Games that make an impact

True educational outcomes from informal gaming

David Lowenstein, Senior Director

dmlowenstein@pbs.org

PBS KIDS Ready To Learn Initiative

pbskids.org

12+ million unique visitors per month

pbskids.org/mobile

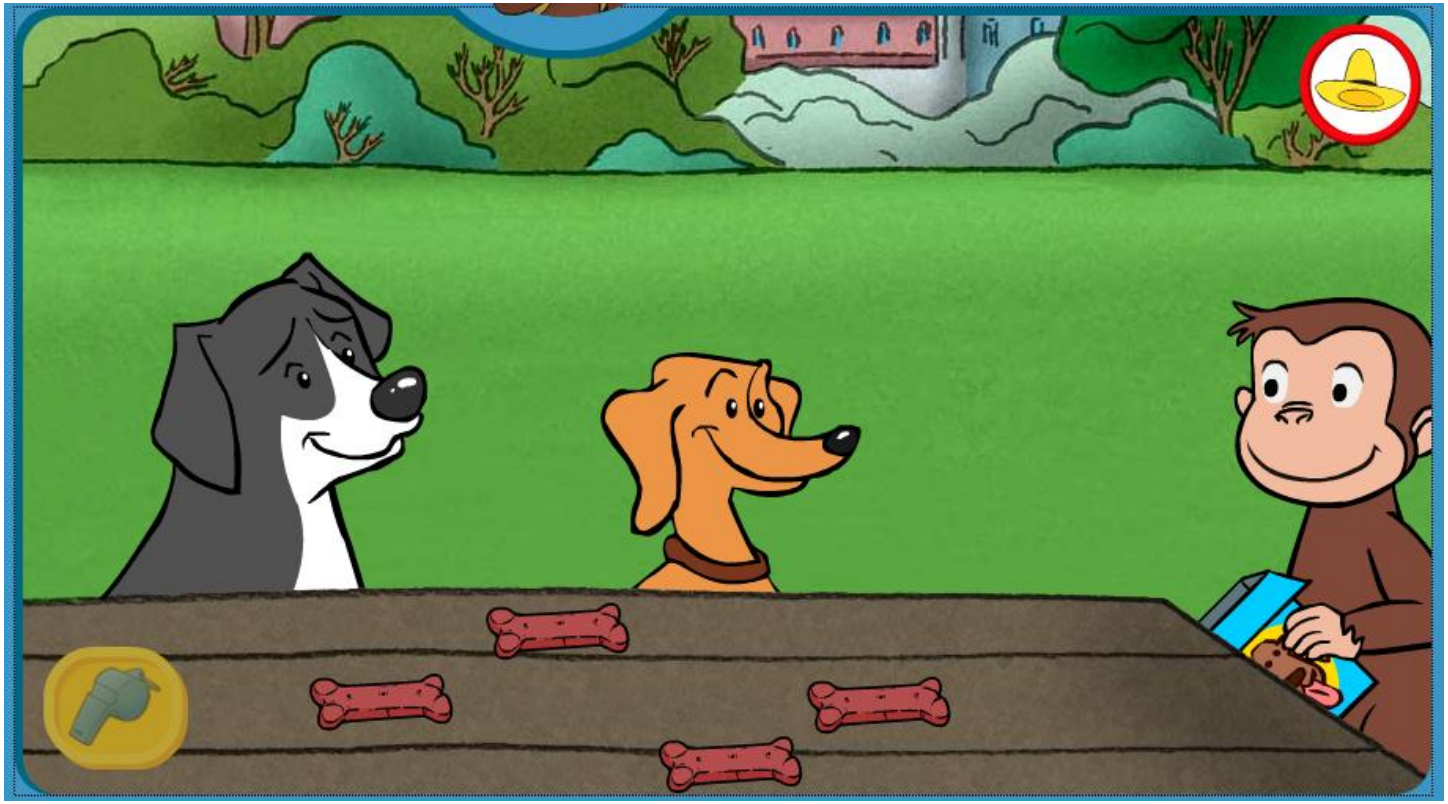
15 apps and growing…

pbskids.org/whiteboard

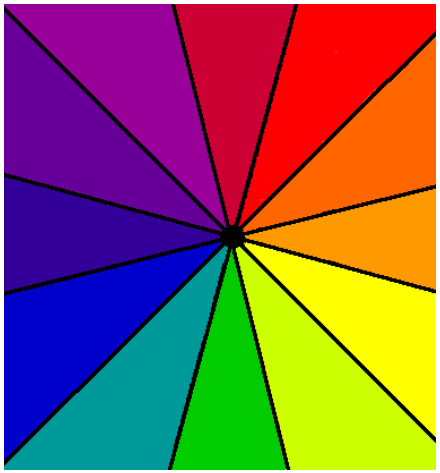
Every new technology is an opportunity for learning

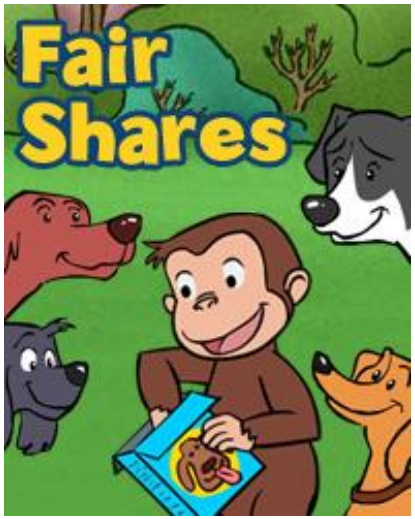
pbskids.org/lab

Game Design



What appeals to the target audience?





What skills are age-appropriate?

		Begin 2-digit addition and subtraction with blocks and counting sticks	
MULTIPLICATION AND GROUPING			
Separate a group of objects (up to 12) into two or three equal groups	Curious George: Fair Shares: http://pbskids.org/curiousgeorge/busyday/dogs/	Group objects into same size groups	
DIVISION AND FRACTIONS			
		Recognize that simple shapes can be split up into ½, ¼, 1/3, and 1/	
REPRESENTING OPERATIONS			
Use + (plus), - (minus), and = (equals)	Curious George: Ribbit: http://pbskids.org/curiousgeorge/busyday/frogs/	Use (not equals sign)	

Paper testing

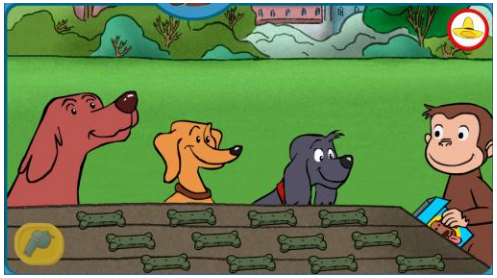
“We conducted some user testing with 5-6 yr olds at the local Y afterschool. Kids were asked to divide 12 items between 3 people. Kids didn't understand the basic idea without additional modeling. Keeping items on a straight line was (nor surprisingly) easier than if they were in an array. Conclusion: we may need to model a strategy. They did like the idea of sharing things with their friends.”

Prototyping

EASY

MEDIUM

HARD



User testing

“As children play the game it gets harder which kept them engaged. This leveling up also worked as a motivator because the kids wanted to keep playing to see how many treats or what new dogs would appear in the next round of play.”

“The kids were able to move the treats to the dogs. However, they had some difficulty clicking directly on the treats in order to pick them up.”

Efficacy/Impact Research

Game	Skill Tested	Percentage of All Students (N = 19)			Percentage of Students Who Did Not Know Skill at Pre-Test (N= Variable)	
		Knew Skill – Pre & Post	Improved/ Mastered Pre to Post	No Improvement Pre to Post	Improved/ Mastered Pre to Post	No Improvement Pre to Post
Group 5 – Solving a Math Problem Involving Dividing the Number of Objects in Equal Quantities						
Fair Shares	Divide items equally	47% (9)	37% (7)	16% (3)	70% (7)	30% (3)

70% of participants improved in the math skill (“fair shares”) taught by this game. The assessment involved answering this question pre- and post-

Fair Shares- Setup:
Trial 1: Place 6 beans on table in front of child.
Trial 2: Place 8 beans on table in front of child.
Prompt: **“Here are some beans. Can you share them fairly between you and me?” (“Put yours here and put mine here.”)**

Research

Research vs. Testing Goals

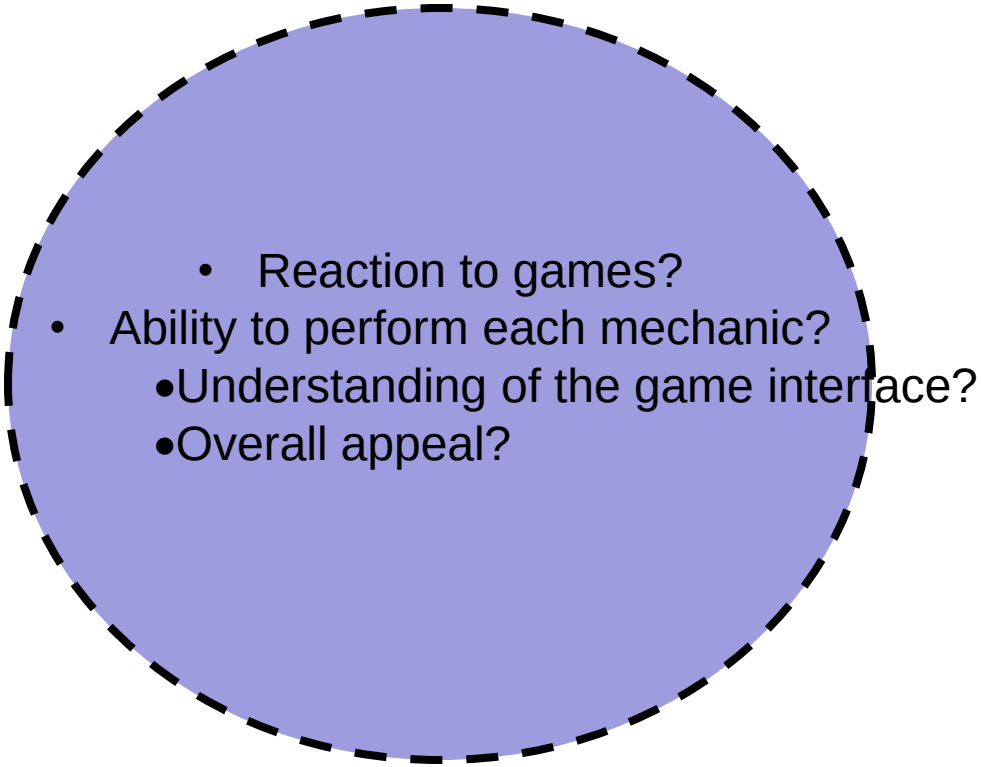
Efficacy/Impact Research

- Do tested skills improve and is the improvement significant?
- Is knowledge gained generalizable?

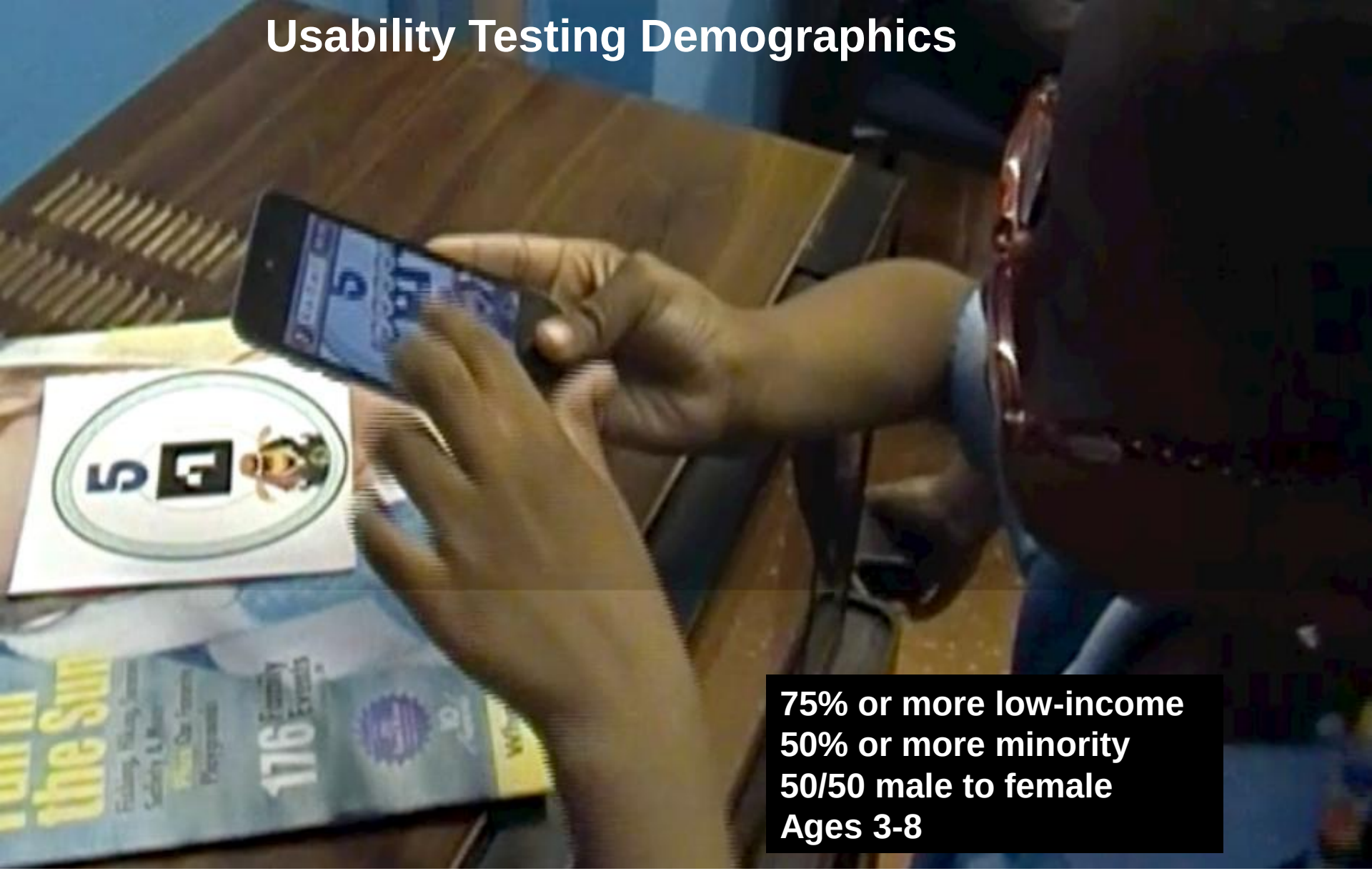
Usability Testing

- Reaction to games?
- Ability to perform each mechanic?
- Understanding of the game interfac
- Overall appeal?

Usability Testing

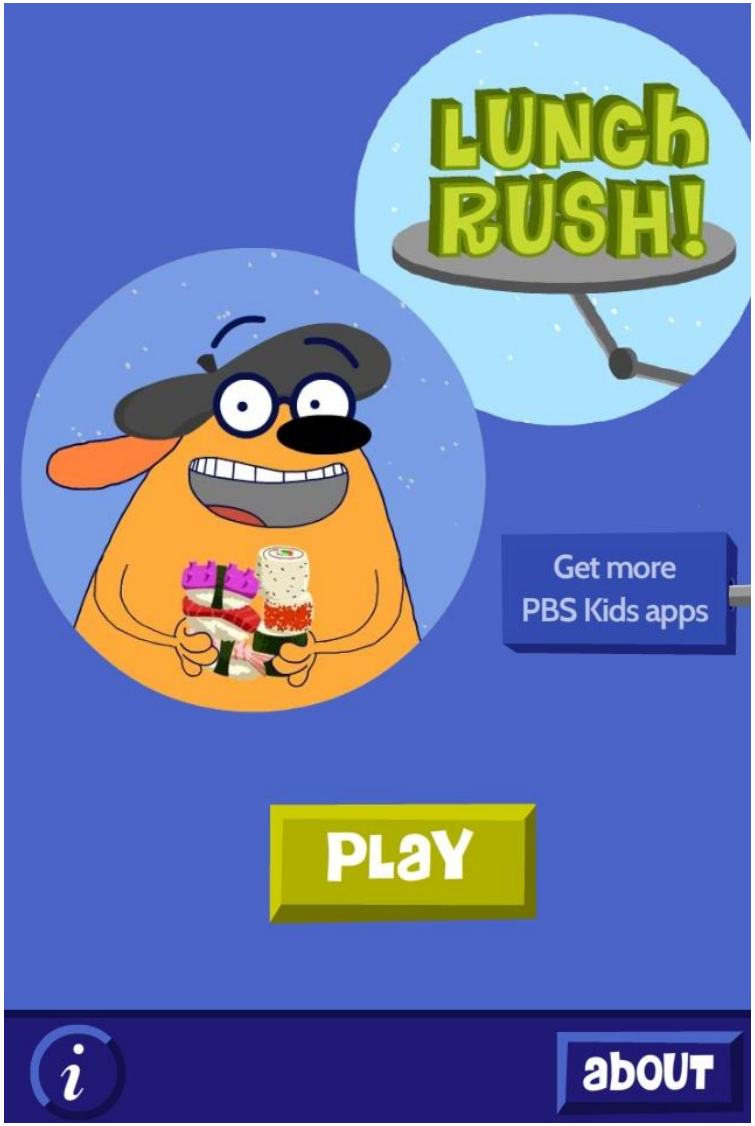


Usability Testing Demographics

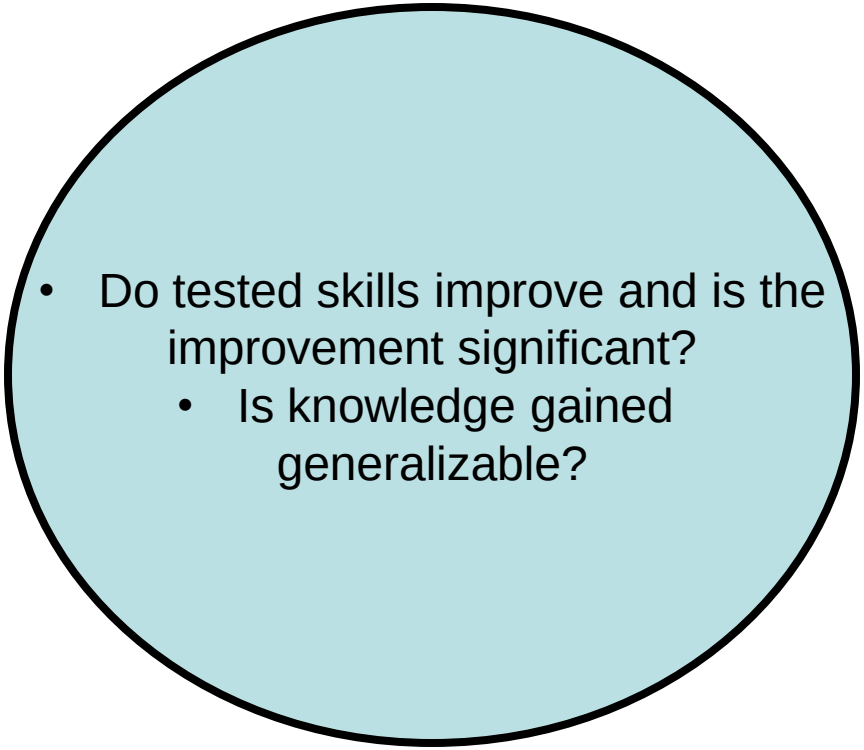


75% or more low-income
50% or more minority
50/50 male to female
Ages 3-8

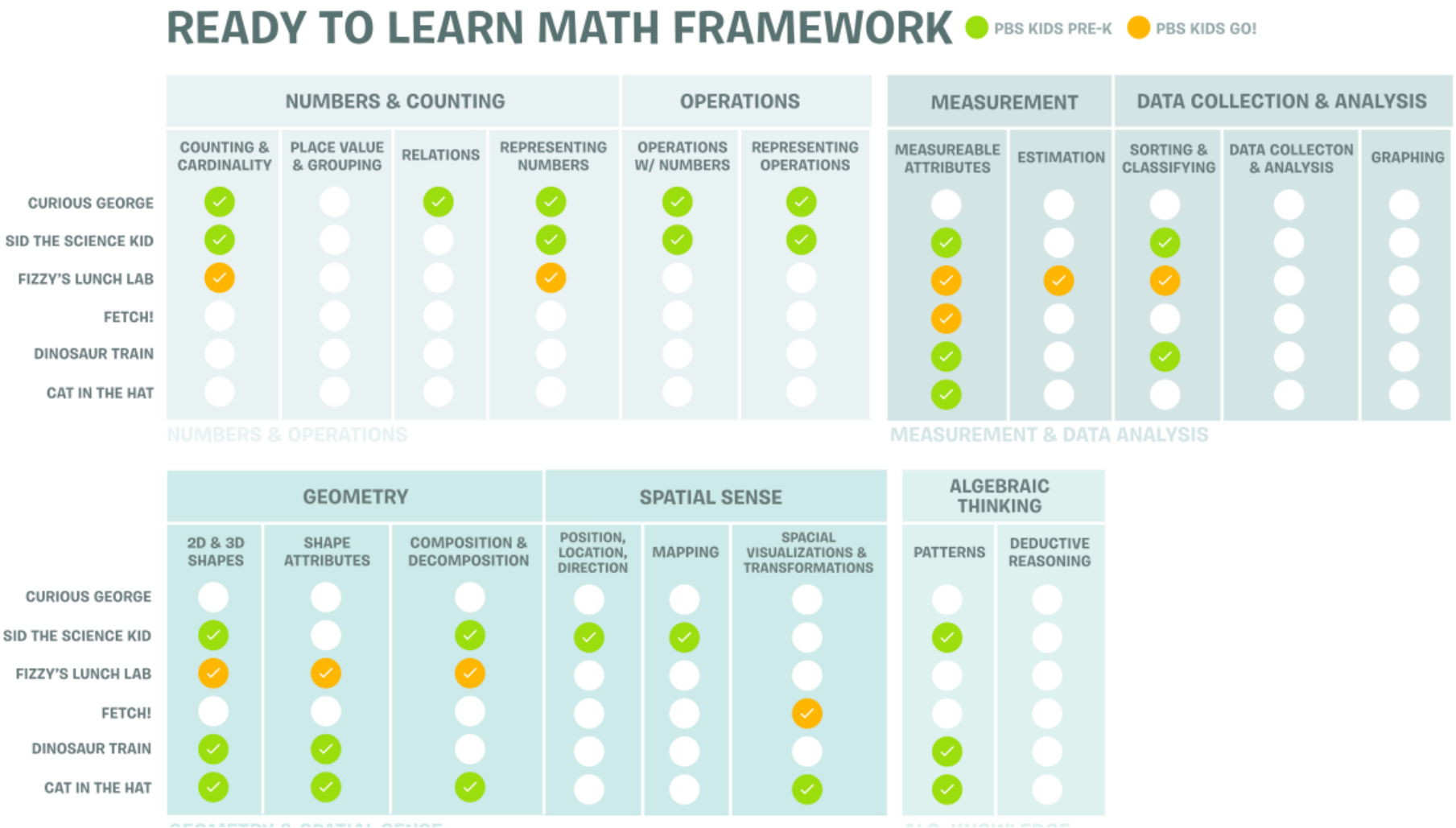

14 + ? = 19
00:43
5
PLAYER 2: GINGER


LUNCH RUSH!
Get more PBS Kids apps
PLAY
ABOUT

Efficacy/Impact Research



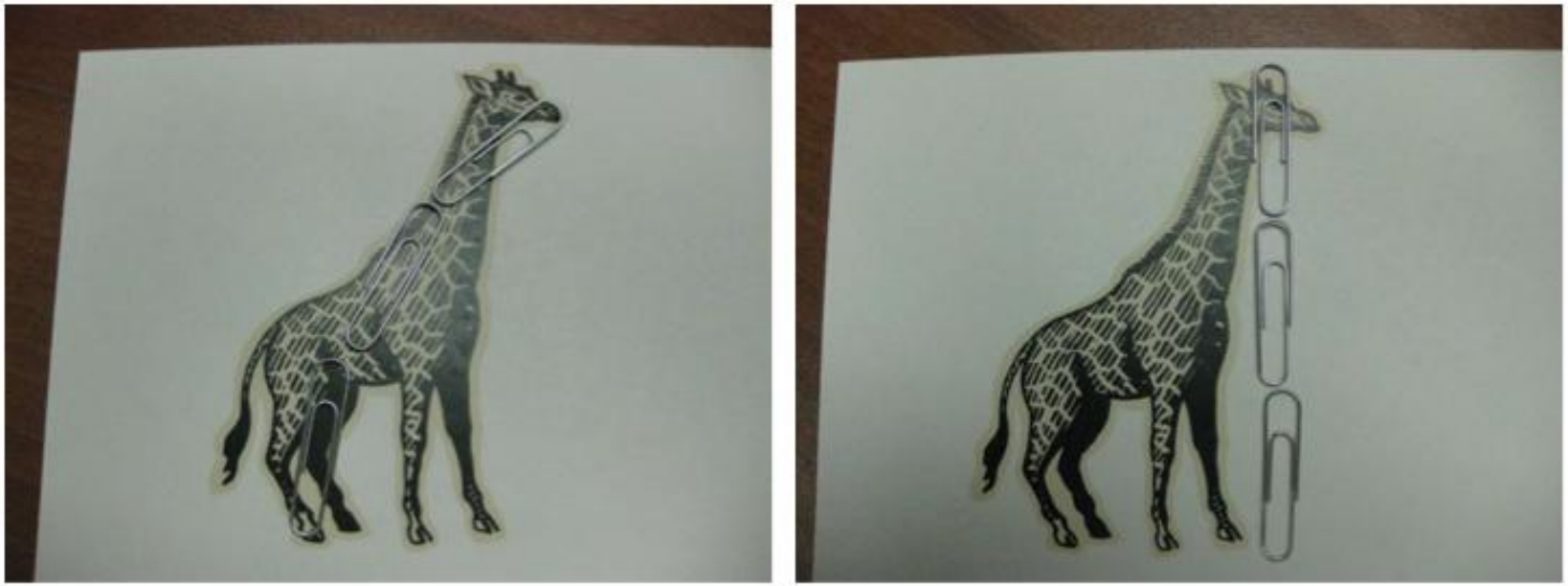
Skills Frameworks



3D Game – Usability Testing

3D Game – Usability Testing

Figure 5 – Substantive Observed Pre-to-Post Performance on Task 8



Pretest

Posttest

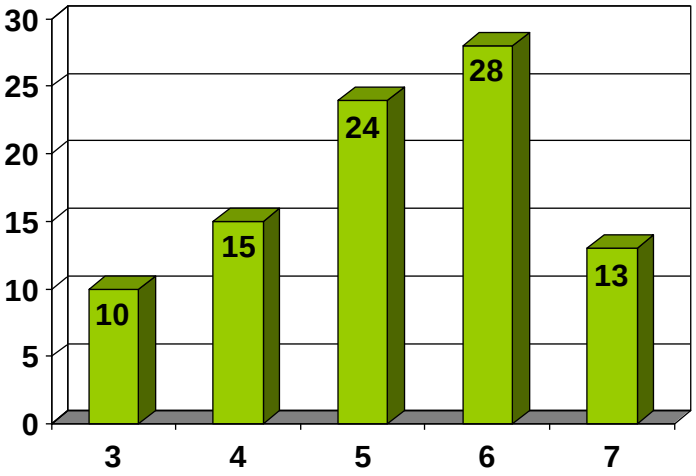
2010 iPhone App Study

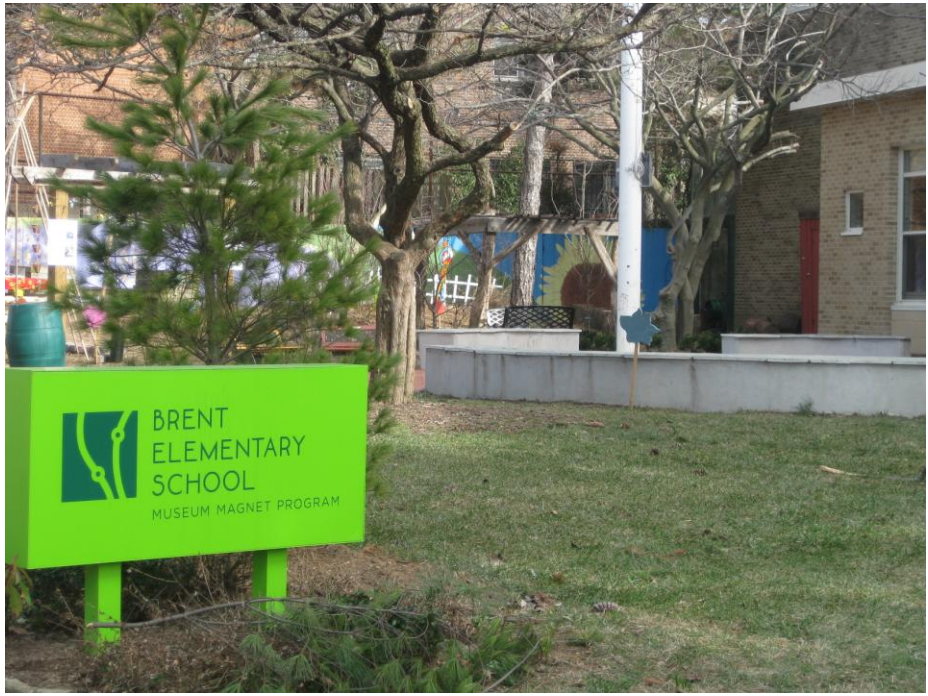
Super WHY!

Martha Speaks:

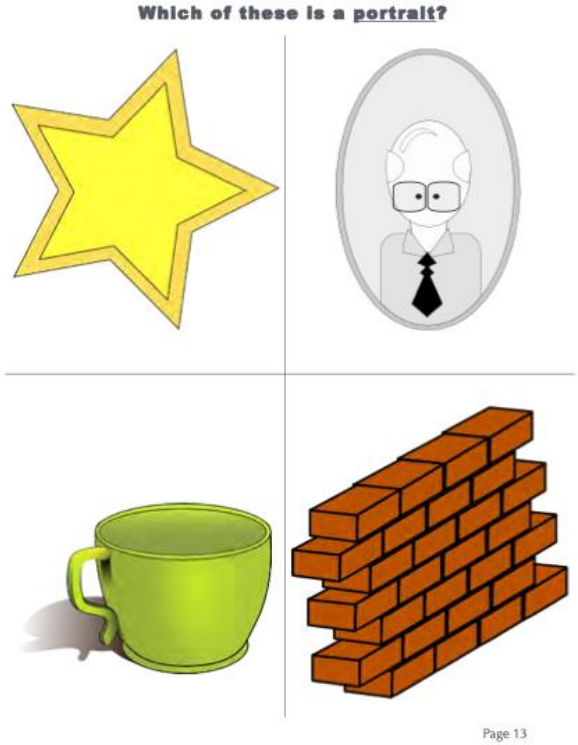
- 90 children ages 3-7
  Indiana (43)
  DC (47)

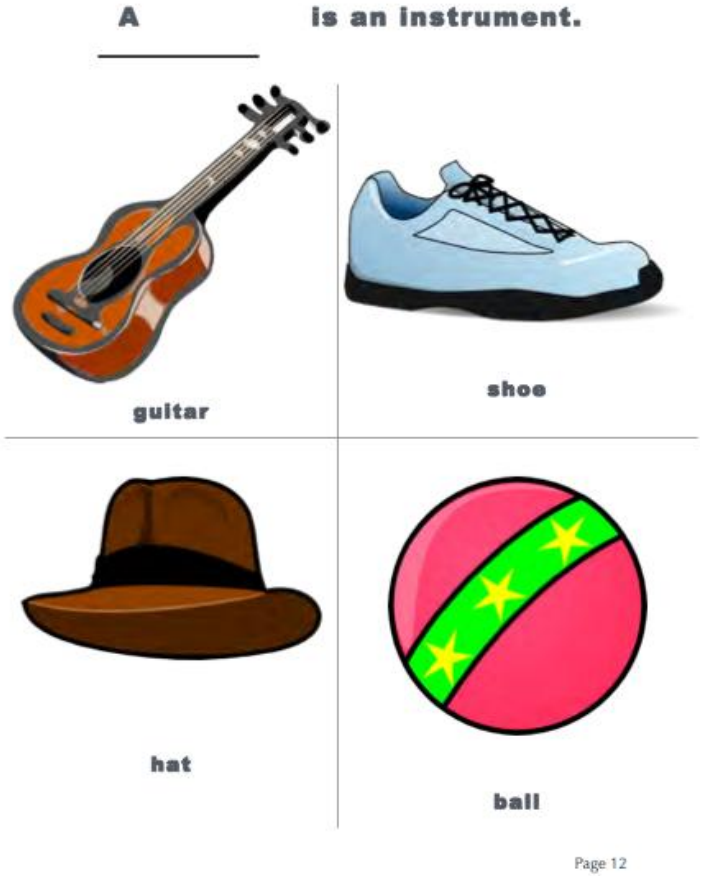
- 100% title one, low-income





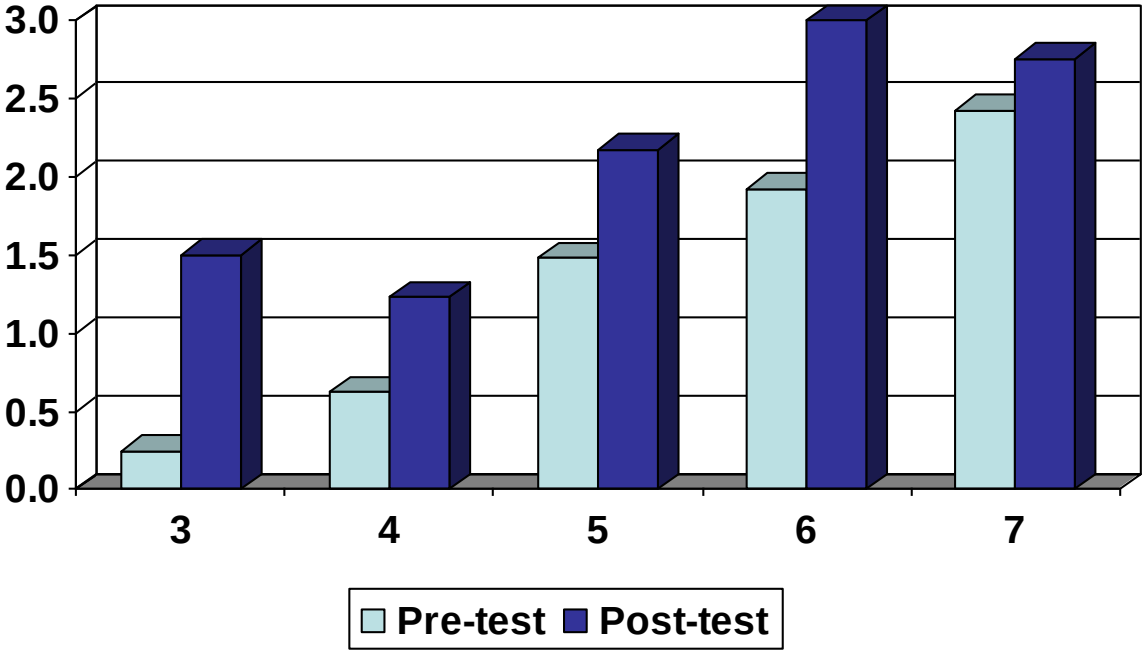
Pre-test measures





Vocabulary Fluency

Three year old children showed the most gain, 31%.



“she was so excited the first night, she fell asleep playing the games and I had to take it from her hands when I checked on her…she began to cry and say, ‘mom, you’re really stopping me from learning-I want to learn.’ I thought how great it was that she was learning and while playing but also that she wanted to continue to learn. I have to say it’s far better than any Leap product we’ve purchased. This is simply an awesome way for children to learn. Thank you!”

– 6 year girl

“…He put the iPod down and we were talking in the kitchen. All of a sudden he says, ‘I’m going to dart into the living room,’ and proceeds to run off. Obviously he picked that word up from Martha!”

– 5 year boy

“I’m able to get improved behavior out of my son, because I threaten to take the iPod away and he’ll instantly offer to make good choices. I was even able to get him to clean his room, he helped me put away groceries and do other chores”

– 3 year boy

Surprises: parallel vs. coplay

More details on the iPod Touch Study in "Learning is there an app for that?"

Best Practices

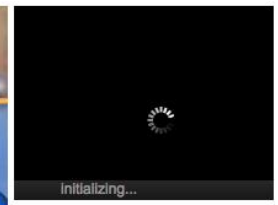
How do you keep up?

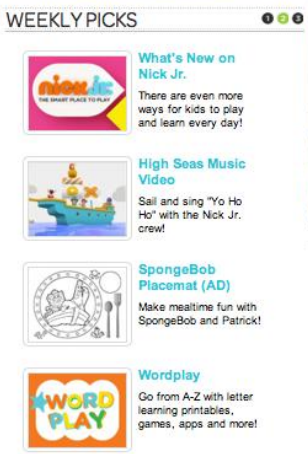
2012

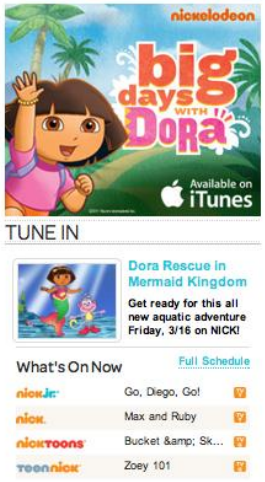
2006

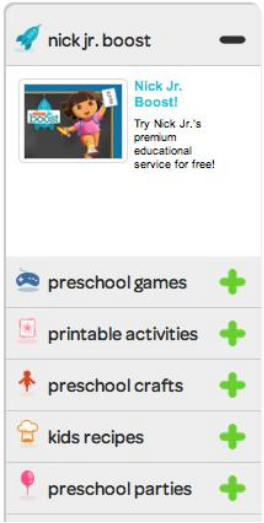
2002

What is good visual design for kids?









How do you increase accessibility?

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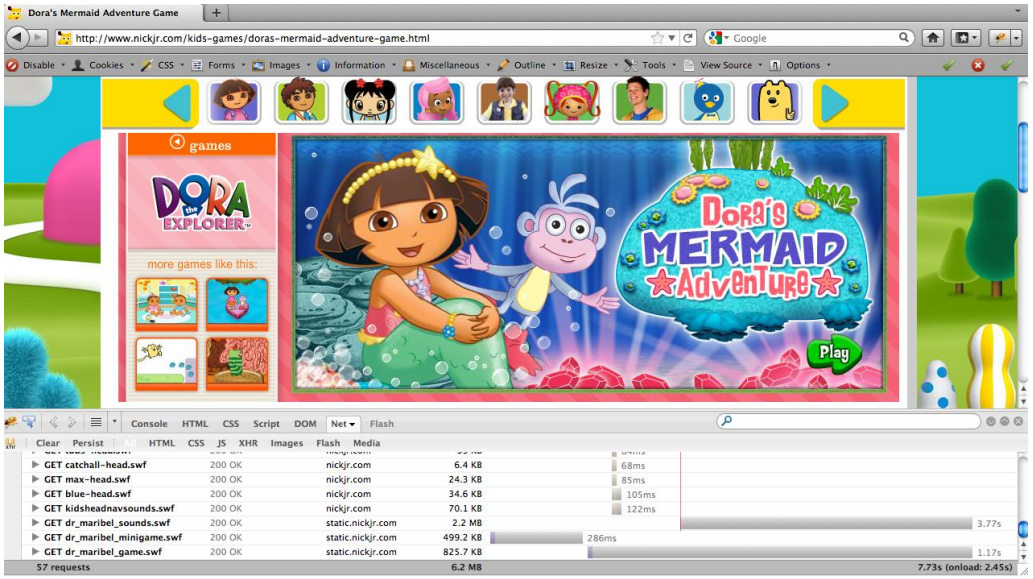
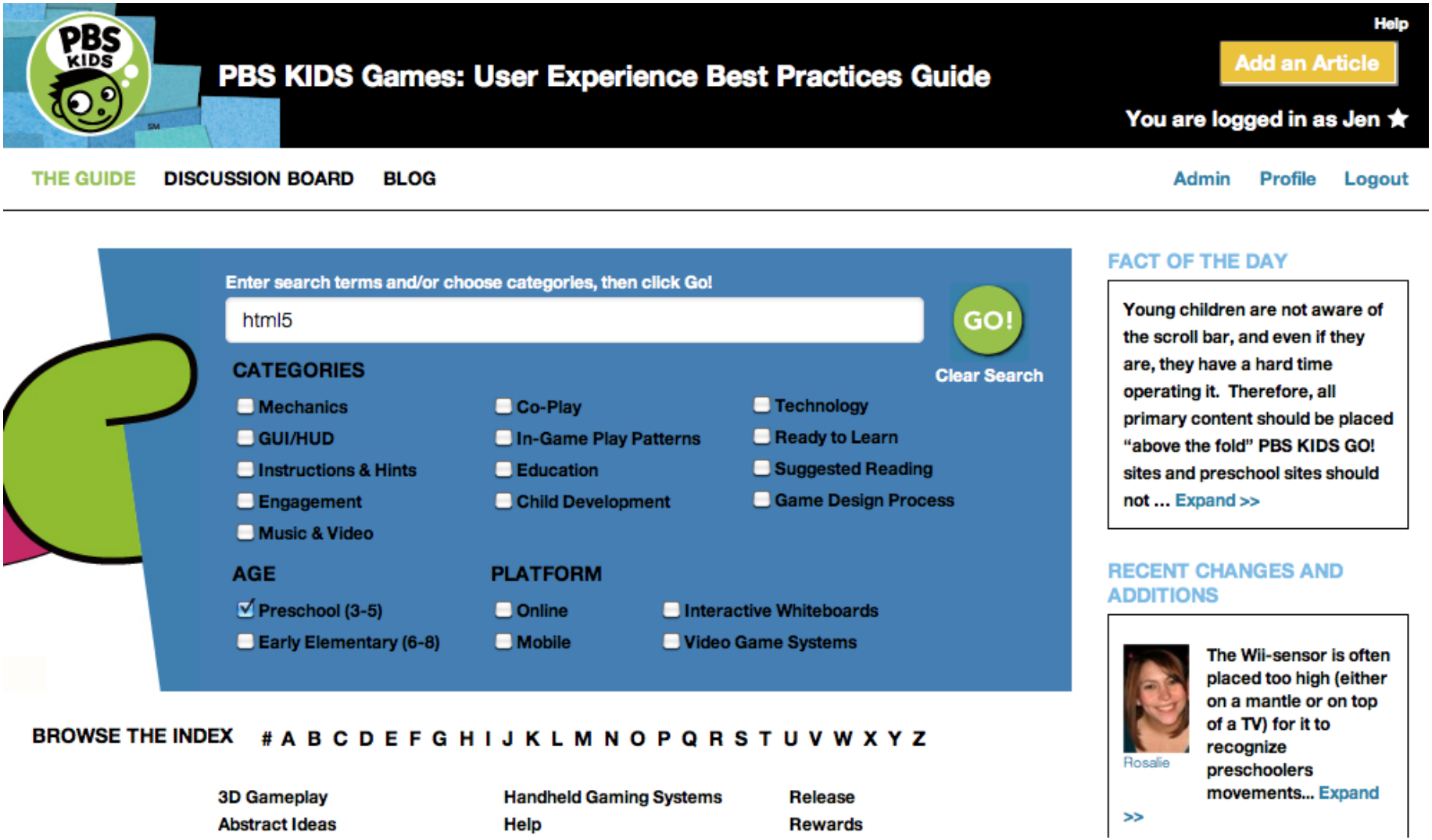


6.2 MB

Best Practices Guide



HUFFPOST EDUCATION

Robert M. Lippincott and Debra Sanchez

Integrating Educational Media in Early Learning Environments to Bridge the Achievement Gap

Posted: 04/13/2012 1:30 pm

For years, early educators have debated whether there is a place for media in learning environments for young children. The National Association for the Education of Young Children (NAEYC) and the Fred Rogers Center recently completed the adoption and release of a joint position statement on technology and interactive media as early childhood educational tools, offering guidelines for the appropriate use of technology and media to support learning for young children. This new statement confirms what the Corporation for Public Broadcasting (CPB) and PBS have been contending for years: educational media can be integrated into early learning environments in a way that is both appropriate and beneficial.

With so many new technologies available to today's kids, the position statement offers key guidelines on how we can leverage these new innovations to help kids learn -- which we believe can have real impact in closing the achievement gap. This could not come at a more critical time, as two-thirds of America's children are not reading at grade level by the end of 3rd grade, and more than 60 percent of all fourth graders are not proficient in math. These statistics foreshadow the more than 1 million kids who drop out of high school every year, severely limiting their options and costing our nation more than $100 billion in lost wages, taxes and human potential.

As NAEYC and the Fred Rogers Center move forward, the good news is that they do not have to go it alone. CPB and PBS continue to be committed to using the power of media to help accelerate early learning, especially for kids from low-income families. Through a forward-looking grant from the U.S. Department of Education called Ready To Learn, CPB and PBS have several projects underway aimed at creating and researching educationally sound and developmentally-appropriate media, and empowering educators, caregivers and parents to be well-informed media mediators for their students and children.

We've already seen amazing results in our work in using multimedia content to support early learning. Third-party research has demonstrated that integrating PBS KIDS content in preschool settings can help kids build key skills for success in school. For example, a recent study found that kids who participated in a PBS KIDS curriculum outscored their peers in the control group on all five tested measures of early literacy.

And as access to new technologies continues to rise, our mission is to build on this success, and to continue to find the learning potential on every new platform. CPB and PBS are working with top kids' media producers, technology experts, educators and researchers to produce suites of content across platforms -- with online games, mobile apps and interactive whiteboard games -- to help children build early math and literacy skills. And we're testing this approach to learn more about how interactive media in early education can help bridge the achievement gap.

Yet as the NAEYC position statement also points out, it is going to take more than developing content for kids to effectively use media in early learning settings; we also need to provide resources for teachers, caregivers and parents to support that learning. All of America's parents and educators must be equipped with equitable access to technology and interactive media experiences -- and the knowledge of how to effectively use them -- to better prepare our children for success in school and life.

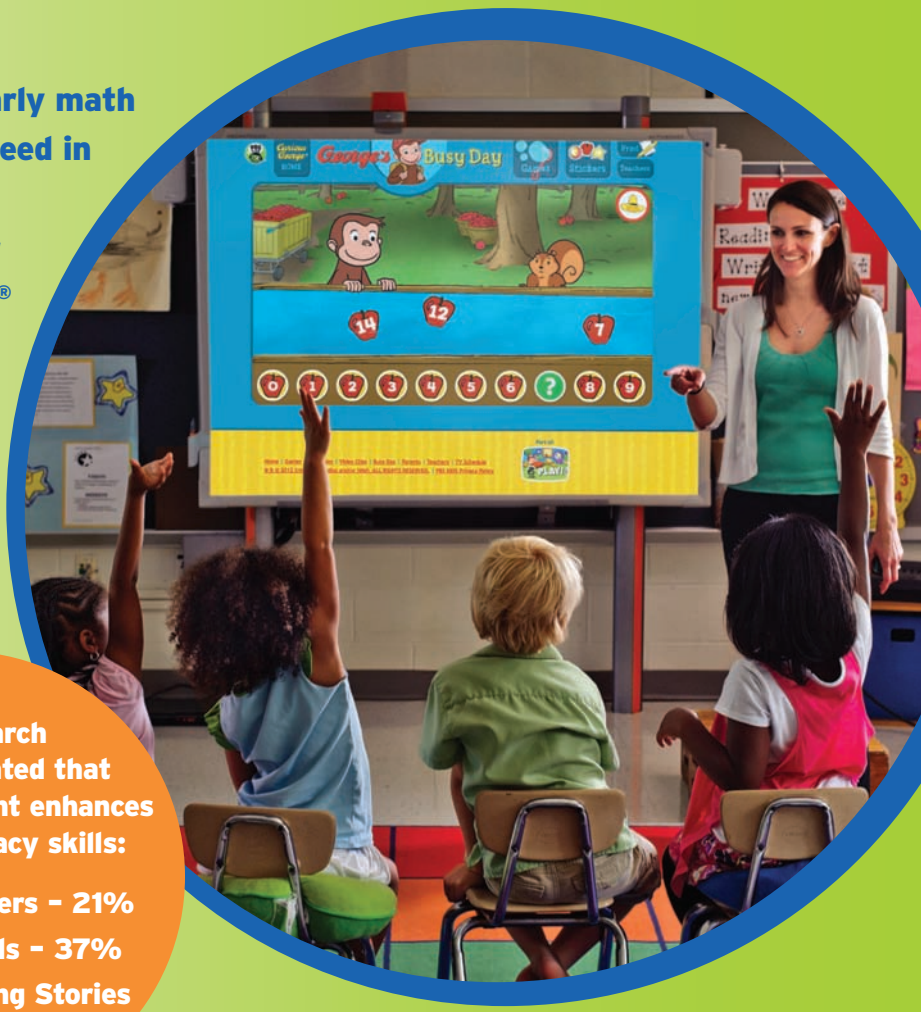
This is a challenging assignment that requires all of us who work in this space to turn our attention to capacity-building in the field. This effort should include high-quality teacher professional development, family training, and a push for a national policy movement to equip America's Title I elementary schools and early childcare centers with cutting-edge digital technology tools, so that our children, both in school and out-of-school settings, are not left behind. That's why we're partnering with Boston University to pilot and test teaching modules to help preschool teachers successfully integrate media into their classrooms to enhance students' learning. We are also working with the Chicago Public Schools' Virtual PreK and K programs to develop resources to bridge learning at home and in school.

Since its inception more than 40 years ago, public media has worked with visionaries like Fred Rogers to use the power of television to help kids learn. Over the last 20 years, public media has demonstrated that same potential with award-winning digital content online, on mobile, and beyond. We've seen through research that educational programming across platforms can have real impact in narrowing the achievement gap.

As we continue to look forward and innovate in the children's media space, we believe that NAEYC and Fred Rogers Center have produced a core policy statement that is relevant to the entire field of early childhood education in the 21st century, and will help guide the effective use of technology and media to improve academic outcomes. Let's embrace technology for our youngest citizens in a way that will help them learn and grow, using this new statement as a guide as we craft strategies and tools to help narrow the achievement gap and better prepare all of our children for success.

The Ready To Learn Initiative: INNOVATING EDUCATING ENGAGING

Millions of children lack the basic early math and literacy skills necessary to succeed in school. Through the Ready To Learn Initiative (RTL), the Corporation for Public Broadcasting (CPB) and PBS® are leveraging innovative digital technologies and content to address this critical need, especially in low-income communities.



RTL research has demonstrated that PBS KIDS® content enhances kids' early literacy skills:

- **Naming Letters – 21%**
- **Letter Sounds – 37%**
- **Understanding Stories & Print – 12%**[1]

With support from the U.S. Department of Education, CPB and PBS are developing engaging content across media platforms and evaluating its impact in narrowing the achievement gap

Corporation for Public Broadcasting

The Ready To Learn Initiative at Work

Over the past several years, RTL has focused on using the power of media to help children ages 2-8 build early literacy skills with impressive results.

Now, CPB and PBS are expanding RTL to include early math skills to continue to help bridge the achievement gap — further innovating with educational media content, educating kids inside and outside the classroom, and engaging local communities.

RTL Successes to Date:

- Children who watched the RTL series SUPER WHY! scored **46% higher** on standardized tests than those who did not watch the show.[2]
- Kids who played the MARTHA SPEAKS Dog Party mobile app for two weeks had up to a **31% gain** in vocabulary tested.[3]
- A study of THE ELECTRIC COMPANY Summer Program showed kids **grew significantly** in their knowledge of math vocabulary **(41%)**, numeracy skills **(20%)**, and phonics skills **(17%)**.[4]

INNOVATING with PBS KIDS content that connects a child's learning experiences across media platforms

CPB and PBS are working with academic advisors, technologists, and producers to create educational content across media platforms for children, teachers, parents and caregivers. Math and literacy frameworks were developed to align this content to Common Core State Standards and help children ages 2-8 build skills, such as counting, measurement, and spatial sense.

RTL has built 77 interactive games that are aligned to these frameworks and help kids learn early math and literacy skills. Available for free on pbskids.org, the games are linked across different media — including video, web, mobile and interactive whiteboards — to form suites of learning content. Early pilot studies of RTL's math content show substantial increases on tests of key skills by students ages 4-8, and that kids find the gaming suites highly engaging.[5] Upcoming research will test how children's use of cross-platform content can improve their learning in both formal and informal settings.

RTL is also using interactive content to support effective teaching and to empower families to get more involved in their children's learning. The PBS KIDS Lab features free, easy-to-use bilingual tips and activities for parents, teachers, and caregivers. Through a partnership with Boston University, resources are being developed to help teachers integrate educational media in classrooms.

EDUCATING children inside and outside the classroom

Research shows that expanded learning opportunities such as afterschool and summer programs make a pronounced difference in students' learning, yet often the neediest students do not have access to them. RTL is working to connect school, home and community with the following activities to complement school-day instruction.

"These kids came in ... not even knowing how to add. And they're on the computer now doing a thousand plus two hundred ... and they're doing it by themselves."

–Lauren, Teacher, THE ELECTRIC COMPANY Summer Program, Natchaug School, Windham, CT

- Through a partnership with Virtual PreK and the Chicago Public Schools, the RTL Initiative is developing math kits and providing training to teachers and caregivers to help extend learning in the classroom to both the home and the community.
- RTL is collaborating with the Joan Ganz Cooney Center and E-Line media on the National STEM Video Game Challenge, encouraging students and educators to develop math games for children ages 4-8.
- A classroom-based summer program premised on Sesame Workshop's THE ELECTRIC COMPANY launched last summer with the goal of building math and literacy skills for kids in 1st and 2nd grade. Children who participated in a pilot study of the summer program showed statistically significant gains in their knowledge of math vocabulary as well as numeracy and phonics skills.[6]

ENGAGING local communities

Ensuring that RTL content reaches children who live in the most underserved communities is a key part of this initiative. PBS stations across the country are collaborating with city-wide alliances, engaging low-income populations, and partnering with Title 1 schools, childcare providers, libraries, and other community stakeholders to effectively deploy and use RTL's educational content to motivate young learners to reach new levels of achievement.

Iowa Public Television is collaborating with its State Education Department, State Library and the Iowa Afterschool Alliance to infuse RTL digital games and technology tools into diverse learning settings, including health clinics.

KBTC in Tacoma, WA is engaging the McCarver Peace Makers, a group of 4th- and 5th-graders, as math mentors to kindergarten-3rd grade students from the Tacoma Housing Authority McCarver Elementary Special Housing Program, an initiative designed to help kids from at-risk families succeed in school.

Montana PBS is working with low-income families at the Flathead Reservation, joining forces with Head Start centers, afterschool programs and local libraries to help kids build early math skills.

Other Community Implementation Sites:

- WVIZ / Cleveland, OH
- Maryland Public TV / Baltimore, MD
- Detroit Public Television
- Eight, Arizona PBS / Phoenix, AZ
- Vegas PBS
- WFSU / Tallahassee, FL
- WGBY / Springfield, MA
- WNET / Thirteen, New York, NY

1 Corporation for Public Broadcasting. (2011). Findings from Ready To Learn 2005-2010. Washington, DC: Author.

2 Linebarger, D.L., Wainwright, D.K., & McMenamin, K. Summative evaluation of SUPER WHY! (2009). A report prepared for the Corporation for Public Broadcasting. Philadelphia, PA: Annenberg School for Communication, University of Pennsylvania.

3 Chiong, C. & Carly S. (2010). "Learning: is there an app for that?" New York, NY: Joan Ganz Cooney Center.

4 McCarthy, B., Michel, L., Tui, M., Atienza, S., Rice, J., Nakamoto, J., & Tafoya, Am (2011). Evaluation of The Electric Company (TEC) Summer Program. A report prepared for the Corporation for Public Broadcasting. Redwood City, CA: WestEd.

5 McCarthy, B., Tui, M., Atienza, S., Yumol, D., & Banes, L. (2011). Transmedia suites pilot summary report. A report prepared for the Corporation for Public Broadcasting. Redwood City, CA: WestEd.

6 McCarthy, B., Michel, L., Tui, M., Atienza, S., Rice, J., Nakamoto, J., & Tafoya, Am (2011). Evaluation of The Electric Company (TEC) Summer Program. A report prepared for the Corporation for Public Broadcasting. Redwood City, CA: WestEd.

The Ready To Learn Initiative–
Helping bridge the achievement gap

In 2012, the RTL Initiative will continue its mission to educate and innovate, developing new content and tools including a sophisticated progress tracking system that equips parents and educators with the means to measure student progress, in real time. New games will integrate technologies like augmented reality, 3-D rendering software, and multiplayer functionality to enhance gameplay. In addition, the program's content will continue to be rigorously evaluated for its appeal and efficacy, so that the Ready To Learn Initiative can continue to offer America's youngest citizens the tools they need to succeed in school and in life.

What's Next for RTL:

- Distribution of RTL educational resources in low-income neighborhoods by over 1,500 community partner organizations
- Research on the development and impact of RTL's innovative learning technologies in home, school and out-of-school environments
- Development of a tracking system that charts a child's progress in curricular areas across multiple games and devices
- Production of a new PBS KIDS TV math series and three new math TV pilots
- Over 50 interactive RTL games and mobile apps

Corporation for Public Broadcasting

The contents of this brochure were developed under a grant from the Department of Education. However, those contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the Federal Government. The project is funded by a Ready To Learn grant (PR/AWARD No. U295A100025, CFDA No. 84.295A) provided by the Department of Education to the Corporation for Public Broadcasting.