

Engaging Families in STEM through Digital Media

October, 2018

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Are You...

A Teacher?


A Researcher?

A Center Director?

Other?

Your Background

Some Questions to Get us Started:



What are some successes and challenges that you've had or seen in the past trying to use digital resources to help young children learn?

What questions do you have about using digital resources with families?

Agenda/Overview


- What do we know about how parents think about supporting their young children's learning?
- Why go digital?
- Research on high-quality media
- Mediation for effective use of media and tech to promote learning at home
- Try things out
- Examples and outcomes from our research
- Sharing
- Q & A



What Parents Talk About When They Talk About Learning

Findings From a National Survey About Young Children and Science

July, 2018



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Introduction

Parental Involvement in Early Science

- Early science experiences can provide a foundation for a variety of skills
- Parents can play an important role in improving their children's literacy and math learning
- Similarly, parent involvement could be vital in improving children's science learning—especially given many early education programs do not address science
- Children from low-income families tend to have less science knowledge at school entry.

Role of Media

- Media are ubiquitous in most families with young children.
- Educational media may help parents support science learning.

This Study

- Purpose: Explore how parents and caregivers view their role in supporting their three- to six-year-old children's learning, particularly science learning.

Research Questions

How do parents and caregivers help their young **children learn in general and learn science in particular?**

- What are parents' attitudes and beliefs about children's early learning?
- How do parents support their children's early learning?

Research Questions

How do parents describe their children's use of **educational media**, particularly science-related media?

- What are parents' attitudes and beliefs about using media to support learning at home?
- What kinds of media activities do parents and children undertake together?



Methods

National Survey

- National telephone survey of 1,442 parents with at least one 3-6-year-old child living at home
- 909 families (63%) had an annual household income of \$50,000 or less

Qualitative Study

- Eight focus groups with a total of 65 families in three locations
- Two home visits with 10 families (selected from focus group participants to ensure variety of comfort with science and use of digital media)
- Science journal between home visits





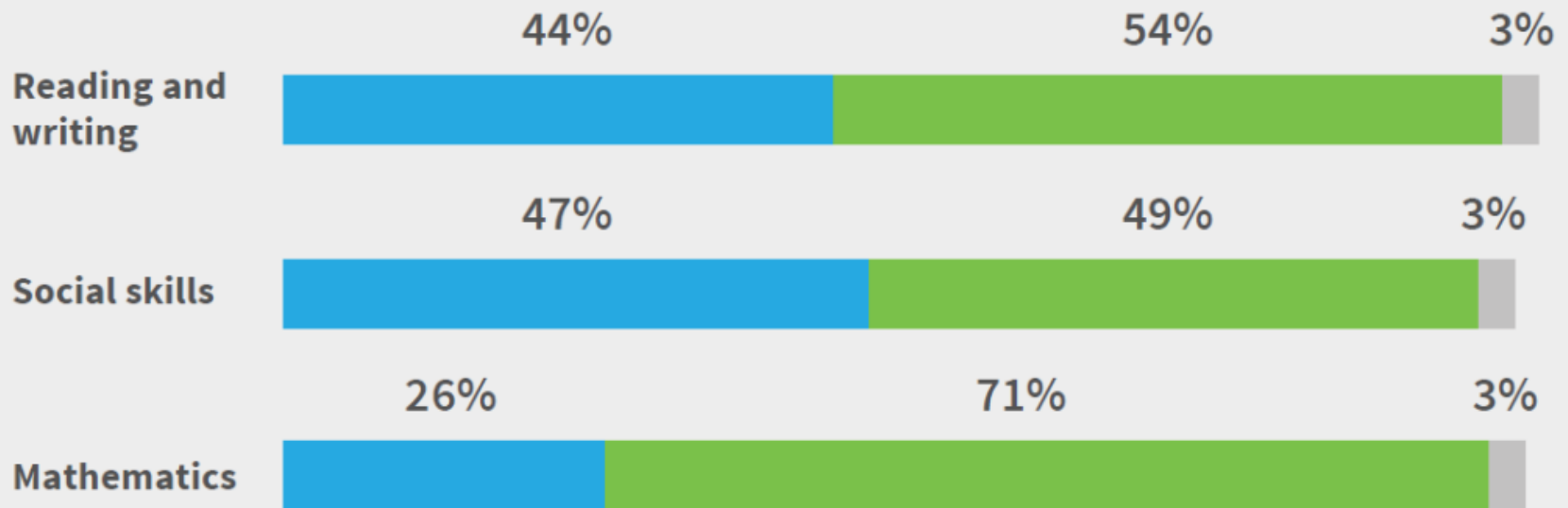
Results

Responsibility for Learning

99% of parents

- **Report that they want to be involved in their children's education**

Parent perceptions of the importance of science



● More important than science ● As important as science ● Less important than science

Parents Say



I think high school is a good time for them to learn science. I think it's overrated, seriously, because my daughter, she's in first grade, and they're teaching her science, and she looks at me like, "What the heck am I supposed to learn with this?" ...I think they should focus on other things more important than science. I know it's going to be more important at one point because it has to do with math and everything, but right now I don't feel that it's necessary in the first grade.



Parents Say



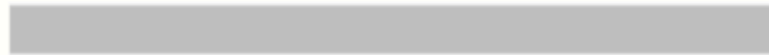
It's important for education. It's important for the kids to know, like you says, where's the food come from? It's important to know how is the water we drink so clean if we know it comes from a reservoir that's full of yucky stuff. It's very important to educate them.



Confidence

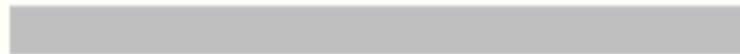
Percentage of Parents Who Feel “Very Confident” in their Ability to Help Their Children Learn Age-Appropriate Skills

75%



Reading and writing skills

73%



Math skills

71%



Behavioral, social, and emotional needs

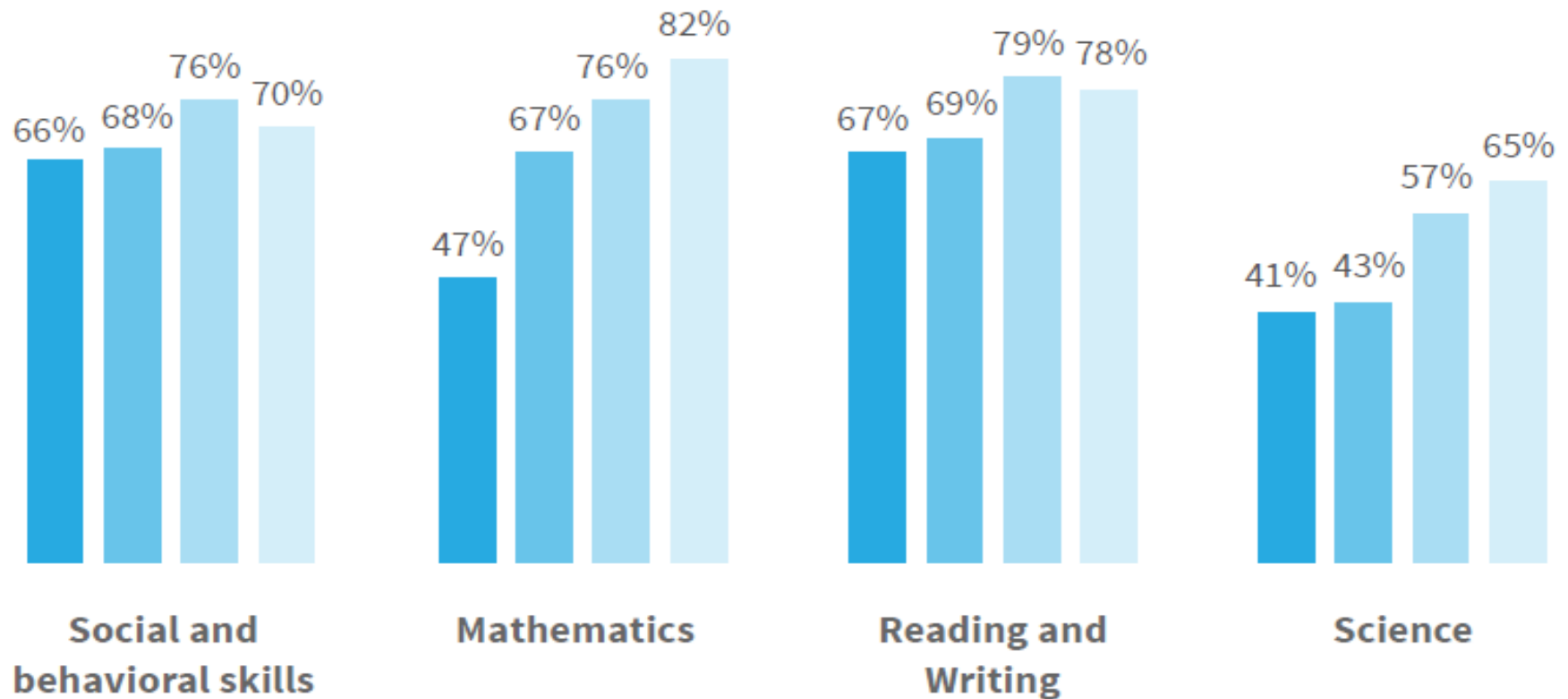
54%



Science skills

Confidence

Percentage of Parents Who Feel “Very Confident” in their Ability to Help Their Children Learn Age-Appropriate Skills, by Parent Education



● Less than High school

● High school grad

● Some college

● College grad+

Confidence

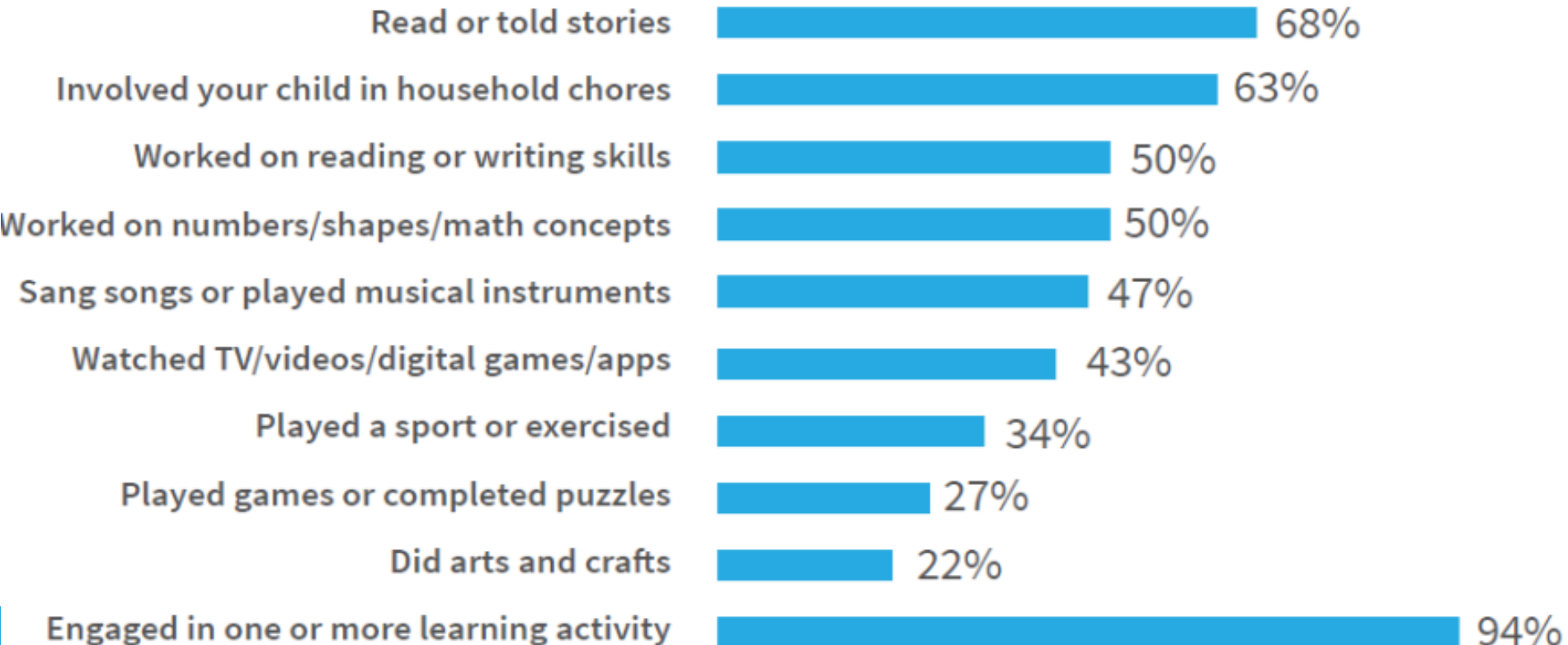
Parents described their confidence about science in terms of their ability to...

- answer spontaneous questions, and
- communicate information appropriately.

Learning Activities

Percentage of Parents Who Report Engaging in Learning Activities With Their Child Daily

General Learning Activities



Science Activities

Percentage of Parents Who Report Engaging in Science-Related Learning Activities With Their Child Daily

Science Learning Activities

Explored science outdoors 36%

Explored science in everyday activities 26%

Watched science-related videos/played digital games 20%

Built something 17%

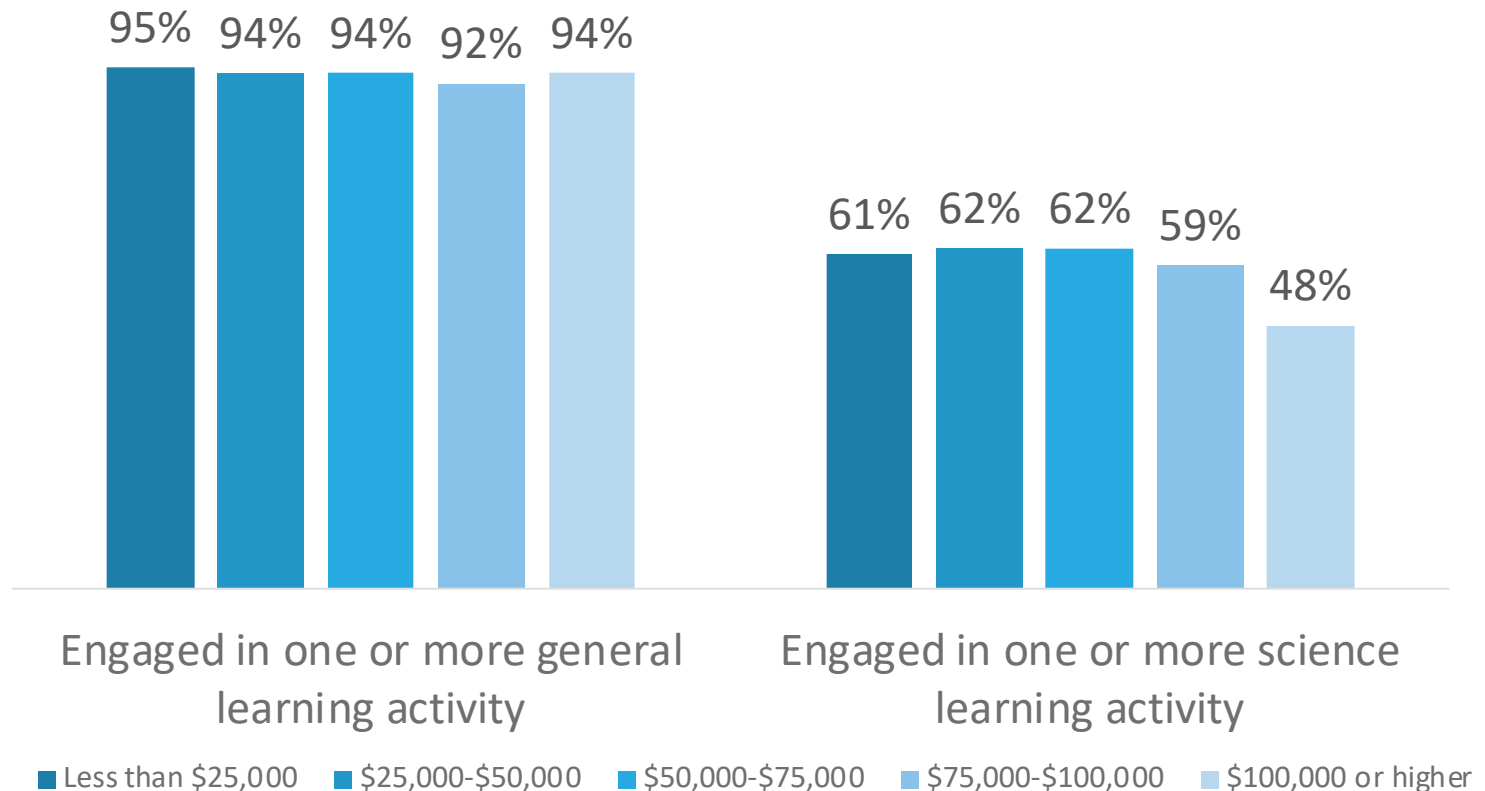
Read about nature in science books or magazines 12%

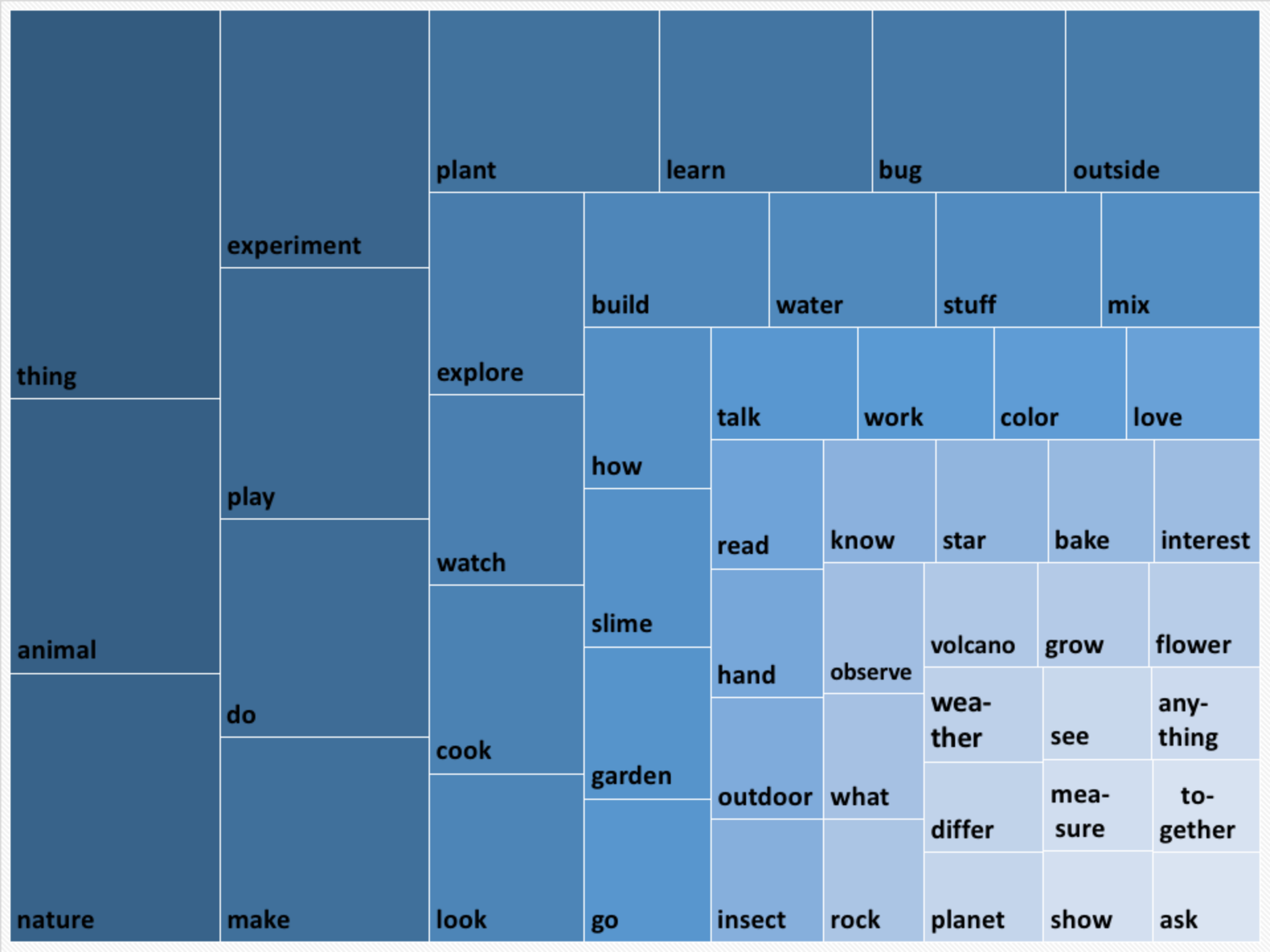
Played with a science-related puzzle or board game 5%

Engaged in one or more science learning activity 58%

Science Activities

Low-income parents reported engaging in science-related activities more frequently than higher-income parents





Parents Say



*I guess, balance, that's science right? [...]
Yeah, balance and motion and, gosh all
this other terminology that I don't
remember from 6th grade.*



Supports

Percentage of Parents Who Reported That a Given Support Would Help “a Lot” in Doing More Science at Home

45%

Better access to technology

52%

Ways to get yourself more interested in science

64%

Ways to get your child more interested in science

64%

Information about what your child should learn about science

71%

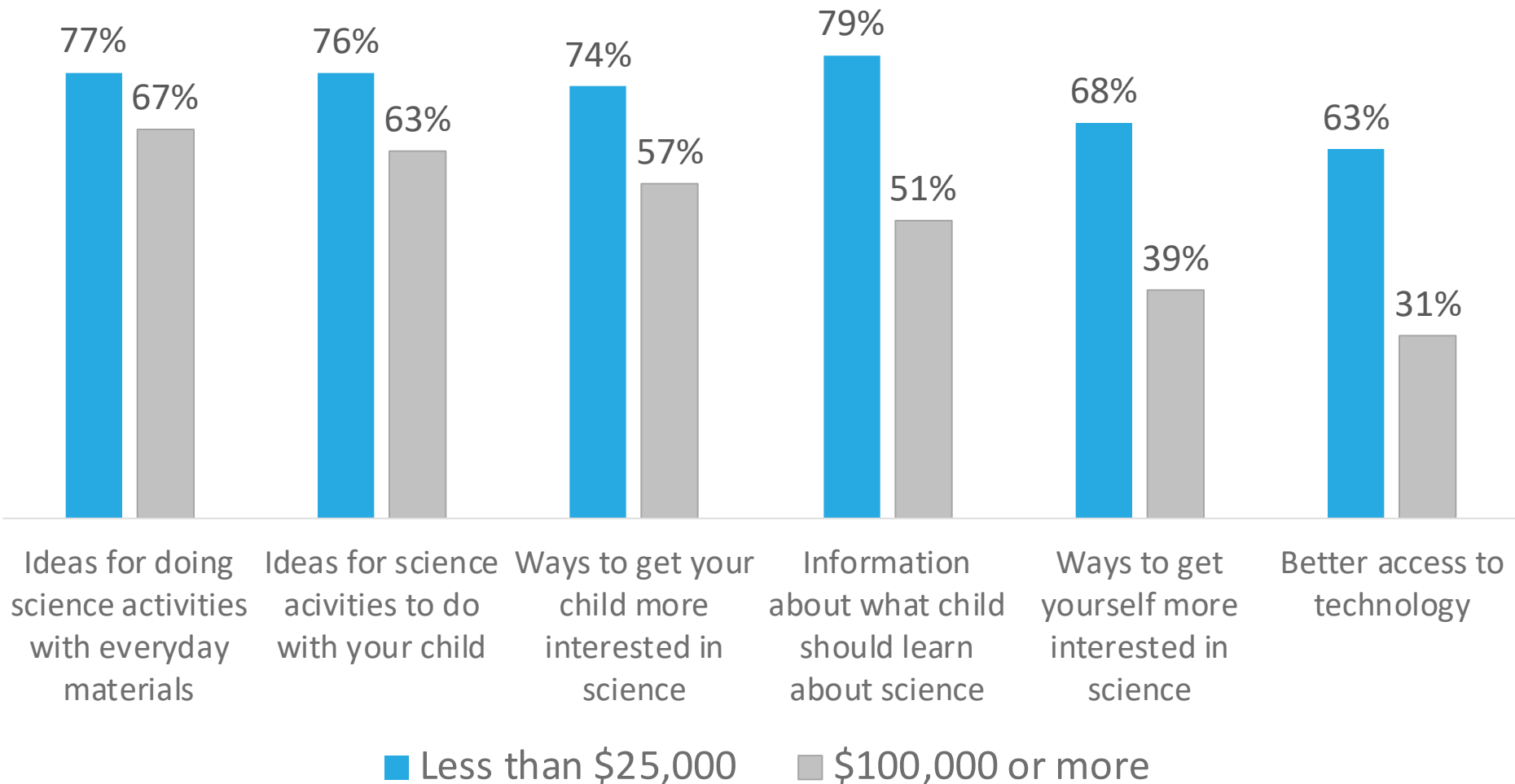
Ideas for doing science activities with everyday materials

71%

Ideas for science activities to do with your child

Supports

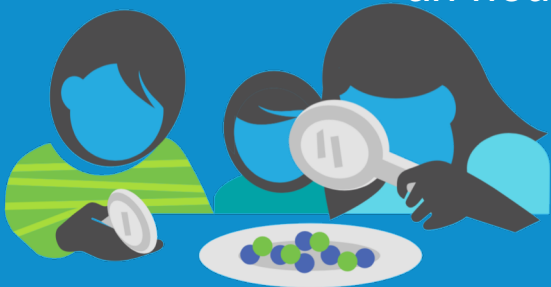
Percentage of Parents Who Reported That a Given Support Would Help “a Lot” in Doing More Science at Home, by Family Income



Parents Say



I think identifying ideas that ... I can do without it being, you know—I don't know if this is going to sound bad—but, like, a really huge thing. Because we're super stressed for time, too. So, I can't go and make her something that's going to take, you know, 20 minutes to set up and 30 minutes to do, and then an hour to clean it off everything...



Parents Say



Whatever I can really scrounge up. If she wants to learn something about animals, or basic animals like hamsters or turtles or fishes, I go to Petco, because I need to get food for the dogs, and she loves looking at animals, fishes, especially we pass by Walmart or anywhere, she'll ask me questions now and then.

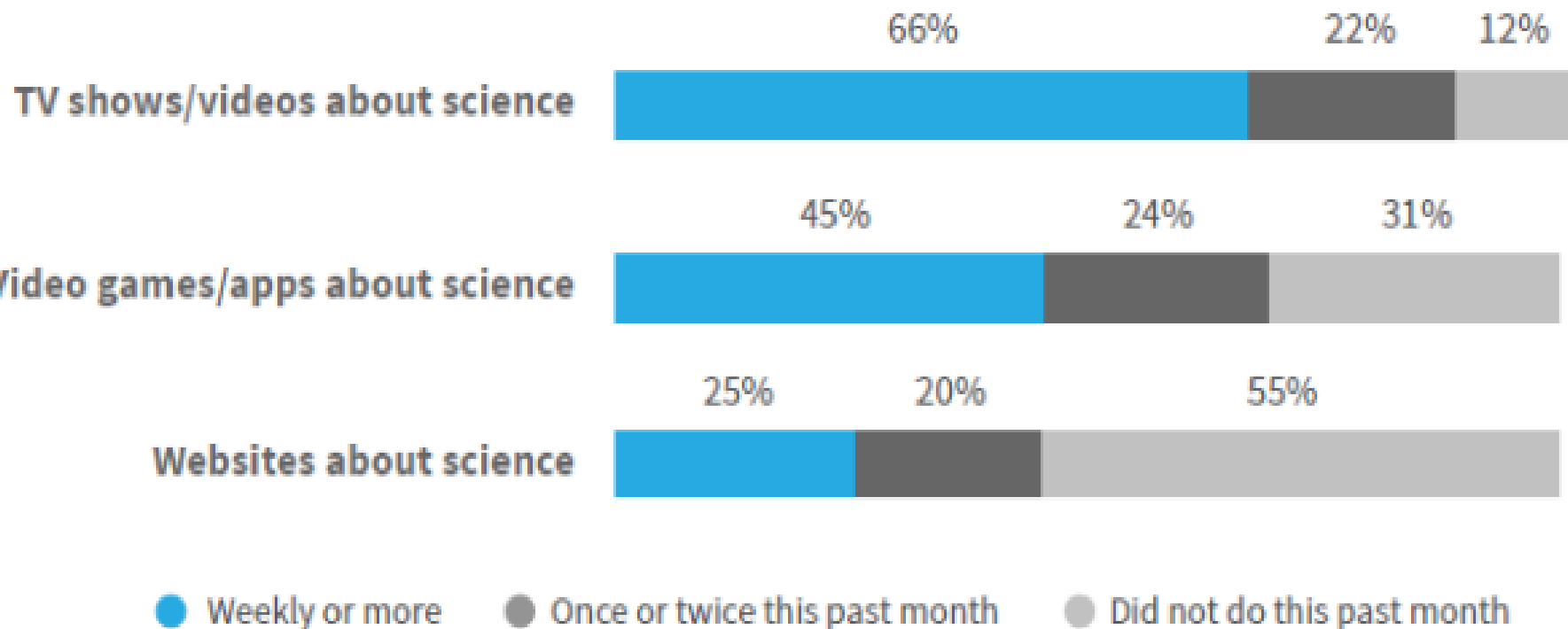


Digital Media Supports

- **94%** of parents reported that their child watched educational TV shows or videos in the past month.
- **84%** of parents reported that their child had played a digital game or app in the past month.

Digital Media Supports

Many children use science media weekly or more



Digital Media Supports

Parents' report of supports they provide while using science media, among parents who used science media in the last month

95%



94%



86%



75%



73%

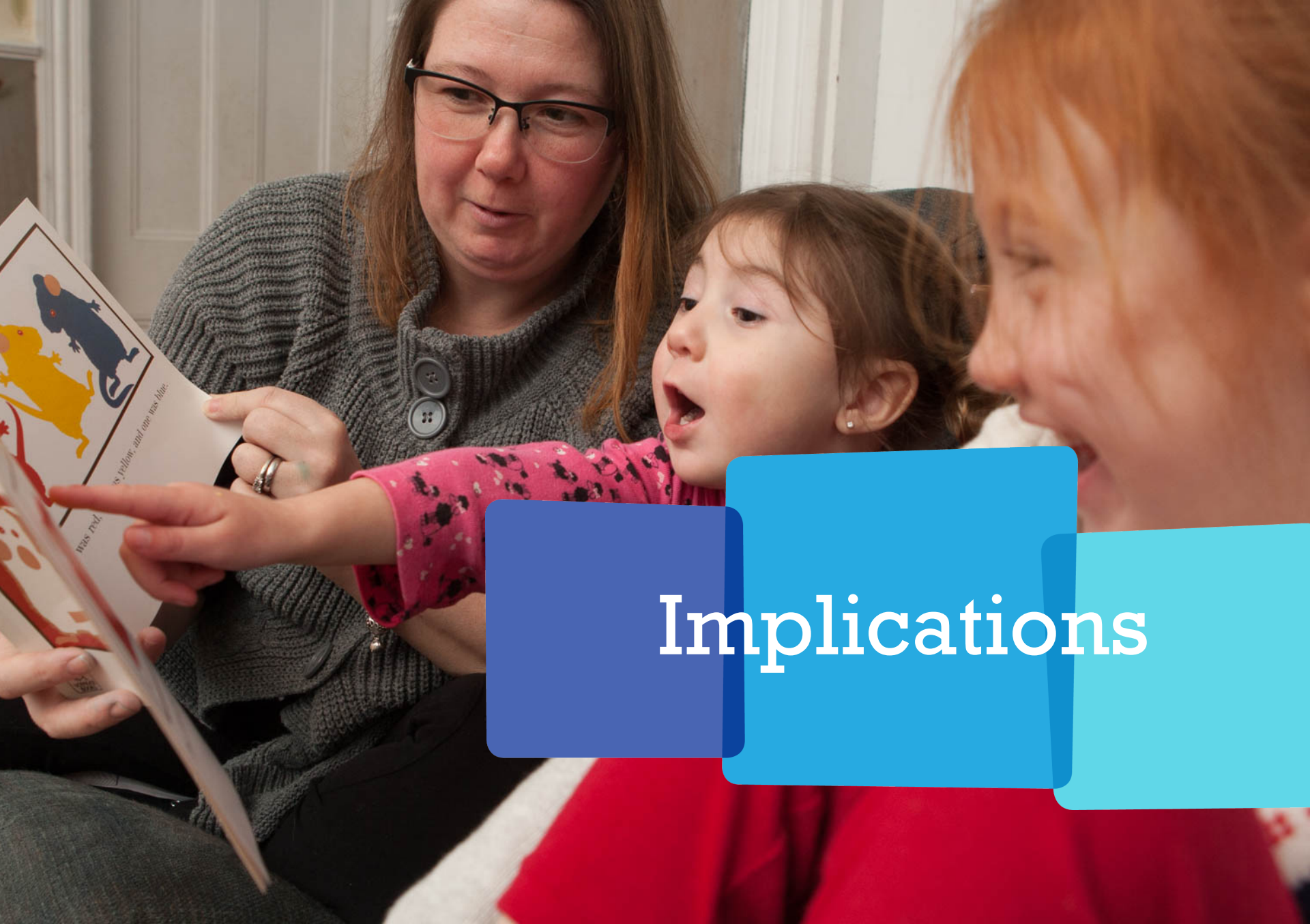


69%



Digital Media Supports

- Parents most frequently use science media to search for answers to specific questions
- View science media as entertainment rather than educational
- Lack of explicit goals for children's use of science media



Implications

How to support parents

- All parents are interested and invested in their children's education.
- Many may not recognize the role they play in science exploration.
- Inspiration, encouragement, ideas, modeling and accessible resources may help.
 - Build on the science in everyday routines.
 - Communicate importance of science for early learning

Guide parents in using media resources

- Young children use educational media & science-related media regularly.
- Media resources have the potential to bring information on a large scale into homes and directly to children
 - Potential for media to engage, provide models and support parents as well
- Parents need help finding these resources and understanding how best to use them with their children to support learning

Full and summary reports available at:

<http://www.edc.org/what-parents-talk-about>



Can media and technology support early learning?

Impacts on learning:

- Engagement with public media in lab, school and home settings can increase learning in literacy, science, and math, and improve other academic-related outcomes (Fisch, 2004; Kearney & Levine, 2015; McCarthy et al., 2012; Pasnik & Llorente, 2013; Pasnik et al., 2015; Penuel et al., 2012)

Using media for learning: your experiences

Question for discussion:

What kinds of media do you look for when thinking about young children and STEM?

What characteristics do you look for?

What kinds of things can children and their families learn from media?

Digital resources can provide powerful models of teaching and learning

High quality digital resources

Show promise as effective supports for early learning

Are designed to be developmentally appropriate and to support critical skills including problem solving, experimentation and collaboration

Enable children and adults to interact with content and phenomena that may be otherwise unobservable

Provide tailored learning opportunities to individuals

Engage parents and support them to better understand the early learning content that is developmentally appropriate for young children

Are accessible

Digital resources can provide powerful models of teaching and learning

Features of media that relate to learning:


- Foster intrinsic **interest, motivation and engagement** (Renninger, 2000)
- **Model behavior**, e.g. ways of thinking, talking, and cooperating, and math content knowledge (Gola, Richards, Lauricella, and Calvert, 2015; Troseth, Saylor, & Archer, 2006)
- Games provide **feedback** to children and invite their active response, and videos can invite **questioning**, which can support engagement and learning (Anderson et al., 2000; Crawley et al., 2002).

A woman with dark hair tied back, wearing a light green polo shirt, is leaning over a white table. She is looking at a tablet computer with a green protective case. The tablet screen shows a simple illustration of a watermelon slice on a light blue background. A young girl with dark hair, wearing a purple long-sleeved shirt with white and pink heart patterns, is also leaning over the table, looking down at the tablet. The background shows a classroom setting with shelves containing books and papers.

Mediation

How families can best use media together: your experiences

Question for discussion:



Can you think of examples of shared media use that helped support learning, in your professional or personal life?

How was using the media enhanced through the shared experience?

What is mediation?

The intentional supports built into and used in combination with digital resources to foster learning, providing a key role for caregivers. For example:

- Selecting and sequencing media and materials with specific learning goals in mind
- Supporting children to interact meaningfully with the materials on their own, with peers, and/or with caregivers
- Guiding learning towards more sophisticated and comprehensive understandings
- Helping children to demonstrate their understanding and connect prior knowledge to digital content

Parents and media

Impacts of media on *parents*

Engage parents in topics they feel are complex, such as science or math

Model, scaffold how to support their children's learning generally and through media

May be especially effective for parents who **lack confidence** (Berkowitz et al., 2015)

Resources


Ready To Learn Website

www.cct.edc.org/rtl/


- Transmedia Math Study
- Materials-Math
- Context Studies
- Media-Rich Literacy Studies
- Materials-Literacy & Science
- Videos
- Publications
- Conferences
- About

Videos


These videos demonstrate classroom use of the Ready To Learn materials by teachers who participated in the 2009 *Media-Rich Literacy Study*. Many of the teachers continued to use and value the materials after our research was concluded.




Nurturing Science Learning in Pre-Readers



Getting Kids Talking About Science



Bringing Literacy to Life Through Science



Video, Computer Games, & Hands-on Activities to Support Literacy

Table 4. Weekly sample schedule of the PBS KIDS Transmedia Math Supplement activities

Monday	Tuesday	Wednesday	Thursday
Video Co-Viewing (25 minutes)	Mathematics Detective Journal (20 minutes)	Mathematics Circle Routine (10 minutes)	Challenge Game Play (25 minutes)
	Easy Game Play (10 minutes)	Guided Reading (15 minutes)	
Computer Center (~10 minutes per pair of children)	Computer Center (~10 minutes per pair of children)	Computer Center (~10 minutes per pair of children)	Computer Center (~10 minutes per pair of children)
	Hands-On Centers (~10 minutes per pair of children)	Hands-On Centers (~10 minutes per pair of children)	Hands-On Centers (~10 minutes per pair of children)

Common Sense Media:
<https://www.commonsensemedia.org/>



Resources

Next Generation Preschool Math

Next Generation Preschool Math: NSF funded initiative to support the design of a series of tablet-based applications (apps) that teach early math (equipartitioning and subitizing) to preschool children

Apps can be played independently or in a formal setting, supporting teachers with resources for use of the apps

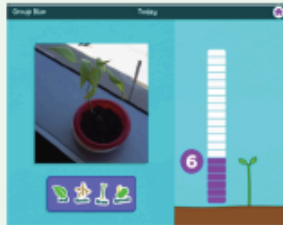


Next Generation Preschool Science

Supporting Student Scientists!

Plant Toolkit

provides opportunities to record observations (photos with labels and measurements)



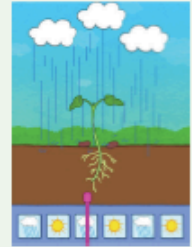
Sunflower Sprout

allows children to interact with simulation that demonstrates growth



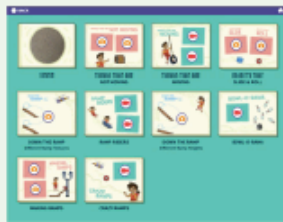
Wonder Farm

provides an opportunity for children to explore how different variables affect growth over time



Ramp Toolkit

provides opportunities to record, predict and compare movement observed in hands-on investigations



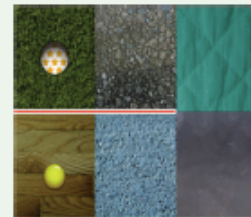
Star Stop

allows children to explore how changing different variables affects movement



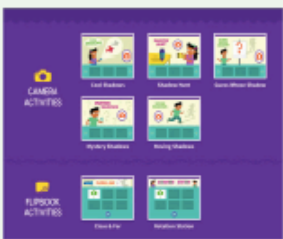
Textures

provides an opportunity for children to explore how different textures affect movement



Shadow Toolkit

provides opportunities to record observations and create flipbooks of shadows as they change



Shadow Simulation

allows children to explore what makes different shadows and what makes shadows change



Sunrise at the Park

provides an opportunity for children to make different shadows and explore how they change over time



Examples from our research

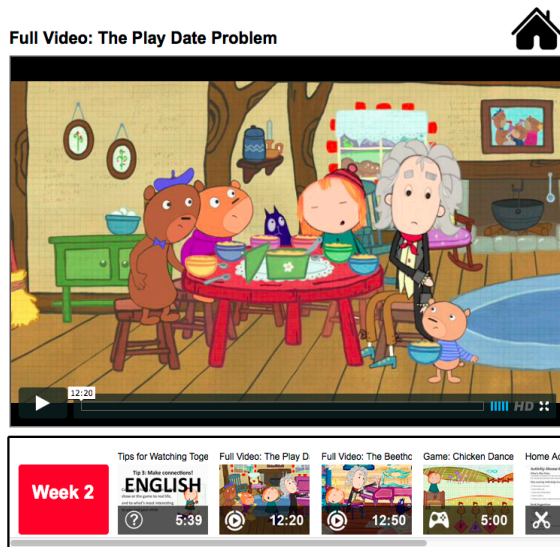
Demonstrate that young children from low-income homes can learn in environments where well-crafted digital media are available and supported

- Math study (home)
- Science study (home visiting project)

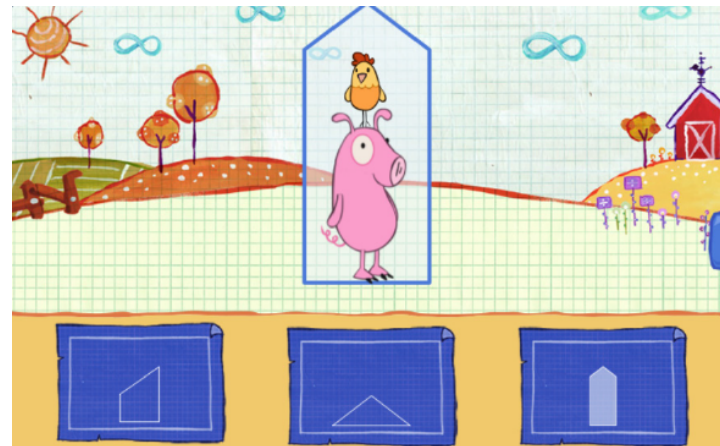


Math Study (Home)

The PEG+CAT Home Study was implemented over a 12 week period in children's homes. Families were provided with an activity schedule including games, videos and hands on activities to complete each week. Included were short video clips with tips for parents on how to support their child's learning.



Videos



Games

Math Study (Home)

Parents in the intervention condition:

- Reported more joint media use
- Were more confident about supporting math learning for their children
- Were more likely to agree that technology and media could be tools for math learning
- And more likely to report engaging in problem-solving strategies (such as exploring “what if” scenarios) with their children



Math Study (Home)

Children in the intervention exhibited greater improvements in:

- ordinal numbers
- spatial relationships
- 3-D shapes



Science Study (Home Visiting Organizations)

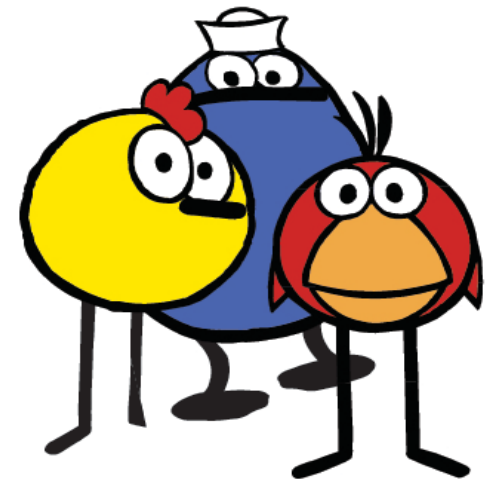
- The PEEP Family Science Study was implemented over a 12 week period in children’s homes with the support of educators from home visiting programs.
- Families were provided with three four week “units” in the form of apps that included parent videos, live-action and animated videos and hands-on activities to complete each week.
- Throughout, parents were encouraged to use specific pedagogical strategies to support their children’s science learning



Science Study (Home Visiting Organizations)

Parents in the intervention condition, compared to a similar comparison group enrolled in the same home visiting program reported:

- doing substantially more science activities with their child
- using the target parent engagement strategies more frequently
- using joint engagement strategies more frequently
- Parents with low confidence were more likely to feel more confident about their abilities to help their children learn science



Resource review and discussion

Question for discussion:

Review the media resources on the tablets

Select one for discussion and share:

1. What characteristics of the media would help support children's learning?
2. How would you use this resource with families? What kinds of supports would families need to use the resource to support learning?

Acknowledgements

Funding from the U.S. Department of Education Ready To Learn Initiative (U.S. Department of Education Award Number U295A100), in collaboration with CPB-PBS.



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Thank You

