</i>	
Massachusetts	7 (26.9%)
Florida	5 (19.2%)
California	3 (11.5%)
New York	3 (11.5%)

Characteristics	Count and Percent
Virginia	2 (7.7%)
Alabama	1 (3.8%)
Illinois	1 (3.8%)
Maryland	1 (3.8%)
Michigan	1 (3.8%)
North Carolina	1 (3.8%)
Ohio	1 (3.8%)

## Family Science Experience

At pre-test, we asked parents about their level of experience doing science activities together with their children.<sup>2</sup> A majority of families (69%) reported that they did “some to none.” Thirty-one percent of families reported they do a lot of science activities together.

**Table 2:**  
**Family Science Experience**  
**(N = 26)**

Characteristics	Count and Percent
<i>Experience with science together</i>	
“We do some science activities together.” OR “Science? I’m not sure we do any science activities together.”	18 (69.2%)
“We do lots of science activities together.”	8 (30.8%)

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<sup>2</sup> We based our survey and interview questions heavily on survey instruments designed by the internal research team, Digital Promise, as we hoped to share our findings with the team as it continuously worked to enhance and improve the *Splash!* app and we hoped to be able to triangulate findings across the internal research being performed and this independent evaluation work. In some cases, we changed the wording slightly for clarity or deleted items to save time, so there will be some data that are not directly comparable.

To gather contextual background for parents' reports, we collected qualitative data about parent attitudes toward science at home. Many parents mentioned that they particularly **enjoyed doing hands-on activities and experiments** with their child. They reported:

- *Because I see them engaged, I see them learning. And I think the things I do with them when I teach them science stick.*
- *I like when the stores were open, I tried to do once a month, one type of science project with her. I would go to Walmart or AC Moore and get the science kits that are for her age and then we'll just try to do some type of science project or something like that. I like doing it because I like to do hands-on stuff with her whenever we can.*
- *We like to do different science experiments. We haven't done any this week, but we usually try to do something. The one thing we really like to do together is cook together and seeing how I put all the ingredients together and to make something.*
- *I like science, so lots of activities like all the STEM toys that are out there, and we just again, I do a lot of reading and writing for work, so unfortunately I do read to him, but I would prefer doing hands on science-related and nature and the environment type stuff.*

Other parents mentioned that they **enjoyed the bonding they felt doing activities together as a family as well as the "a-ha moments"** when their children learned something new. They said:

- *I think it's fun. Most of the science things are hands on, and so it's fun to participate with them and do things together, so it's a good time to bond. I think it's educational, and I feel like if you show them science at home, it's easier to learn at school.*
- *Well, we've done some experiments with him before and it's fun. It's something the whole family can enjoy.*
- *I like to see their wonder, their curiosity, their aha moments. And we like to get dirty. We like to make a mess.*
- *It's fun. It's fun to watch them absorb it and understand it.*

Almost all parents agreed they thought young children generally like science and are interested in it. Many parents commented that **their children liked science activities that were hands-on or interactive in nature, especially if they were relatable or applicable to their lives**. They reported:

- *I feel like my kids are more intrigued and into those because they're interactive. So I feel like science is just an interactive experience where they get to be more hands on than say with reading or other subjects.*

- *I just find that my kids love the hands-on, seeing how things actually work. ...The way their heads spin, kind of just start working, figuring out how things go with science, I love that. I think it's so much more applicable than other subjects.*
- *Well, my kids particularly, they like finding out cool things and I like doing experiments and they like trying new activities and learning how things function and work. So I feel like my kids like learning about things.*
- *I just think children are interested when they are able to work out the experiments and things in that area of science and just learning about organisms, plants is very, interesting for them. It always has been for mine.*

Some, but not all, parents **called themselves a “science person” mostly because they like the subject.** They explained:

- *I always wanted to be a doctor and I took lots of science in college, and then I went to law school. But I have an interest, I read the new England journal of medicine just for fun.*
- *Well, I mean, I love science, but I guess I wouldn't say that we do experiments all the time.*
- *Well, I just enjoy science in general and I always try to do different activities with the kids like outdoors, or we're working on observation journal now with the kids.*
- *I love science. I was always really good at science in school and I think it's fun and I think it helps you understand the world around you. So I do a lot of STEM toys with them, stuff like that. And I think it just makes something creatively. So I like it. I prefer it than math.*

A majority of parents also agreed that **they need support to help their child learn science.** Most generally said that they **needed help and resources** and that **seeing examples is helpful.** They reported:

- *If there was stuff more easily accessible available, like apps and TV programs more direct that came to me, I would definitely do it. Like I said, I have such a busy schedule, I feel like I'm not doing enough for them individually. But I used to find an app or something that I just grab it.*
- *I've been okay with what I have now been able as resources. There's a lot of resources available. I don't know it all. I've been able to use the resources available in order to educate myself on things that I may have not remembered.*
- *I know there's some certain aspects I can use help with. So, I'm learning myself. I'm still learning how to break it down for her age, where I'm up in the much, much higher levels*

*than she is. So I guess I'm bringing it down more for her level would be where I'm at, where I'd need more help with it.*

- *I think that I always need somebody to facilitate the activity for me, because I don't really know where to start. So buying kits or looking something up always helps.*
- *I think I'm just too black and white with thinking of things of how I teach science. So, seeing examples or ideas just really helps me facilitate it and make it understand on their level, which sometimes I forget to think of when I'm teaching this to them.*
- *I think everyone can use support. I think I have a basic knowledge of thing, so I can do it. But I'm always looking for resources, whether it's from their teachers or outside ideas. I think nobody's an expert in all things, so all support is good support.*

Others mentioned they **searched for science-related “things” on the internet**. They said:

- *I'm quick to jump onto Pinterest or I know the right Google keywords to search, that I'm not afraid to search for resources. That as long as you have internet access, I think you can find something that will be helpful for a certain age group.*
- *I prefer the so many things, like Google is the most important thing for me to teach.*

A majority of parents disagreed that science is too difficult for young children to understand.

They felt that **science can be taught in age-appropriate ways** so that it is not too difficult. They said:

- *It just needs to be broken down to age-appropriate levels of vocabulary. Lots of pictures make it fun. They've got to relate to what they're doing.*
- *I think if the concepts are presented in the age appropriate way, then they can grasp them. There are certain levels of science that they can, but I think there's a lot of it that they can get in their little sponges that absorb and learn a lot more than we think that they do.*
- *Especially I think you can break it down in different levels for them to understand it more. So, it's just on how you explain it to them or how it's explained to them*
- *I think there is a way of explaining things that young kids can always comprehend and we don't need to use big words for them to understand basic things.*
- *I think that as long as you buy toys or do activities that are age appropriate, it doesn't have to be difficult.*

## Joint Media Engagement Experience

At pre-test, we asked families what their typical co-viewing or joint media experiences were, if any. Almost two-thirds of families (65%) reported that they mostly watched educational TV together while 35% of parents mostly just monitored what their children watched.

**Table 3:**  
**Media Co-viewing Experience**  
**(N = 26)**

Characteristics	Count and Percent
<i>Experience co-viewing educational TV together</i>	
Mostly together	17 (65.4%)
Mostly just monitor	9 (34.6%)

We asked families what shows or videos their child watched at home. The most popular shows mentioned were *Daniel Tiger’s Neighborhood*, *Sesame Street*, *Paw Patrol*, *Blaze and the Monster Machines*, and various *National Geographic* videos. Parents generally liked shows that were **educational** in nature and that they felt were **safe** and **age appropriate**.

- *So Blaze, I definitely particularly like, I mentioned it to you earlier. Also there's an element of science and engineering in it and I really love it because the older kids are watching too sometimes and they pick up often and they explain it to him.*
- *Actually, Sesame Street taught me how to read, so that's one of the reasons why I'm not anti screen or TV, or whatever, when I was little. So I've been watching Sesame Street.*
- *I love Daniel Tiger. It Reminds me of Mr. Rogers Neighborhood, and I loved that show when I was little, but I feel like I like how they talk about hard things or things that might be scary to a kid, but then they make it in a positive light, not a scary light.*
- *He likes to do the Nickelodeon and the Disney, sometimes we watch the National Geographic, the kids, children one. He also has, likes animals. So he's into a lot of whether reptiles, or if we're talking about a caterpillar or anything to that nature.*
- *I try and find them stuff that I think has some sort of educational content to it, whether it's ... I feel like Daniel Tiger is a lot about feelings and emotions.*
- *I really like that they teach counting, they teach letters, they teach sounds, they're basic to understand, they teach caring habits like kindness and what it means to be a good*

friend. They just have good morals, and I don't have to sit there with him while he's watching one of those shows to make sure that it's appropriate. I know if one of those is on, it's good to go.

- *Blaze and the Monster Machines. They incorporate science, they incorporate math, and the kids are more into it because they don't realize they're learning. So when it's a show that incorporates learning but the kids don't realize it, I love that.*

We asked parents to describe their watching habits and whether they watched shows and videos together with children. The majority of parents reported that they **sometimes watched with their children and at other times just monitored what they were watching**. They said:

- *It's about half and half. There are some shows that we like to watch together and then there are some shows that they watch on their own.*
- *I would say 50/50. 50% is she watches it by herself, in the zone and I'm probably with the baby or cleaning up or something like that or maybe it's bedtime and she has a little TV time before going to bed. Then the other 50, I really try to sit down because that's what she likes.*
- *I'd say we're in between. I'm certainly not always sitting right there, but the TV that I mainly watch is kind of in an open area. So I am monitoring it periodically if I'm not able to sit there watching it.*
- *Sometimes I sit and watch it with them and other times I use it while I'm trying maybe feeding the baby or doing other things where I'm not as overly engaged as I would be at another time.*

Some parents said that they **primarily used the videos and TV shows as a way of occupying their child while they did other things**. They reported:

- *I don't watch. I take that time to do chores. I'm often in the room, but I'm doing stuff.*
- *I'll be totally honest. No, that's my time to clean the house. So I put that on and let them watch it. I don't sit there and watch it with them. I just don't have the time.*
- *I do frequent check-ins, the borderline hover.*
- *So right now, if I'm not in the immediate room, I'm within earshot so I can make sure it's not like auto-playing into something she shouldn't see. But generally speaking, most apps have the child account, so it's limited in what is shown.*



We then asked parents to describe what they do when they watch shows or videos with their children and whether they talk about or discuss what they are watching. About half of the parents reported they **talk with their child while watching**. They said:

- *We talk about it. We talk about what we see and that goes with even the older kids. If there's something that they saw in school and they didn't like or they were worried or they wanted to try, we talk with it.*
- *Typically, we do talk about it. I mean, because they're kids, and they have a million questions about everything. Usually there's a question like, "Why is he doing that? Or what is that? Or what does this word mean?"*
- *I would say that we always talk about what's going on. A lot of the times those shows will bring up questions and we'll pause it and we'll talk about it, and maybe talk about some examples, and trying to incorporate it into his life. Even that being four years old, but making those connections is important.*
- *I'll stop the show throughout if it's something interesting or a learning moment and I'll stop and talk to them about it definitely. I just don't let the whole show go without me.*
- *We talk a lot through about what we're watching and about what's going on. How to apply it to what we're going through, what we're doing.*
- *I questioned him about what he sees, what he understands, why is something the way it is just to hear how he connects the dots or not connect the dots.*
- *Yeah, I always ask them, "Hey, what did you think about that? Did you like it? What did you learn?" I think it's important to ask, because I want to get them talking and they think of their feelings about stuff. So I say that the majority of the time we talk about it.*

Other parents said that they **sometimes talked with their children while watching**, but other times they did not. They said:

- *If it was something like, I'm making dinner and I need the two of them to not kill each other, then I'm not, honestly, I'm not discussing what My Little Pony just did. But if it's something, we're sitting on the couch together, especially like a Daniel Tiger, where there's a message that she can kind of realize that's what they were teaching, we have mentioned it.*
- *It's probably a combination of both. If he has a question about something. There've been some episodes where Daniel Tiger was sick and didn't feel good, so we talked about that. He gets better, and especially with everything that's going on now, so when episodes like that come on, we'll talk about it. But it depends. There are times when we just sit and watch it and I don't ask questions or check in with him about it, or her. Well, she's only two, but it really depends, I think, on honestly, my energy level.*

- *I'd probably do it a little bit. I always laugh, because my mother does it a lot with them, but she also does it as an adult if she was watching a movie, which is something that drives my husband crazy. I probably have a little bit of that in me, like "Okay, let's just let them watch it and absorb it." But I will try and point out a little bit here and there, so like the storyline that I think they might not be absorbing.*

Other parents reported that they **did not talk while watching shows or videos** with their children. They said:

- *Well, some of the time they'll talk or they'll be playing while watching something. Most of the times the kids will say, "Quiet, I want to watch this."*
- *I would say typically don't talk much about this show unless he asked me a question or if there's a word that he doesn't know what it means.*
- *Typically, we'll just literally sit and watch.*

A majority of parents reported that **questions or moments for teaching or explanation led them to talking with their child about what they were watching**. They explained:

- *Well, if he asks me a question, for instance, then I would respond to it. Or if I feel like it's something fun or something that maybe he should know about, then I would probably ask him a question. If he's really, really interested, I want to ask him and see, did he retain that concept?*
- *A lot of times he'll ask. He has lots of great questions, so he'll ask questions about something that he sees or he'll make a comment about something that he sees, but that'll kind of open a discussion.*
- *A lot of times they'll talk about some kind of event or things that happened to people that he does not understand, so I have to explain to him.*
- *If they're curious about something or if it's something I think they don't understand, but they don't realize they don't understand, I'll explain it, but I still want it to be an enjoyable thing that they do.*
- *Her questions about it. And maybe if they're doing something inappropriate, like if it was a bullying, some were one of character was bullying another character, I'll just process with her on, why is that wrong and how does that make someone feel?*

All of the parents reported **that their children asked questions about how things work**. Types of questions included:

- *Well he asks how things like microwaves work and certain like video games.*

- *How they work, how was it, what happens and then sometimes he doesn't, but most of the time he does.*
- *You know about cooking or how something works with TV or there's this show that we sometime watch, it's called How It's Made and sometime they might have a question about something that they're making there, especially if it's related to a toy.*
- *Like why did they do that? Or how did that happen? How did they get from one area to the next?*
- *Oh like, what is this for? How do you do this? Can I do this? Is this something that we can do or is that how something works? Or, somebody said I could do this, can I do this? Is this okay? I don't know. But they're just some of the ones I can think of. She asks a lot of questions, like a whole lot, all the time.*
- *She asks if it's raining, why is it raining? What in the clouds make it rain? She knows the water cycle song so I think that she's just trying to have me explain it more to her. So things like that.*
- *He'll ask how... The truck drives by, and it's loud, he'll ask "why is it loud?" He'll ask about... Like yesterday, it was raining and he asked "how the clouds were blocking the moon." He's always thinking about how things work.*

Most parents reported that they tried to **answer their child's question** when questions were asked. When they did not know the answer, almost all parents said they would **"look it up"** to find out the answer. They elaborated:

- *I try to answer them the best that I can. Mostly with a story.*
- *Well, I'll tell her, if I don't know the answer, I'll look it up. So if I don't know the answer, we have an Alexa and a Google and so she knows to ask them questions too.*
- *I try to answer them to the best of my ability. And if there's something I don't know, I'll tell, "Hey, why don't we go online and look it up?" And we'll look it up together and then I'll read it and he'll be like, "Oh okay."*
- *If I know the answer off the top of my head, I'll, go into it. If not, we'll look. Sometimes we'll look it up together, and other times I direct her to her siblings.*
- *It depends. If they're simple questions, obviously I just answer right away. If they're more complex, I might get some back up help from my husband.*
- *I tend to answer and if there are questions or comments that you don't know yourself, you'll ask Google or Alexa.*

Some parents mentioned that they try to **explain and demonstrate** the answers to their child's questions. They said:

- *Sometimes I try to explain, or if it's something you can demonstrate, show him, or we'll look it up online.*
- *I try and explain it as best as I can to where he'll understand it. And if the opportunity presents itself, like this one, I can show him. I like to show him what we're talking about, rather than just talking about it.*
- *I try to one, explain or two, show. Like the science experiment, he can see a generate from the seed up into a fruit. So he will understand that afterwards.*

Many of the parents reported that their child makes observations about the work around them. The most common observation was related to other the **behavior of others**. Parents said:

- *I'd say she observes people's behaviors.... I'd say she picks up on people's feelings and actions, and if somebody is being kind or not very nice.*
- *Everything. We'll go out and he'll say, even if it's negative or positive things people don't do right or things that he doesn't see often, he may see something that I don't even notice. It goes over my head and he will point it out. So mainly things that aren't as obvious to adults are obvious to him.*
- *He observes people doing different things. Like when we're riding in the car and he'll point out, he'll say, Oh Mommy that person is smoking while they're driving. Are they supposed to do that? So he'll observe something and then ask a question of it.*

Other observations included **nature, color, and things related to COVID-19 rules**. Parents reported:

- *Especially if it's red and blue he'll notice it right away. Yes, he likes those colors. So if it's something related to that, he would notice it right away.*
- *Wow, mama, did you see that bird? It had blue wings. Or why didn't it go sit up on the tree? Why did it sit on the grass?*
- *It's really situational what he pulls out or what he observes or notices. I mean we could be walking, and he just notices a flower and brings up the color and says, "Ooh, it smells good," or he sees a bee talks about that bee and how it's going to sting him.*
- *I noticed recently she's really observing, because we've been on a lot of walks and we're limited in what we're doing, but nature walks. She's goes on about what to move the environment, why something's at a place. Like if she saw a squirrel on our trash can or*

something, "Why isn't there and not in the tree?" Just observing that things are out of place or not in order.

- *She is very observant. She knows how to really observe everything. Even when we go out, when we could, even just looking at the trees and things like that. If you tell her one time, she's going to remember it. We can pass a certain tree and she'll be like, "Oh that's an oak tree."*
- *When he sees something, he'll point it out to me. If he a bird, he's like, "Mom, there's a bird. Where's the bird going? Where's the bird's house? Where's the bird's babies? Why does the bird make that noise?"*
- *Oh gosh, recently, why people have been wearing masks.*
- *he's very grown up for her age. She's had to experience things that other people don't. So I feel like she's more, she's very observant and she knows things that are going around. She's made three music videos for this Corona Virus and washing your hands and how to avoid it and how to be healthy.*

We asked parents if they noticed their children **comparing and contrasting** things based on their observations, and almost all parents agreed they had. They reported:

- *Yeah, he might say, "Oh, why doesn't that person have a mask on right now, when someone else does?"*
- *Yeah, he says[sic] to me, he'll tell me about his sisters, who looks alike and who acts the same and, "I have two sisters and we have two brothers in here. Me and my brother, and me and my sister." And then he would tell me that he thinks that him and his middle sister, they're two, the two middle ones look more alike, and that his younger sister and the older brother look more alike.*
- *Yes. Especially more recently, like after he was in preschool this year obviously. Because they learned about people doing different and stuff, so he's had lots of commentary about that. Girls versus boys, just how people are different.*
- *Yes. Just how we were talking about the exhaust pipe he was saying, "is the exhaust little or is it big?" So yeah. I try and use those words a lot, because in my first-grade class. Comparing and contrasting is a skill that is very, very difficult to grasp. I'm trying to start him very young.*
- *She did it the other day to two birds that she saw the backyard. Again, she's like, "Mommy, that's a bluebird and it does this. And mommy...". I want to say it was a pigeon or something near the water because we live on the water. And she goes, "That bird could fly, that bird waddles." So she does a lot of times in nature when we're outside.*

- *I know she'll do a lot of the big and little. I've noticed her do light, like light colors, dark colors... wider or thinner. Farther away, closer.*
- *Yeah, so that's what we're working on in our academic time right now is similar and opposites. I think that's what it's called. It's a book. But we're working on that, so she'll have to circle like five magnifying glasses, and one is upside down and the others are going outwards.*



## Program Implementation

Nearly half of the families (11 out of 26) reported that they had watched the *Splash and Bubbles* episodes on both a TV and another device. The remaining families were split between TV only and other devices only (no TV). Three families could not recall any information about what they watched or what devices they used, so their data are excluded for this section.

**Table 4:**  
**Devices Used to Watch Shows**  
**(N = 23)**

Device	Count and Percent
<i>Did you watch on TV or somewhere else?</i>	
TV only	6 (26.1%)
Somewhere else only	6 (26.1%)
Both TV and somewhere else*	11 (47.8%)

\* "Somewhere else" option included devices such as phones, tablets, and computers.

We asked families how many episodes they watched during the study. Answers ranged from one episode to 10 or more episodes. Almost all of the parents indicated that they watched the episodes with their child for all or a portion of the time. The behavior is likely attributable to the fact that they were in the evaluation study, since only 65% of parents reported that they typically co-view TV or videos with their children.

**Table 5:**  
**Family Watching Experience**  
**(N = 23)**

Characteristics	Count and Percent
<i>Number of Episodes Watched</i>	
1 episode	2 (8.7%)
2 episodes	3 (13.0%)
3 episodes	3 (13.0%)
4 episodes	2 (8.7%)
5 episodes	4 (17.4%)
7 episodes	3 (13.0%)
8 episodes	1 (4.3%)
10 or more episodes	3 (13.0%)
No response	2 (8.7%)
<i>Experience co-viewing episodes</i>	
Watched with child	20 (87.0%)
Child watched alone	1 (4.3%)
No response	2 (8.7%)





## Findings

### Usability of *Splash!* App

Twenty-three of the 26 families reported on their app usage. This section contains data for those 23 families, while other report sections include data for all 26 families.

**All of the parents were able to download and use the app without support.** However, **only roughly half of parents were able to use the Sync feature without support** (the Sync feature allows parents to sync their device while watching the episodes). Eleven of 23 parents reported that it was clear how to use the Sync feature on their own, with most of the others indicating that it was clear to them only after receiving the follow-up email from CEG. Two parents said it was not clear or that they were unable to get the sync function to work at all, even with support.

Once they enabled the Sync feature, most parents (17 out of 23) reported that they were able to automatically sync to episodes, while 6 parents had to manually look for the episodes.

**Table 6:**  
***Splash and Bubbles for Parents App Set Up***  
**(N = 23)**

Characteristics	Count and Percent
<i>Were you able to download and use the Splash and Bubbles app?</i>	
Yes	23 (100.0%)
<i>Was it clear to you during the first week how to use the Sync feature or was it clear after Christine sent the week 1 follow-up note?</i>	
Clear the first week	11 (47.8%)
Clear after follow-up email	10 (43.5%)

Characteristics	Count and Percent
Not clear / could not use sync feature	2 (8.7%)
<i>Were you able to automatically sync to episodes or did you have to manually look them up?</i>	
Automatically sync to episodes	17 (73.9%)
Manually looked them up	6 (26.1%)

We specifically asked parents if they used the *Let's Talk About It* prompts while watching episodes with their children. Almost all the parents (19 out of 23) indicated that they did use the prompts at least once during the study.

**Table 7:**  
**Splash and Bubbles for Parents App Usage**  
**(N = 23)**

Characteristics	Count and Percent
<i>Did you use the Let's Talk About It prompts?</i>	
Yes	19 (82.6%)
No	2 (8.7%)
I don't know	1 (4.3%)
Did not answer	1 (4.3%)

Almost all of the parents reported that they found the *Let's Talk About It* prompts to be helpful. When we asked them why, many parents found them to be **informative**. They said:

- *I felt like they were very helpful. They gave informative tips and sometimes they were a little drawn out, but I feel like they were to the point and they were informative.*
- *I thought that was very helpful because those were mainly questions [that] I would had asked her but may not have thought about right away. It just made sense. Everything was laid out, mapped out for me.*
- *It gave you the main idea and the talking points.*

- *It has way more information than I was expecting.*
- *It did give you more information to pick up on. Because sometimes it wasn't just the major theme of the episode, it was like other stuff to kind of bring it to the next level.*
- *I'd say they were most helpful because you know, me going into an episode, I don't know what it's going to be about. So, to be able to kind of like put that concept like that seed in their head in advance.*
- *I liked that a lot just because obviously I didn't know what the episode's going to be about. It just made me feel smarter with my kids...being able to go into better questions for them and to dive into it. So, I really enjoyed that feature for sure.*

Many parents also commented that the prompts were helpful in **providing interaction opportunities**. They reported:

- *I did find it useful to look at the questions and try to ask him questions during and after episodes.*
- *It is helpful because you can explain things and talk about what you're seeing, what the episode is about, what you're going to be talking about at the beginning, middle, and end.*
- *I liked that part because that gave us the interaction part because she can't read yet. So, I will read the questions and then I'll say, "Okay so what did you learn about migration or which, which animals migrate?" And then she would answer me based on what she learned from the video.*
- *They were much more intentional questions to make an open conversation more. It would go off of really what I asked them, but we were talking about different things that they had questions about. And so, it just made them think deeper I feel like than just, how was it? What'd you think?*

Other parents mentioned that the prompts helped to **engage or get their child more interested** in the episodes. They said:

- *I think it was helpful to have to make her pay attention.*
- *They were guiding, so it helped. It helped me ask the right question, and kind of pique his curiosity and keep continue talking about the topic.*

Of the parents who used the *Let's Talk About It* area of the app, **no perceived differences were noticed between the first and second viewing**. A few parents noted:

- *They are [repetitive], but for a four-year-old and for her it was good because when it is repetitive that's how she learns.*
- *With those I didn't find you know a huge difference, but there were little things that were worded differently. But they were very, very similar.*
- *No. And I did compare them thinking well why would they choose this over this one you know?*

Almost all of the parents reported they accessed other areas of the app in addition to the prompts. Sixty percent accessed the video clips while slightly more than half (52%) accessed the activities. Other areas parents reported using were *Dive In*, *Photos*, *Ocean Guide*, and *Favorites*.

**Table 8:**  
***Splash and Bubbles for Parents App Usage by Area***  
**(N = 23)**

Characteristics	Count and Percent
<i>Did you access the Clips in this section?</i>	
Yes	14 (60.9%)
No	5 (21.7%)
Did not answer	4 (17.4%)
<i>Other sections of the app accessed.</i>	
Activities	12 (52.2%)
Dive In	3 (13.0%)
Photos	3 (13.0%)
Ocean Guide	2 (8.7%)
Favorites	1 (4.3%)
All	1 (4.3%)
Did not answer	1 (4.3%)

Overall, the feedback on the other areas of the app was positive. Most of the parents watched clips with their children and reported that they were **engaging**. They said:

- *Some of the clips we did watch. I know she really liked the songs a lot, a lot of the song clips and there were some other clips that she liked too. I thought it was interesting.*
- *She was pressing, "Let's look at this one. Let's look at this one."*
- *They were great but they were very short. They were only like a minute, a minute 15, a minute 30, so I just felt like I wish they were longer. They were just very, very short clips.*

Many parents reported they accessed the activities within the app and found them to **be fun and educational**. They said:

- *We did this one we did to look for things outside and take pictures that show animals or plants camouflage. So we did that. So I really liked that because she loves using the iPad, and you can do it on your phone, too, but I have mine on my iPad, and she loved walking around outside and taking pictures. Especially now it really comes in helpful, the app, because we really can't go far, so it's a good way to tie the whole camouflage lesson together kind of like how a teacher would do it like a lesson, a video, questions, clips, and then activity. So it was very cool.*
- *Yeah, where the activity section, I like that. It's fun and educational. There was like a gallery section that had pictures. But, there's only one picture, which I kind of wish there was more for that.*
- *There [were] a few other ones that we looked at where they gave you pictures to look at. He liked that a lot. Because he likes books in general, and that's why this is a great use of that. He likes the books that are real picture, like real photographs? And that's why this app is like real photographs. So he prefers that. He's really into real pictures.*
- *He liked activities a lot. We actually went for a walk. We live near woods, so we were able to go for a walk and there's a river. I remember when we went in the trail and they have signs about fish and habitat. So, that was a talking point that we could do during our hike, which was fun.*
- *I love the completed activities part because it showed me if I had already done it, which I can't remember if I did or not. So that was kind of nice.*
- *I think the activities are good.*
- *I think they're super helpful. Again, it's kind of a weird time for everyone right now. I feel like tensions are high, I'm trying to limit screens, that maybe when it's something she has a set schedule and on the weekends, we could have fun with it. Now it's kind of like, we hit the weekend and it's like, "I'm over trying to educate you." So I think it has good*

*intentions and I could see us playing around with it in the future, but just right now it's a lot going on.*

- *And I loved the activities, so we can take a picture of it when we're done. But, the activities were not guided with visuals and pictures.*

Other feedback on the app included:

- *[Photos] The pictures thing. I personally didn't like because I'm always weird about pictures of my kids posting them on stuff. So I didn't like the photos where they have the it snap it or the photo part in general. And I get using it as an engaged thing and I think that's cute but I felt weird about [it].*
- *[Ocean guy] That was awesome because it was like, okay, you're into this, now this is where you find it. So I really like that part of the app too.*
- *[Dive In] I wish that there was, I don't know what, like a game or some kind of activity that they could do there because I felt like a lot of the dive deepers just said visit the zoo or science center or go somewhere and it wasn't just, especially right now, practical to do.*
- *[Favorites] I liked the favorites, so the ones that I thought that were simple for him to understand, I saved them for later for quick access.*
- *[Dive In] We did the dive in. We looked at that. And then I like on the dive in it automatically told you what we're going to learn about. Because that's the first thing she asked. "Mommy, what is this about?"*
- *[Let's Talk About It] Then I really liked... We talked about the Let's Talk About It part because it literally tells you what to talk about like before, during and after the episode. So I really like that one.*
- *[General] I thought that they was nice, like it was nice and helpful. But I feel like there could have been more things, like it could have had experiments or projects.*
- *[General] It was impressive but it was like, I feel like there could be more there. There was a lot of things that were really promising about it, but I just feel like there could be more to make it more beneficial so that parents would utilize it more. Like doing, like for if it had projects or things that you can try or even pop up fun things that you can try or... I just feel like it could get more if it offered a little bit more.*
- *[General] It was almost like little homework exercise. I just didn't feel like it was just oh something playful and entertaining. And very interesting. I found she was very interested in the app.*
- *[General] I think the really good thing about the app is the pictures, the animation, and then it connects to the factual information. I feel I don't need to go to a second source to*

verify information. Or maybe, what I'm trying to say is, it doesn't look like it's pretend. It's real but it comes with animation and cartoons and the vivid colors that attract kids.

- [General] He liked the whole exploration piece, like Dive In and also the learning about the different animal sections. So that was good because it was very informative and told you information about it.

We also asked the parents if they experienced any **challenges with the technology** or the study. Some parents noted that they had **difficulties syncing the app to the episodes**. They said:

- *I actually couldn't even get the Sync function to work. It would tell me to check my internet connection. I don't know what the disconnect was there.*
- *What I didn't like about it, like why I think my kids couldn't do it is you can't sync until the theme song is over, which kids don't know what a theme song is, do you know what I mean...so if it could sync with the theme song playing, I think that would help because I think kids would get frustrated having like a message pop up that they don't understand. I don't think they can navigate it by themselves.*
- *Whenever I went to another page, the episode would still be playing, right at the top. But when I would go back, to try to go back to the home page of the episodes, I'd have to re-sync. And then, whenever I paused the show, which I did quite a bit, to talk to him, he wasn't paying attention to the show, and too much was going on, and we would lose a whole bunch, I had to go back. The app just kept going, as if we were still watching the show.*
- *Yeah, we watched both but we weren't able to sync the episode to the app. You know how it has the button to link it? We weren't able to do that and we've tried it probably 10 or 15 times and it wouldn't let me sync.*
- *But I think maybe also I was trying to sync when they're playing their little intro, and so it doesn't pick up when you're trying to sync if you're not into the episode yet.*
- *But once she sent the episode and I knew, don't try to sync it while the intro's playing. Just that I wasn't clear on how to sync it before your email.*
- *I tried to sync it many times, but it's not happening. The sync feature is not working. Every time it shows me that your internet connection is not there. So I left it.*

Other parents mentioned that they **expected that the app would be more interactive for their children**. They said:

- *I was thinking about this because my daughter, she also loves ABC mouse, and ABC mouse also... what they find easy, kind of make it more user friendly, is like a matching section where they pull and drag.*

- *Now I was kind of disappointed. I thought it was going to be more interactive. I think she needs to have stimulation more than just us reading through information regarding the fish or because it's a story. She wants to play.*

Other areas where parents **experienced challenges** included the **clips section and activities**. They said:

- *[Regarding the clips] every time I try to click the Play button, it didn't do anything. So I don't know if it was an iPad issue on my side or if it was the app.*
- *[Regarding activities section] it was within the act of, anytime there was something where I have to slide up on the screen it wouldn't let me move up to continue to see what was underneath it. So I'm sure there were some of the activities or some of the things I missed.*
- *I could not get the volume to make sound on my phone, at all. I didn't try it on the iPad yet. There was no sound and I looked into why it was doing that. You could do captioning though, but it's just hard because he doesn't read yet.*

## Parent Attitudes toward Children's Technology Use

Before and after using the *Splash!* app, we asked parents to rate their agreement on a scale of 1 (strongly disagree) to 4 (strongly agree) with a series of statements expressing attitudes towards media and technology. Before and after using the app, all parents agreed that they were comfortable learning new technology, that technology helps young children learn skills they will need in the future, and that technology should be a part of young children's learning. These attitudes were very positive from the start and did not change over time. Parents who self-selected into the study knew during recruitment that their family would be using technology in the study and were likely already comfortable with technology to begin with.

For several of the attitude items, we did observe a positive and significant change over time after using the *Splash!* app. After using the *Splash!* app, parents were significantly **more likely** to agree that technology was helpful for teaching science skills to young children and that technology provided young children with information that they might not get at home or at school.

After using the *Splash!* app, parents were also significantly **less likely** to agree that young children spend too much time with technology and that technology distracts young children from learning.



**Table 9:**  
**Attitudes toward Media and Technology Use, Before and After Using the App**

	Pre-Test Average (sd)	Post-Test Average (sd)	Statistically Different?
I am comfortable learning how to use new technology.	3.87 (.344)	3.87 (.344)	n/a <sup>3</sup>
Using technology helps young children learn skills they will need in the future.	3.52 (.511)	3.65 (.573)	t <sub>(22)</sub> = -1.000, p = .199
Technology should be part of young children's learning.	3.48 (.511)	3.48 (.593)	t <sub>(22)</sub> = .000, p = 1.000
Technology is helpful for teaching science skills to young children.	3.43 (.662)	3.65 (.573)	t <sub>(22)</sub> = -2.011, p = .029
Technology provides young children with information that they might not get at home or school.	3.17 (.717)	3.57 (.507)	t <sub>(22)</sub> = -2.598, p = .008
Young children spend too much time with technology.	2.96 (.767)	2.52 (.994)	t <sub>(22)</sub> = 2.011, p = .024
Technology distracts young children from learning.	2.22 (.736)	1.91 (.733)	t <sub>(22)</sub> = 1.908, p = .035

Almost all of the parents said that the *Splash!* app helped them engage in conversations about science with their children. Many parents noted that the app was a **good conversation starter**:

- *It gave you more or less ways to ask questions, to get a conversation started. You know, a conversation starter. If you didn't know, then you get this issue of what you can learn as well. So it helped in many ways with parents not knowing, or technical terms.*
- *It was very, very helpful to just orient, to start the conversation about it.*
- *And so making her think, "Oh, okay, I learned it from this episode or I learned it from this movie or the aquarium," helped create prompts for us.*

<sup>3</sup> The correlation and t cannot be computed because the standard error of the difference is 0.

Other parents reported that the app gave them **inspiration for additional activities** and **extended their child’s learning**:

- *It just got us thinking more about science that we could explore and learn about the ocean and different terms and definitions and things like that.*
- *He was asking me about the animals, like more different things and what they do. So it was more exploration on that level because even though the other ones are kid friendly, the fishes and all that you saw, this was a little more in depth. So he was able to engage more, to inquire more about other living creatures.*
- *Definitely helps me to think about opportunities, because we would have during the hike, we would have read the signs, but it made more sense to link it back to something that he has more access to at home. It definitely helps. And it made me aware too, because I think of science in one way and not realizing that science is actually so much more. It's literally everywhere.*
- *And then I love the activities. Like I said, we didn't do the sort trash, but I plan on doing it. I think that's a good way to visually see it. I think that visually doing stuff like that's pretty big.*

## Parent Attitudes toward Science

Before and after using the *Splash!* app, we asked parents about their level of agreement on a scale of 1 (strongly disagree) to 4 (strongly agree) with a series of statements related to their attitudes about science exploration with their children.

At pre-test and post-test, parents reported that they liked doing science with their children, they believed that young children generally like science and are interested in it, and that they need support to help their children learn science. Parents were less likely to agree that they were “science people” or that science was too difficult for young children to understand. **We did not observe any notable changes over time.**

**Table 10:**  
**Attitudes toward Science, Before and After Using the App**

	Pre-Test Average (sd)	Post-Test Average (sd)	Statistically Different?
I like doing science with my child.	3.82 (.395)	3.77 (.429)	$t_{(21)} = 1.000, p = .165$

	Pre-Test Average (sd)	Post-Test Average (sd)	Statistically Different?
Young children generally like science and are interested in it.	3.43 (.590)	3.35 (.714)	$t_{(22)} = .492, p = .314$
I need support to help my child learn science.	3.09 (.684)	3.09 (.811)	$t_{(21)} = 0.000, p = 1.000$
I am a "science person."	2.96 (.928)	3.09 (.848)	$t_{(22)} = -.901, p = .189$
Science is too difficult for young children to understand.	1.32 (.568)	1.50 (.598)	$t_{(21)} = -1.283, p = .107$

Despite the lack of statistically significant findings, many parents indicated that their **thoughts or ideas have changed about engaging in science talk or doing science activities with their child/family** after using the app. They reported:

- *If anything, I think I'm more excited to do them. She's already that kid that's out in the dirt, making puddles, playing with worms. So you know, if I can have a tool like this then I can help whenever we can go back to the aquarium. I can go, "Oh, remember that I episode? This is that fish, or this is that octopus or whatever it is."*
- *I want to do more activities with her.*
- *So now because we started the app during academic time, we actually use the app and we learned about one topic each science day. I do science every other day. So every other day she's learning something new thanks to this app because I didn't have any lesson plans for science.*
- *I think it added, it reminded me that I can use other terms in science and other aspects of science to be able to connect to everything. It allowed me to use what was around me or reminded me that I don't have to have specific tools or special things to make a science lesson out of.*
- *Math is taught regularly. English is taught regularly. And I feel kids in school don't get regular science input. Sciences in public schools are four months out of the year. They have five months of social studies and then two months history.... I feel like this stuff is so necessary. It's so important because we don't have the resources to give that to the kids in public school.*
- *I think it made it more accessible. It's not so difficult. It's easy little things that I would never think of.*

- *I don't think particularly about the ocean, but it has piqued our interest in other science projects.*

A couple of parents reported their **thoughts or ideas did not change after using the app**, since they believed that they already incorporated science activities and discussion in their lives. They said:

- *I still feel very strongly that that's something that needs to be done.*
- *I've always been interested in that and I've always participated in helping her with her homework and trying to even understand things myself.*

Most parents said that they felt the app **helped support them helping their children learn science**. They reported:

- *I think it's extremely helpful. So as long as the parents are engaged and want to do that, then I think that's definitely there for them to help drive home the episode lesson. But if the parent can actually drive that information home with the kid. I think that's definitely cool to have.*
- *There is no made-up information. All information is factual, which is really awesome as a parent.*
- *I think it helps them support in finding it as there's so many lessons that can be learned from the app. I enjoyed it using overall.*
- *I like that this is definitely a tool that you can do. It doesn't cost you anything. It's an app, and it's easy to use with it, to get more out of the shows. So, it's definitely a good tool.*
- *I think it does support it. For early learning is to be able to associate the different shows because even just using the show that you all had, looking at other shows where they have animals it's other things that we can pick up from the definitions that you all gave. So I think it was very helpful.*
- *I think it definitely supports you. I mean it all depends on the parent too. But I think there's some definitely good talking points. Some parents might have to look up additional stuff. There might not be enough, but I think it's a good starting point. Definitely more educational than some of the other apps that she would want to play with.*

Some parents were less positive about the app. It was **unclear if they realized that this was an app for parents** and not one to be used solely by their child. They reported:

- *I feel like it's a useful tool, but I feel like there could be more things done to it to make it more innovative and more family-friendly. I feel like the way that the app is now is for older kids and not necessarily the way it is now is for toddlers because I feel like it needs to be more exciting when you're relaying things to children to keep them interested. And I feel like it didn't have as much excitement into it that it could of to keep the kids interested. So I feel like if it was an older kid, they'd be more interested, they'd be more focused. But for younger kids I feel like you have to have bells and whistles on it to make it fun and exciting.*
- *I think it supports to an extent. I think that it was giving the information for a parent to discuss things with their child, but that's only half of the equation. The other half is the child being of interest in it and it kind of fell short for her. Did it give me the tools that I would need to be able to talk to her about fish and about the sea? Absolutely. But do I think that she was interested enough to learn about it? No. And that was just simply because it wasn't playful enough for her.*

We asked parents if there was one episode that helped their child learn about science the most. A few different themes emerged from the data we collected. We found that many children seemed to learn the most from or enjoy episodes that were **relatable to their own lives**. For example, parents reported:

- *So, the one she really, I think, was engaging with was the one where the fish had the infection on her face. I think it's just because in life she's having an infection, whether it be an ear infection or strep, and it was just something like, "Oh, okay. It's bad for you, you get medicine for it."*
- *Maybe the invasive species one, with the orange sea stars...Yes. I like the invasive species one because we have a lot of English ivy in the backyard here. And I cannot stand it and it is an invasive species. So, we got to talk about that too.*
- *And then we also watched the one where the seahorse character was looking for a special quiet place, which is the ongoing thing in our household right now. And I know he liked that, because we're all right on top of each other, and we all need a quiet place.*
- *There was one about litter, you know in the ocean. And I think that helped a lot because you know there were times when we were talking about that we were walking on Lake Michigan and you know you see litter. And I talked about how it goes into the water and what happens and that was a really good episode and relatable.*

Other parents noted that their children seemed more engaged when they watched episodes about **topics they already had interest in or had seen in school**. For example:

- *Whatever he was watching, he had liked it and it was in line with things that he always likes to do, because he's done the STEM program and all that in school.*
- *I think it was the one with the two fish, they [were] the same, but they were different colors. She really enjoyed that one. She was just looking at the differences and how there's so many different fish. That's another one. And she knows a little bit about. She likes sharks. She likes different, she would say, different videos about the ocean.*
- *I feel like one that kind of stuck out to her was recycle one. I think that one probably got her brain thinking of like, how does that... how could you do that? That one seemed to pique her interest a little bit.*
- *Well, the one that he liked the most was the one where, I think it's called a Parrotfish. It's the fish that eats the algae and the coral and poops out. Which is horrible, but that's what little boys like.*

Some other specific episodes that were mentioned included *Season 2: Episode 1, Artificial Reefs, Camouflage, House Hunt, Hide and Seek*, and the interstitial episodes. However, a few parents noted that the episodes **did not seem to hold their child's interest or were too advanced for their child**. They commented:

- *I attempted with two [episodes] And when I realized it wasn't engaging her, I wasn't going to keep trying to push the issue. I think we tried two separate days.*
- *So, for my four-year-old ... My daughter's really too young.*
- *The story was too fast, while also simultaneously being boring. And it just didn't hold his attention at all. And honestly, it didn't hold my attention, either. It was just, everything was happening quickly, too quickly to get any of the science concepts across. And I was using the app while I was doing it.*

We also asked parents if there were any specific things that their child really enjoyed learning about. A popular topic that parents reported the children enjoyed learning about were the **specific sea creatures and their capabilities**. Parents commented:

- *[The episode where] fish can change colors and they can camouflage. That was interesting to her. She's like, "Oh, they don't have to look the same all the time. It's like they have a new outfit."*
- *I think it was migration [episode]. She liked that one because I think it was because they compared it to humans. So, she kind of got a kick out of that.*
- *It was the shrimp episode, where the cleaner lost her shell. Yeah, so he really liked that one. He didn't understand it until it was really... Like she came out, and told how she got bigger, and shed the shell, and other fish ate it.*

- *I know that she liked the baby sea urchin and learning about the dolphins.*
- *She just told me her favorite character was Bubbles. She said, "The pink fish," Bubbles. She said it was her favorite fish and she liked learning about the fish, the sea animals. She loved learning about the aspects of it.*
- *And the jellyfish, I remember him saying, because we were talking about twins recently, they're identical when they're from the same pod or something like that. And that we thought that was so cool, that they're exactly the same, that you can't tell them apart. He said that they had that many siblings, he thought that was crazy.*

In addition, some parents mentioned various topics related to **oceanic environment or terrain** as areas their children most enjoyed learning about. They said:

- *The currents one was interesting. That's a big thing down here in Florida with current. So they liked that one and it was kind of important one to teach because it can... it happened to my sister, it happened so quick.*
- *The reefs, they thought that was very cool.*
- *It was talking about the reef. I think he connected that to other cartoons he has seen like Nemo, especially them talking about, yeah, the coral reef.*

Some of the parents commented that it was the **characters or the visual appeal** that captured the attention of their children. They noted:

- *He liked some of the characters. He liked Bubbles and the stingray.*
- *He was probably real fascinated with the different colors and the things that they were doing, too.*

## Evaluations of the *Splash!* App

Finally, we asked parents and children to evaluate their experiences with the app. Overall, **the feedback from the children was positive**. Some of the children reported:

- *I like it. I liked the rainbow fish because they're cool. I like watching it because it's funny.*
- *Liked it. I liked that fish, the seahorse. It was fun.*
- *It's cool. The games. The movies.*
- *It was kind of fun.*

Some of the children reported that they watched the video clips, liked the songs, or accessed the letters and numbers activities. **Most of the children said that they would watch or use the *Splash!* app again.**

Almost all parents indicated they **expect to continue using the app**. They reported:

- *Yes, he enjoys it, and he asked to listen, and review, and watch the episodes, and the app. So something that sparks an interest, that's scientific, or as a learning experience, or enables him to learn, I'm always for if it's educational. So yes, we'll continue to use it.*
- *I'm going to do more of the activities with her. I think she loved the activity section more than anything because it is combining that technology and experimenting and being outside. So yes, we definitely will continue using it.*
- *I like the awareness that it's creating, I love that. So I'm going to continue to use it. In fact, my older kids use it as well.*
- *We will continue to use this app because it's very useful and come from a reputable brand.*
- *I still wanted to explore them and watch them.*

We also asked parents if their children would continue to watch the episodes of *Splash and Bubbles*. Most parents said that their children **would continue to watch** the episodes. They reported:

- *So now that our whole world is kind of upside down, I think I'd be more willing to be like, "Oh, okay, you can watch another show, but it has to be *Splash and Bubbles*."*
- *She likes watching the fishies and she doesn't know that she's learning, but she's learning. So it's one of those things that gives you entertainment and you're learning at the same time. So it's a win-win for parents.*
- *She told me she wants to still be watching it.*
- *I think now that she knows it's out there she'd be willing to do it. And the one year old thought it was, you know, it's very colorful and I think that she'd want to sit on the couch next to her too.*

A few parents did not think their children would continue watching because they don't watch videos at home or their children are not old enough to watch on their own and comprehend it. They said:

- *Probably not, just because we don't watch videos or feel a need to be watching extra videos.*



- *Not independently. I think I had to encourage him to watch it because it's educational and he needs guidance to help understand what they're talking about.*
- *This is way too advanced for her. This is way more advanced than what I've seen them do at school. I don't think she could handle it just because of her attention span.*

## **Pandemic-related Feedback**

Finally, since families were participating in the study during the pandemic, we wanted to get a sense of what their family-life was like during this unprecedented time. We asked parents how they were coping with managing schoolwork and being at home themselves. Not surprisingly, a majority of parents reported that **it has been challenging**. They reported:

- *It's hard. Mom guilt is strong. And it's really hard because it's actually my job's fiscal quarter end. So I'm an accountant, so I'm trying to get really trying to get stuff done. So I ended up just going like, "Here, teach my kid. Give me an hour."*
- *Very challenging. Very challenging. You know the school had, they made a lot of changes, you know with the curriculum for us for home. It's just, it's challenging from week to week. I got to say it's stressful.*
- *I'm losing my mind. My sanity has gone out the door.*
- *I just have like 13 hour days, I'm not going to lie. Because I've been scheduling some of his teacher meetings and check-ins, because really, at his age, it's me [who needs to organize everything].*
- *It's difficult. I don't know if managing is the right word. Maybe supervising? Managing suggests there's a higher level of success, or something, going on.*

We also asked them if participating in the study during the pandemic was easy or difficult. Almost all of the parents said it was **easy to participate in the remote study**. They said:

- *I feel like it was easier because we have more free time available. So I don't think it was really difficult at all. I mean regular life when we're in the hustle and bustle and driving because when there's no pandemic, we have to drive to all these extracurricular activities after school. So that is always a tight schedule.*
- *It helped me a lot actually. It gave her something different to do.*
- *I found it easier because we have more downtime.*
- *I'm going to say it's been easy or it is pretty easy to do it because we've got a lot of time on our hands.*
- *I thought it was easy. It gave me something that I could focus on through this time. So it was nice having like that specific app.*

- *It's easy because we're home and it was something new, which is great because we're looking for new stuff.*
- *It was good timing because we're cooped up with nothing to do.*
- *It was easy. I think it probably would have been just as easy had it not been on the pandemic. We would have maybe had to spend like one weekend day messing around on it and not that she got to do it over a few days.*

Understandably, a few parents thought the **study was difficult** during the pandemic. They reported:

- *I'm still working full time from home. So, it was hard to remember... I think I try to get at least like a half an hour of schooling in with him every day, because I feel like that's all I can do.*
- *Timing was the key. It was very difficult to dive in and I'm normally the hands-on person. I would've been involved all the way through, but with the time that I had to commit to my work and trying to help my other children with schoolwork, it was very different than what my normal life would have been, where I'm actually like at peace, where I'm not stressed about trying to do different things because it was too much. It's a lot going on. So it wasn't even about the study being too much, it's just that it's a lot that we all have to adjust to around the time that the study came up.*
- *Like I can say, it seems to be far more difficult, not too much. It's somewhat difficult because of the lack of materials, and some activities which are only available in schools. But I need to purchase them to demonstrate for my child.*

Parents were then asked if apps like this were helpful during times like these. **Almost all parents agreed apps like this were helpful.** They said:

- *Yeah, definitely. I think more of technology available the better, especially right now because people back in the olden days, people would just have to read a book and sit down. But now you have this technology where you can get involved with what your kids are watching and before, you could talk to them about things.*
- *[It was] very helpful. Well it gives the kids something else to look forward to, something to try.*
- *It's helpful in times like this. I think it gives parents some assistance in what to do because some parents could be lost, and would just let them watch TV all day, instead of having something educational to do.*
- *I can even see private schools and public schools posting the app as a suggestion.*

- *I can totally see this being incorporated. Especially if we start virtual learning like they're talking about for next year too. It would be a great thing to incorporate.*
- *I think they're definitely helpful. Well, I learned quite a bit myself and just about the ocean and different science activities and I don't know, I just had fun doing this with her.*
- *I think it's helpful to sense it gave us something new to do, definitely. I mean during this time or anytime, just in general, it's so expensive to keep buying movies and books and stuff. So I'm always looking for something that is something new that we don't have to pay tons of money for.*
- *I think so because it was a great learning experience. It was nice. I enjoyed watching it with her as well.*
- *I think it is helpful. Well, with being at this time with the pandemic it's helpful because it's giving you something extra that you can do and bring in so that you can use them.*
- *100% helpful. Minus the visit the aquarium and zoos because you can't do that.*
- *It's educational and he's not going to school, so it's supplementing that science instruction.*
- *[I'm all for] Anything where they're not watching something on YouTube that you have no idea if it has any educational value. I'm all for trying to sneak it in through cartoons.*

## Study Limitations

This evaluation study was designed to provide qualitative data about the usability and potential effectiveness of an app for a national sample of families. But, because the sample was small and not randomly selected from the population at large, there are limitations to the generalizations we can make to the population of families with young children across the country. In addition, it is possible (and probable) that the families who were interested in the study to begin with were likely more motivated to help their children learn about ocean science at home using technology. Parents who were less motivated likely self-selected out during the recruitment process. Given that the sample self-selected into the study, it was not surprising that the parents in the study reported high levels of science interest and exploration and favorable attitudes towards technology use by children before the study began. Thus, it would be informative to repeat the study with a sample of families that is less motivated, less interested, or has less positive attitudes about exploring science with their children to see if the results are similar.



## Summary

Below is a high-level summary of the findings and recommendations or lessons learned, where applicable:

### Usability of *Splash!* App

- All of the parents were able to download and begin using the app without support. Thus, the initial “out-of-the-box” experience was highly usable and successful.
- Only roughly half of parents were able to use the *Sync* feature without support. Eleven of 23 parents reported that it was clear how to use the *Sync* feature on their own, with most of the others indicating that it was clear to them only after receiving the follow-up email from CEG. ***Since the Sync feature is so new and unique, it may be more helpful to explain the feature with a tutorial or other instructions for parents.***<sup>4</sup>
- Almost all the parents (19 out of 23) indicated that they used the *Let’s Talk About It* prompts at least once during the study, with parents reporting that the prompts took the app “to the next level” and helped their children “think deeper.” Almost all of the parents reported that they found the *Let’s Talk About It* prompts to be informative, providing interaction opportunities, and helping them to engage their children with even more information than they expected to find.
- Almost all of the parents reported they accessed other areas of the app beyond the prompts. Sixty percent accessed the video clips while slightly more than half (52%) accessed the activities. Other areas parents reported using were *Dive In*, *Photos*, *Ocean Guide*, and *Favorites*. Parents reported that these areas were engaging, fun, and educational. ***The only suggestions from parents were the desire for longer videos clips, more games, and more animations.***
- While most parents reported that the app was user-friendly or easy-to-use, some did report specific problems using different features at one time or another. The most

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<sup>4</sup> Since these data were first reported to the client, the information about using the *Sync* feature has been enhanced to hopefully add clarity about its purpose and how to enable it.

common technology problem was the inability to sync with the episodes. ***This appeared to be problems related to WIFI or Internet connectivity and parents trying to Sync the app while the theme music was playing (it does not sync until the actual episode begins). Our suggestion would be to let parents know that the Sync feature will not work until the theme music stops playing.***

## **Parent Attitudes toward Children’s Technology Use**

- Before and after using the app, all parents agreed that they were comfortable learning new technology, that technology helps young children learn skills they will need in the future, and that technology should be a part of young children’s learning. These attitudes were very positive from the start and did not change over time.
- After using the *Splash!* app, parents were significantly more like to agree that technology was helpful for teaching science skills to young children and that technology provided young children with information that they might not get at home or at school.
- After using the *Splash!* app, parents were significantly less likely to agree that young children spend too much time with technology and that technology distracts young children from learning.
- Almost all of the parents said that the *Splash!* app helped them engage in conversations about science with their children. Many parents noted that the app was a good conversation starter and that the app gave them inspiration for additional activities and extended their child’s learning.

## **Parent Attitudes toward Science**

- At pre-test and post-test, parents reported that they liked doing science with their children, they believed that young children generally like science and are interested in it, and that they need support to help their children learn science. Parents were less likely to agree that they were “science people” or that science was too difficult for young children to understand. We did not observe any notable changes over time.
- Many parents indicated that their thoughts or ideas have changed about engaging in science talk or doing science activities with their child/family after using the *Splash!* app

and most parents said that they felt the app helped support them in helping their children learn science.

- Some parents reported their thoughts or ideas did not change after using the app, since they believed that they already incorporated science activities and discussion in their lives.
- A few parents were less positive about the app and it was unclear if they realized that this was an app for parents and not one to be used solely by their child. ***Given the proportion of parents who reported that they use technology to “keep their children occupied” while they do something else, we suggest highlighting the fact that this app is for parents so families’ expectations are set from the start.***
- Parents’ often noted the level of engagement that the *Splash!* app was able to achieve with their children. Many children seemed to enjoy episodes that were relatable to their own lives. Other parents noted that their children seemed more engaged when they watched episodes about topics they already had an interest in or had learned about in school. Some of the parents commented that it was the characters or the visual appeal that captured the attention of their children.

## Evaluations of the *Splash!* App

- Most of the children said that they would watch or use the *Splash!* app again.
- Almost all parents indicated they expect to continue using the *Splash!* app.
- Most parents said that their children would continue to watch the *Splash and Bubbles* episodes.

## Pandemic-related Feedback

- While most parents reported that life during a pandemic was challenging, almost all of the parents said it was easy to participate in the remote study.
- Almost all parents agreed that apps like the *Splash!* app were helpful during the pandemic, giving their children something new to try and to look forward to. Parents

appreciated that their children were able to use the app as an educational distraction from and supplement to virtual schooling during the pandemic.