

PBS: LEARN MORE

The Impact of America's
Largest Classroom
on Learning







PBS: LEARN MORE

THE IMPACT OF AMERICA'S LARGEST CLASSROOM ON LEARNING

Table of Contents

Foreword	4
Overview	5
Part 1: PBS and Learning: 2015 Literature Review and Quantitative Analysis.	6
Part 2: 2015 PBS LearningMedia Impact Study	14
Part 3: 2015 Future of Digital Learning Survey	18
Conclusion	21
Endnotes	22



Foreword

At PBS, education is in our DNA.

PBS was founded to use the power of media to educate, engage, and inspire all Americans. We take that mission very seriously.

For decades, we've used our on-air content to get children ready for success in school and in life. We have also sparked people's curiosity about the world around them, paving the way for a nation of lifelong learners. PBS content does more than entertain, it also inspires and teaches viewers of all ages.

“We have also sparked people's curiosity about the world around them, paving the way for a nation of lifelong learners.”

To connect with viewers wherever they are, PBS has innovated and expanded its offerings beyond television. Today we make our high-quality children's and adult programming available through broadcast, mobile and

digital offerings at home and in school designed to help people learn anywhere at anytime.

Just as we have done for decades, we test and evaluate the educational effectiveness of our content to guide us in how to create and deliver media that impacts achievement for learners of all ages. This report highlights the results of three studies that prove that our work is truly making a difference in learning.

This report would not have been possible without our member stations and partners, including the Corporation for Public Broadcasting, who have worked with us to both produce and evaluate much of the content studied.

I invite you to read more about our exciting work and its impact on learning. We look forward to continuing our important work in education both at home and in classrooms around the nation.

Sincerely,
Paula Kerger, *President and CEO*
PBS





Overview

Since the debut of PBS 45 years ago, education has been at the center of our mission. Many PBS member stations still have the words “educational television” in their name, even as they develop content in interactive media platforms, print, and other formats. From high-quality children’s programming to a vast array of cultural, historical, scientific, and public affairs programming and tools, the broadcast and digital programming offerings of PBS are designed to help enable learning anywhere at anytime.

Since its inception, PBS has invested in evaluations to determine the educational effectiveness of its content and to use the findings to inform the development of new content. This report highlights three recent investigations into how PBS content influences learning, the effectiveness of PBS content in improving student achievement, and the readiness of PBS to connect with the next generation of educators and learners.

This report is divided into three sections:

1. The first synthesizes much of the research conducted by a broad range of scholars and research organizations over the last 15 years regarding the effectiveness of PBS content in helping to educate and inform the many audiences PBS serves.
2. The second section contains results from a new impact study conducted for PBS by the Education

Development Center (EDC)—an independent, nonprofit research organization that has conducted numerous studies of the impact of digital content—examining the impact of PBS LearningMedia content on student performance when integrated into curricula. The study focused on four core subject areas in middle schools.

3. The third section shares findings from a national survey focused on the types of technology, tools, and content that today’s teachers are using—and those they expect to use in the coming years. Understanding the needs of its users is an important element of PBS’ work and this survey, like many others PBS has conducted over the years, influences our work.

This collective research explores the impact of PBS content across all ages and levels of schooling, and how well it works in different contexts and on multiple platforms.



PART 1: PBS and Learning: 2015 Literature Review and Quantitative Analysis

WHAT IS THE IMPACT OF PBS CONTENT ON LEARNING?

PBS creates content that inspires, engages, and educates. But what is the educational effectiveness of content developed by PBS and its partners?

To answer that question, PBS embarked on a project to gather research and do a literature review of studies evaluating the educational effectiveness of the most recent generation of programming and educational tools available from PBS. PBS also asked Education Development Center, Inc., a nonprofit research and evaluation company, to conduct a quantitative review and synthesis of all the studies to determine the impact of PBS content when used in six areas:

1. Early childhood education
2. In-school learning
3. Science, technology, engineering and mathematics (STEM) education

4. Extracurricular and lifelong learning

5. Technology platforms, such as television, computers (desktop, laptops), and mobile devices (phones, tablets)

6. Teacher professional learning.

The results reveal that 90 percent or more of the studies with measurable outcomes* show that PBS assets have significant positive impacts. The analyses demonstrate unequivocally that PBS content has a consistently positive and statistically significant effect on learning. **The research provides comprehensive evidence that PBS content makes a difference for all age groups and across commonly studied subjects and all delivery platforms.**



* These studies include both positive findings (in this report, called “fully positive” findings) or a mix of measured outcomes (referred to here as “mixed” findings). The mixed findings show positive impact for many, but not all outcomes. Only a minuscule percentage of studies found no impact across all of the areas measured. This synthesis of the results of the studies presents a top-level review of the findings, which did not take into account many of the specific features of the measures used, and thus provides a summary of findings but does not constitute a meta-analysis.

The review of 146 research studies, which were conducted principally from 2000 to 2015, covered a range of content areas (English language arts, mathematics, science), age groups (preschool through adulthood), settings (home, school, afterschool, camp), program/research purposes (student learning, adult

learning, teacher professional development, features of resources, participant views of the resources), and types of technology products PBS developed to support programming (television, video, tablet, games, handheld devices and other interactive technology).



KEY FINDINGS:

- The research findings are extremely positive, demonstrating that **PBS content has educational effectiveness and a statistically significant impact on learning**. Researchers found that 90 percent or more of the studies within a category showed a significant or positive impact of PBS content on student learning outcomes.
- **These findings remain constant across all subject areas and no matter where students learn**. This is true whether students or adults learn at home, in school, or in the community, and whether the learning took place using TV, video, tablet, games, or handheld devices and other interactive technology.
- The effectiveness of using various types of PBS content (such as video, lesson plans, interactive games)—drawn from different PBS properties in different combinations with different kinds of media platforms—affirms that **using different PBS content over various platforms to support each other improves learning**.
- The findings, taken as a whole, affirm that **PBS content adds high value to learning that goes beyond being informative and inspiring** and helps people develop skills and knowledge.

On the following pages you will find more detail about the key findings of the review of the research on PBS educational media.

Early Childhood Education

Since its inception, PBS has conducted rigorous research that has consistently demonstrated that high-quality educational television and digital content can help children learn. The impact is particularly high for reading development and also includes significant learning gains in mathematics and science, relatively newer areas of PBS content that have not been studied as extensively.

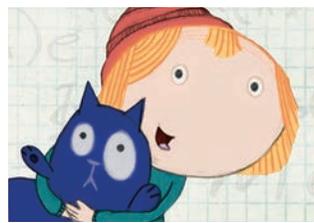
- **English language arts.** Most of the research focused on the preschool and kindergarten levels, with fewer studies of learning at the first, second, and third grades. Of the 33 relevant studies that looked at English language arts (ELA) learning from pre-K through grade three, 97 percent showed that PBS content had a statistically significant impact on student learning (55 percent fully positive, 42 percent mixed). Research findings in this area are so robust that researchers noted that some PBS products, such as *Martha Speaks* and *Between the Lions*, have

the potential of helping to eliminate the achievement gap that exists between low-income students and students of color and their peers.¹

- **Mathematics.** Of the 13 relevant studies, 69 percent had fully positive findings and 4 percent had mixed findings related to student learning.
- **Science.** All five of the studies of early childhood education that measured science learning found significant learning for students using PBS materials, although they used different assessment instruments, making comparisons difficult. Researchers noted that the findings suggest that the use of PBS materials is a promising approach to increasing science learning; however, additional research is needed to determine the specific factors within the PBS materials that influence science learning as well as which activity features are best at various ages and grade levels.



97% of ELA studies reviewed showed that PBS content had a statistically significant impact on student learning



RESEARCH SPOTLIGHT: **EARLY LEARNING**

The success of educational shows on PBS has led to an expansion of excellent digital offerings, school curricula, and other early learning content across a large array of PBS KIDS programs. Research has continually confirmed that these shows help young people learn to read, use numbers, and gain social and emotional skills. The shows are effective in part because they come with additional products, tools, formats, and characters that were carefully designed to work for children and improve their learning.

Between the Lions

When compared with similar children who did not watch the show, low-income kindergartners who watched 17 episodes of *Between the Lions* had significantly greater gains in key literacy skills, such as recognizing letters and reading whole words. The show has been found to be especially effective for bilingual kindergartners, helping them to strengthen their awareness of letter-sound relationships in English (Linebarger, D. L. et al., 2004).

Curious George

A 2014 study showed that *Curious George* helped increase students' mathematical skills related to number comparison and informal concepts and increased understanding of science and science tools. The intervention also had beneficial effects on students from different ability levels (McCarthy, B. et al. 2014).

Martha Speaks

Studies showed that *Martha Speaks* provides strong support for word learning compared to the average educational television program, resulting

in vocabulary knowledge scores that were between 1.39 (Moses et al., 2010) and 2.22 times higher (Pasnik et al., 2007).

Sid the Science Kid

A 2012 study found that *Sid the Science Kid* increases student understanding of science and science tools. A 2010 study found that kids using the materials asked more sophisticated questions related to concepts, replicated activities, and used terminology from the show that reflected scientific investigation and observation (Bachrach, E. R., 2012, 2010).

Super Why!

A 2009 study showed that *SuperWhy!* boosts scores on various measures of literacy development, including knowledge of letters and awareness of letter-sound relationships, with low-income children posting the greatest gains. Watching just 20 episodes was more than enough to give them a significant boost in literacy skills (Linebarger, D. L. et al., 2009).

In-School Learning

Studies exploring the impact of PBS content on learning outcomes in school settings, including classrooms and computer labs, showed significant learning gains. Of the 36 relevant studies, 94 percent showed significant impact (50 percent fully positive, 44 percent mixed findings).

The analysis showed similar positive results for each subject area.

- **English.** Of the 21 relevant studies of the impact of PBS materials on English language arts, 95 percent showed significant impact (43 percent fully positive, 52 percent mixed).

- **Mathematics.** Of the 13 relevant mathematics studies, 92 percent showed significant impact (69 percent fully positive, 23 percent mixed).

- **Science.** Of the 11 relevant studies focused on science only, all showed significant impact (82 percent fully positive, 18 percent mixed).

Taken together these findings demonstrate the benefits of using PBS assets to encourage learning within schools. The next section of this report takes a deeper look at the impact PBS content has on student achievement.



RESEARCH SPOTLIGHT: PBS NEWSHOUR Broadens High Schoolers' Skills

A 2013 study of 500 high school students participating in PBS NewsHour Student Reporting Labs at member stations indicated that in addition to gaining skills in communication, collaboration, and technology, students gained significant new knowledge across a wide range of subjects, became more self-confident and intellectually curious, and gained media literacy skills. Students also demonstrated an increased commitment to civic involvement (Hobbs, R. & Donnelly, K., 2013).

STEM Learning

PBS science, technology, engineering, and math (STEM) resources geared to all ages have helped students and adults become more able to understand key concepts, apply what they learn, and increase their interest in STEM fields. Of the 35 relevant STEM studies, 97 percent found significant learning (74 percent fully positive, 23 percent

mixed). Of the 19 of these studies focused on math learning only, 95 percent showed significant results (63 percent fully positive, 32 mixed). Of the 11 studies focused on science only, all showed positive impact (82 percent fully positive, 18 percent mixed). All five STEM studies focused on both math and science had fully positive outcomes.

RESEARCH SPOTLIGHT: PBS Programs and STEM Learning

Studies of the impact of STEM content in grades three to five, supported by Ready to Learn grants, indicate that *CYBERCHASE* and *DragonFlyTV*—two programs that use real, inquiry-based investigations to teach science—helped increase children’s content knowledge significantly and build critical thinking and problem-solving skills as well as student interest in science fields (Fisch, et al., 2010; Flagg 2009; and Rockman and Borland, 2006).

Similarly, elementary and middle school students watching a variety of shows—including *Mission: Solar System*, *FETCH!*, and *Lost in Loop*—increased their knowledge of math and science (Paulsen, 2013).

In middle and high school, studies of the impact of PBS STEM content—such as *Get the Math Modules*, *Design Squad Nation*, and *NOVA Labs*—showed that students demonstrated improvement in the ability to apply concepts and procedures to new problems, to understand key science and engineering concepts and processes, and to interpret and use scientific data (Fisch, 2012; Paulsen, et al., 2011; Sickler and Wojton, 2014). PBS content from *Design Squad Nation* also was shown to dispel negative stereotypes about these fields and to spark student interest in pursuing them (Paulsen, et al., 2011).





Lifelong and Out-of-School Learning

For adult learners, researchers have studied the impact of several PBS shows on student and public knowledge of current events as well as civic engagement. PBS content has been shown to increase adults' knowledge of science, technology, scientific research, and crucial issues in science, and to encourage people to pay more attention to these issues and discuss them with colleagues, friends, and family.

In fact, **all of the relevant studies for adult learning (82 percent fully positive, 18 percent mixed) showed statistically significant impacts on learning.** Specifically, programs such as *NOVA Making Stuff* and *NOVA science-NOW*, as well as shows on specific science topics, were shown to increase public understanding of, and interest in, science issues and scientific research. Research has shown that science content knowledge increased as a result of watching, and knowledge gains were stable over time.² Research also indicates that community campaigns run in partnership with PBS member stations raise awareness about key issues.^{3,4}

In addition, **all of the studies of student learning outside of school demonstrated significant learning** for students using PBS content, whether at home (61 percent fully positive, 39 percent mixed), at camp (83 percent fully positive, 17 percent mixed), or in after-school programs (80 percent positive, 20 percent mixed).

Many of these extracurricular learning efforts are PBS station-led initiatives in partnership with local organizations. These efforts—in schools, libraries, community centers, museums and science centers, and PBS stations—provide after-school and summer academic enrichment to bolster learning and student confidence, and opportunities for guardians, families and childcare providers to learn more about how they can help children learn. They also provide opportunities for members of communities to come together across age groups and other characteristics to participate in informal, community-based learning experiences.

RESEARCH SPOTLIGHT: SUMMER CAMPS

Some PBS member stations host Summer Learning Camps associated with *The Electric Company* and *SuperWhy!* Studies of these camps have shown:

- significant learning gains
- increase in skills and knowledge
- elimination of summer learning loss

Specifically, children participating in *The Electric Company's* Summer Learning Program showed:

- 20 percent gain in numeracy skills
- 41 percent gain in mathematics vocabulary

- 17 percent gain in phonics skills (McCarthy et al., 2011)

Similarly, in a study of 80 *Super Why!* Reading Camps, participating children showed:

- 112 percent gain in word decoding
- 64 percent gain in encoding
- 33 percent gain in reading words
- 20 percent gain in letter sounds

(Marshall et al., 2011, cited in CPB, *Findings from Ready to Learn*, 2005-2010)

Technology Platforms

As the way people engage with media continues to evolve, there has been continuous research on the impact of technology on learning, from mobile devices and apps to online games and other media.

The research shows that combining PBS digital games, hands-on learning activities, and video episodes from different programs increases student literacy and numeracy skills, is useful for children at different levels of performance, and can help families work with children to improve their skills.^{5,6}

Across 63 studies about video and television delivery, 99 percent showed statistically significant impact (59 percent fully positive findings, 40 percent mixed). All of the studies involving games, interactives, and tablets (62 percent fully positive, 38 percent mixed); web pages (69 percent fully positive, 31 percent mixed); and use of documents and lesson plans (57 percent fully positive, 43 percent mixed) revealed significant student learning outcomes. Of the 28 relevant studies exploring the impact of PBS online teacher resources, 97 percent showed significant impact (79 percent fully positive findings, 18 percent mixed).

PBS content is effective because it makes the best use of different kinds of media and continues to combine these to reach young people in ways that produce the best results.

For example:

- All of the 13 relevant studies focused on a combination of television and/or video and web pages (77 percent fully positive, 23 percent mixed). All of the six relevant studies exploring how PBS television and video were combined with web pages and online teacher resources showed positive results as well (83 percent fully positive, 17 percent mixed).
- All of the six relevant studies reviewed that explored how PBS television and video were combined with games, interactive, or tablet activity and web page materials had fully positive findings.



Teacher Professional Learning

Numerous studies indicate that PBS content for educators has helped teachers become more effective in teaching literacy, math, and science skills. PBS content—much of which comes from PBS TeacherLine’s professional development courses—also has helped teachers to become more knowledgeable about subject matter, more able to integrate technology, more adept at introducing instructional approaches tied to best practices, and more confident in their teaching.^{7,8,9,10}

In fact, all of the 24 studies reviewed that had data on student learning (most of which was teacher self-reported data from surveys) found statistically significant results

(75 percent fully positive findings, 25 percent mixed), including for ELA teachers (62 percent fully positive, 38 percent mixed) and math and science teachers (80 percent fully positive findings, 20 percent mixed).

The research shows that teachers rely on PBS for educational content and that efforts like *DragonFly TV*,¹¹ *The Electric Company*,¹² *NOVA Labs*, *PBS Transmedia Math*, *Project VITAL*, *QUEST*, *Sid the Science Kid*, *Teaching Tips*, and PBS LearningMedia have a significant impact on teaching practice, and in many cases, on student learning, engagement, and understanding of complex concepts.^{13,14,15}



PART 2: 2015 PBS LearningMedia Impact Study

Changes in technology have transformed consumer and classroom behaviors. “Digital natives” enter school hungry for rich digital experiences. Educators see technology as a tool for classroom innovation. In response to this growing need, PBS, in partnership with the WGBH Educational Foundation, created PBS LearningMedia in 2011. An online digital media library, PBS LearningMedia is a free resource of educational materials for teachers, students, parents, and home-schooling families nationwide.

The library aggregates the research-based content produced by PBS, member stations, and public media partners, including the National Archives and NASA. It also draws from our rich history of programming, which includes such critically acclaimed PBS programs as *NOVA*, *FRONTLINE*, *American Experience*, and *PBS KIDS*.

PBS LearningMedia has the fastest-growing library of curated digital resources for educators in the PreK-12 market. The digital library currently offers teachers more than 100,000 videos, images, interactives, lesson plans, and articles in major subjects covering more than 7,000 PreK-12 curriculum topics. Among its most rapidly growing set of materials is a library of more than 1,000 Spanish-language videos spanning a wide range of subjects, including a large number in STEM fields.

But to what extent does PBS content have an impact on teaching and learning in classrooms?

To understand what happens to student achievement when students use PBS LearningMedia intensively, PBS in June 2014 engaged EDC to examine learning outcomes in 36 middle school science, math, English language arts, and social studies classrooms.

The impact study was designed to address:

- What is the effect of the use of PBS LearningMedia resources on student learning?
- What is the effect of the use of PBS LearningMedia resources on teachers and the quality of instruction?





On average students made gains of **8 percentage points** on content assessments

KEY FINDINGS IN CLASSROOMS USING PBS DIGITAL CONTENT

- **Students outperformed national assessment norms (NAEP) by 10 percentage points** and state assessment norms by 11 percentage points.
- **Students made sizeable gains in content knowledge across all four subjects**—science, math, English language arts, and social studies. On average, students made gains of 8 percentage points on content assessments from pretests to post-tests in each of the four subjects.
- **Students made significant gains in critical thinking skills.** More than half (56 percent) of students showed an increase in critical thinking skills after using the material for several weeks.
- **Teachers using PBS LearningMedia materials spent less time lecturing** and reported that the digital resources helped make student learning more active, collaborative, and engaging; improved critical thinking in the classroom; increased classroom resources; and provided more ways to use technology and individualize instruction.
- **The vast majority of teachers would recommend PBS LearningMedia** in their subject areas—English language arts (94 percent), social studies (90 percent), science (80 percent); and math (77 percent).

Participating teachers used a common set of PBS LearningMedia tools (two resources per lesson for 12-30 lessons) over a six- to 10-week period, allowing researchers to get a clear picture of the impact of consistent and intense use of purposefully selected digital content. The supplemental learning materials were identified by educators, PBS staff members familiar with PBS content, and EDC. They began by using existing curricula within the districts as starting points and searched for additional

resources from the PBS LearningMedia service to enhance the lessons.

The EDC research gathered information based on student test results on highly trusted assessments of subject matter knowledge and higher-order thinking skills (including questions from the National Assessment of Educational Progress and a state assessment) as well as from instructional logs, surveys of teachers and students, classroom observations, and informal interviews.



PBS LearningMedia improves student achievement and teaching

The new research found significant increases in student achievement and deeper learning across four subject areas. The research reiterates what scores of other studies have shown: PBS digital resources add significant value to student knowledge, engagement, and higher-order thinking skills and help teachers work smarter and more effectively.

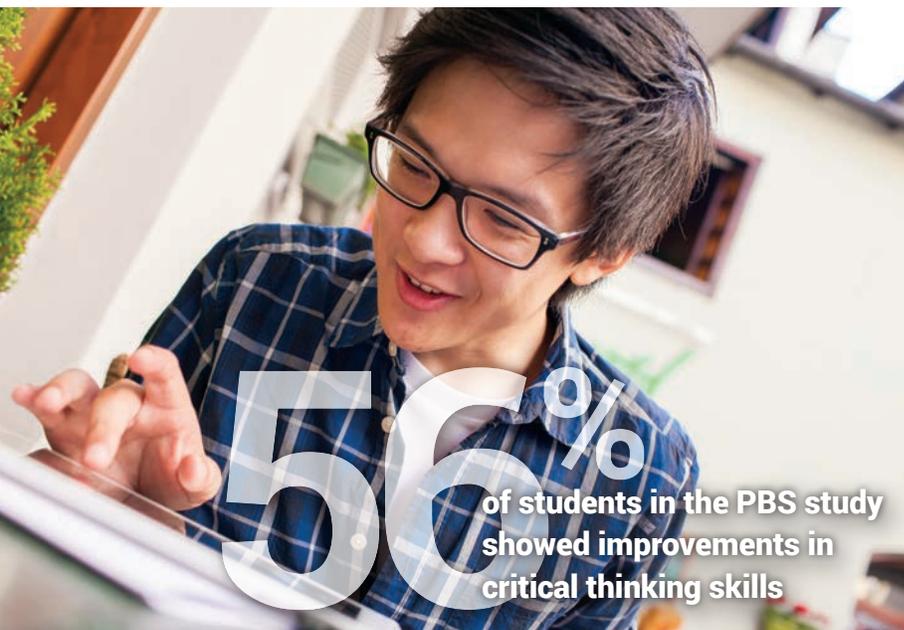
Students made significant gains in critical thinking skills. Some 56 percent of the students participating in the study showed an increase in critical thinking practices.

Using PBS LearningMedia tools improves teaching. PBS digital content met the rigorous expectations of the teachers who planned their curriculum with PBS LearningMedia resources. Specifically, teachers made significant shifts in their teaching practice and valued what the resources did for their classrooms.

The majority of participating teachers in three of the four subject areas—science (91 percent), math (69 percent), and English (54 percent)—say that PBS LearningMedia has helped their students become better able to connect the ideas covered in their classes to real-world contexts.

All social studies teachers (100 percent) and seven in 10 math teachers (69 percent) and nearly half of ELA teachers (46 percent) agreed or strongly agreed that they spend less time lecturing during class thanks to PBS LearningMedia tools and materials. Teachers in all subject areas said that the availability of the PBS content enabled them to help make student learning more active, collaborative, and engaging. For example:

- Almost three-quarters of science teachers (73 percent) agreed or strongly agreed that they are asking their students more open-ended questions with PBS LearningMedia resources, and more than nine in 10 (91 percent) participating science teachers say students are more engaged/interested.
- Nearly three-quarters of social studies teachers (72 percent) and more than half of science teachers (55 percent) reported that their students worked in small groups more frequently.
- Seven in 10 (70 percent) of participating social studies teachers and 46 percent of ELA teachers say their students are asking more and better questions during class.



Students in classes with PBS LearningMedia content made sizable gains in content knowledge. Students' average scores on content-area assessments were significantly higher after using the LearningMedia-enhanced lessons. The number of students who answered the content questions correctly on the post-assessment increased by 8 percentage points across subject areas. On several questions, students who performed below national norms on pretests significantly exceeded them after using PBS LearningMedia. **On average, students participating in the study outperformed the national average for selected NAEP assessment questions by 10 percentage points.**

In addition, social studies and science teachers, in particular, noted that the use of PBS digital resources prompted students to think more critically and to better understand content. About six in 10 participating science teachers (64 percent) and social studies teachers (60 percent) say their students think more critically as a result of using PBS LearningMedia in their classrooms. Meanwhile, 55 percent of participating science teachers say students better understand the concepts.

Between 80 and 100 percent of all teachers in each subject area agreed or strongly agreed that PBS LearningMedia materials provide more resources that educators can draw upon to support teaching and

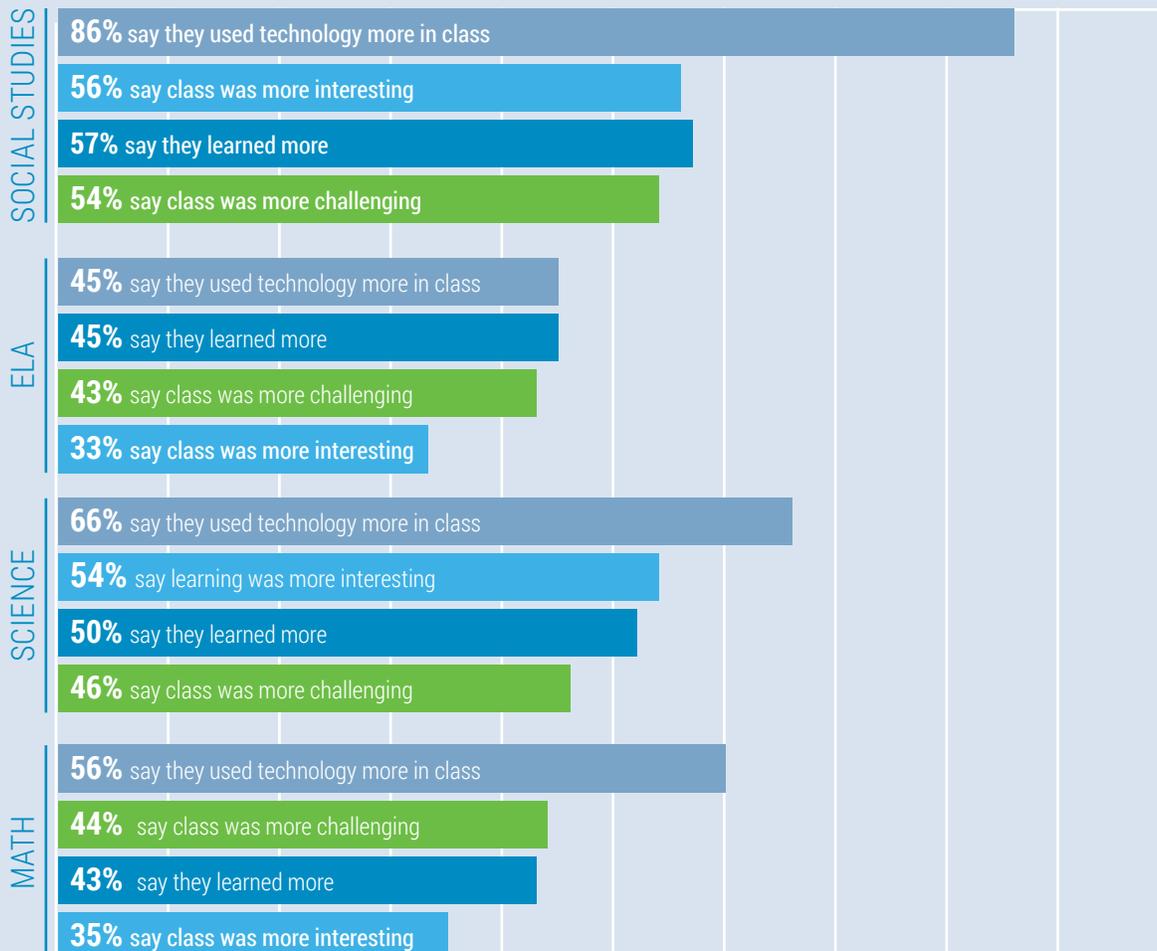
learning. Specifically, all science teachers, 92 percent of ELA teachers, 82 percent of math teachers, and 80 percent of social studies teachers agreed or strongly agreed that this was the case.

The vast majority of teachers would recommend PBS LearningMedia in their subject areas—English language arts (94 percent); social studies (90 percent); science (80 percent); and math (77 percent).

PBS's history of creating high-impact content has found a home in the rich offerings of PBS LearningMedia. The next section focuses on how PBS will continue to build its education portfolio with new products, tools and services.

STUDENT PERCEPTIONS BY SUBJECT AREA

Students say that PBS LearningMedia classrooms are more challenging and interesting, and that they learn more in them. Students participating in the EDC study noted that the digital resources brought classrooms alive and helped them visualize content, engage with learning activities, explore in deeper ways, engage more extensively with material, and work at their own pace.





PART 3: 2015 Future of Digital Learning Survey

The learning landscape has shifted significantly over the past several years. Learning is now multi-platform and multi-dimensional. Learners want information in the ways they are most likely to use it—in multiple formats using new devices. The classroom is no exception to this shifting landscape, requiring that PBS continue to develop and test new ways of delivering its content.

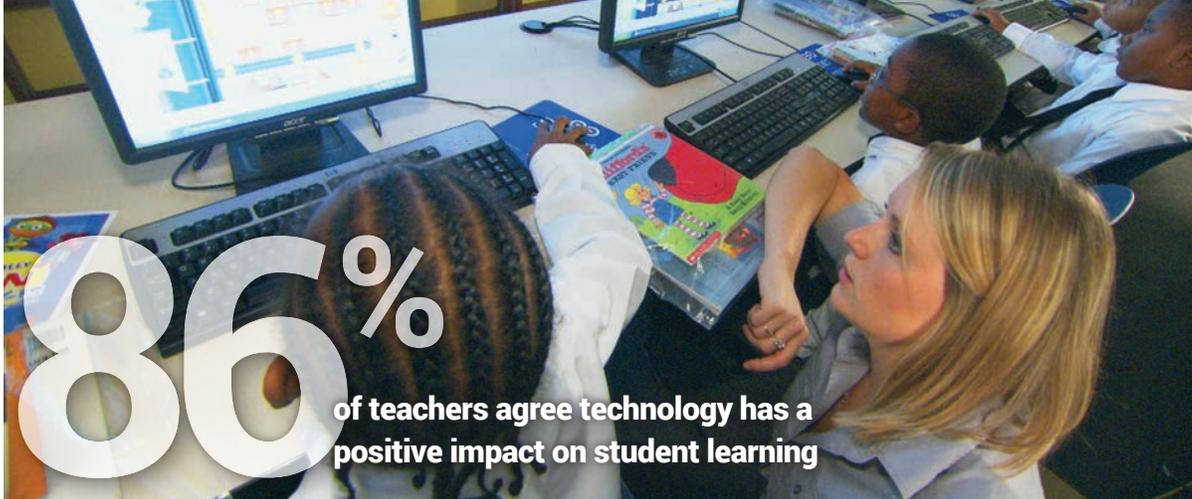
The best way to determine what educators will need and how they will use digital content is to ask the educators themselves what they are doing now and how that is changing. PBS conducted its most recent survey, the *Future of Digital Learning Survey*, in 2015 to better understand how PBS will need to adapt its content to improve teaching and learning in new educational contexts. More than 1,500 educators responded to a call for more information. Nearly two-thirds (65 percent) identified themselves

as classroom teachers, roughly evenly divided among elementary, middle, and secondary schools.

The study tells us how educators think technology will continue to transform teaching and learning in the years to come. Most excitingly, the research serves as a compass for PBS, reaffirming that our content and platforms like PBS LearningMedia are designed for the future of digital learning.

KEY FINDINGS:

- **Teachers value digital resources that support their lessons.** Teachers cite images, videos, and online lesson plans as the most valuable supplemental content, followed by games/interactives, apps, online professional development, and social media/blogs. Teachers overwhelmingly turn to the Internet to find these materials, with more than nine in 10 using Web searches and free education websites like PBS LearningMedia to find materials.
- **Nearly six in 10 educators (58 percent) think that they will use digital media to supplement textbooks,** indicating that they will look to content from sources like PBS LearningMedia to supply what textbooks alone cannot.
- **Teachers see future uses of technology continuing to evolve.** Most believe technology will continue to serve a supplementary role in the next few years, but that project-based learning, 1:1 device implementation, game-based learning, and blended learning will become increasingly important. These strategies are already being put into use, with two-thirds of teachers using project-based learning, while half have used game-based learning and 44 percent have used blended learning strategies.
- **Teachers believe their role will change as they implement more technology.** Currently, they are almost evenly split between being comfortable with experimenting with new tools and desiring additional support or direction from their schools.
- **Tools are becoming more mobile—and more personal.** The tools teachers say they are using more frequently than in past years are the ones that support 1:1 learning (each student with his or her own technology device), including tablets, e-readers, and mobile devices encouraged by bring your own device (BYOD) policies. While these tools are also among the ones large numbers of teachers report not yet using in their classrooms, they lead the technologies educators believe will be used more frequently over the next five to seven years.



Following are the findings in greater detail:

Educators who use technology overwhelmingly see its benefits. Large majorities of survey respondents agree or strongly agree that classrooms need to embrace a 21st-century curriculum (88 percent), that technology is a teaching aid that would be hard to live without (84 percent), that technology is a new and exciting way to communicate with and motivate students (92 percent), that it allows teachers to go deeper into core curriculum topics than ever before (85 percent), that it has a noticeable positive impact on student learning (86 percent), and that it creates an environment of greater student collaboration (78 percent). Conversely, just one in three believes that using technology requires too much work on the part of teachers.

Not all technology-savvy teachers have access to multiple media. While more than eight in 10 have access to personal computers, only a little more than half have interactive whiteboards, tablets, and electronic readers. Other tools, including mobile devices, are used daily by at least one-fourth of teachers.

Technology Used by Educators	
TEACHERS SUREYED	1,544
Personal computers or laptops	81%
Interactive white board (e.g., SMART Board)	58%
Tablets/electronic readers (iPad, Kindle, etc.)	52%
Mobile devices (including cell phones, smart phones, iTouch devices)	41%
Portable lab	29%
Chromebooks	23%
Other	9%
None of these	1%

Technology is being used more frequently in the classrooms of teachers who are most comfortable with it. Fewer than one in 10 educators surveyed said that they are using these tools less frequently than in past years, and fewer than 10 percent of teachers said they never use any type of technology specified as instructional tools.

Tools are becoming more mobile—and more personal. The tools that tech-savvy teachers say they are using more frequently than in past years are the kinds of devices that support 1:1 learning, including tablets, e-readers, and mobile devices such as those encouraged by bring your own device (BYOD) policies. However, these tools are also the ones that the largest numbers of teachers say they have never used in their classrooms, suggesting that the implementation of these tools and policies remains uneven. But that is likely to change: tablets, e-readers, and mobile devices also lead the technologies teachers believe will be used more frequently over the next five to seven years.

Teachers who use technology believe these tools help them in important ways. Large majorities believe that using educational technology helps them reinforce and expand on the content they are teaching (88 percent), demonstrate something they couldn't otherwise show (80 percent), and respond to students with different learning styles (79 percent). Other benefits more than half of all teachers cite include increasing student motivation, making students more technology-literate, providing additional practice for struggling students, changing the pace of classroom work, and teaching current events and breaking news.

Technology users value digital resources that can support their lessons. They rank images, videos, and online lesson plans as the most valuable supplemental content, followed by games/interactives, apps, online professional development, and social media/blogs. Those who use these resources use them regularly—nearly one in three teachers uses images in lessons every day.



Educators who use technology overwhelmingly turn to the Internet to find supplemental content. Most teachers find digital learning materials through Web searches (93 percent), free education websites including PBS LearningMedia (91 percent), and video sites like YouTube (88 percent). Fewer than half access school and district-supplied resources (40 percent) or paid services (38 percent). Teachers also say these readily available materials are sufficient for their needs: More than three-quarters of teachers (76 percent) say they have the content they need to support technology use in their classrooms.

Online Resources Used by Educators

TEACHERS SUREYED	1,544
Web searches (Google, Bing, etc.)	93%
Free education sites (e.g. Share My Lesson, PBS LearningMedia)	91%
Video sites (YouTube, SchoolTube, etc.)	88%
News sites (NBC, CNN, etc.)	42%
School or district supplied resources	40%
Paid subscriptions (e.g. Discovery, Safari Montage)	38%
Other	8%
None of these	1%

Educators who use technology believe digital media will continue to serve a supplementary role in the next few years. Teachers are skeptical about online textbooks, with less than a third of teachers believing their teaching materials will become online-only in the next five to seven years. Most (58 percent) expect to continue to use digital resources to support traditional textbooks during that time period.

But the nature of supplementary technology will continue to evolve, these educators say. Teachers believe project-based learning and 1:1 device implementation will become more important classroom techniques over the next five to seven years, as will game-based and blended learning scenarios. And they're already being put into use—two-thirds of teach-

ers (74 percent) already are using project-based learning, while half (50 percent) have used game-based learning and 44 percent have used blended learning strategies.

Supplementary Technology Forecast

TEACHERS SUREYED	1,544
Project-based learning	74%
Game-based learning	50%
Blended learning	44%
1:1 device implementation	35%
Bring Your Own Device (BYOD)	31%
Flipped learning	24%
Coding	17%
Other	3%
None of these	8%

Teachers know how to use these tools—but they want more training on how to put them to better use. Only 12 percent of teachers have not had any formal educational technology training, but large numbers say they want more, particularly for specific tools whose use is growing. More than half (51 percent) want more training on tablets and e-readers, while 36 percent want training on supporting the use of mobile devices by students. Nearly as many (46 percent) say they need more training for interactive whiteboards. Teachers are roughly split between being comfortable with experimenting with new tools and desiring support—nearly four in 10 say they wish their schools or districts had a special department to support teachers on technology, and one-quarter wished they had more direction on how to use it.

Teachers know their role is changing. Majorities believe that as technology becomes more prevalent in the classroom, teachers will focus more on technology implementation, spend more of their time teaching online, and will require new skills in technology support. Less than 15 percent agree or strongly agree that their role will stay the same.

Conclusion

As this report shows, numerous studies by a variety of researchers have found, across multiple subject areas and formats, that PBS content has a statistically significant positive impact on learners of all ages. This impact is likely to continue well into the future as digital media continues to play an important role in learners' everyday lives.

PBS, its member stations, and partner organizations remain committed to producing high-quality educational content, informed by research, that inspires, engages, and entertains learners of all ages – wherever learning is happening. Our approach is to optimize learning for all age groups in ways that work in diverse settings. With support from federal agencies, partners, and members, PBS will continue to deliver rich, trusted, and effective digital media to help people learn more and be more.



PBS digital resources add significant value to student knowledge, engagement, and higher-order thinking skills and help teachers work smarter and more effectively.

Endnotes

1 Urban children who watched *Martha Speaks* at home over 4 weeks (16 episodes) made such large gains in vocabulary that researchers noted the significant promise of educational television to help prepare readers and to lower failure rates in school: “[E]ducational television designed using evidence-based vocabulary instructional best practices is an easily scalable, near universally available intervention tool with the power to reach young children most at-risk for early and lasting reading and school failure.” See Linebarger, D. L. (2010), *Television’s impact on children’s reading skills: A longitudinal study*. Philadelphia, PA: Annenberg School for Communication, University of Pennsylvania.

In a series of studies, researchers at the University of Pennsylvania found that students learned more by watching *Between the Lions* and reading books and print materials based on the same characters than by simply watching the show. Researchers then found large gains when teachers were also supported with lesson plans, additional learning tools, and coaching and mentoring. A 2010 randomized controlled study by researcher Deborah Linebarger found that low-income African-American students in classes where teachers had all of these supports made gains of up to 300 percent on key aspects of early literacy—including tests of oral language and vocabulary, word recognition, and phonemic awareness. (See <http://www.cpb.org/rtl/FindingsFromReadyToLearn2005-2010.pdf>, p. 19).

In 30 weeks, the gains posted by low-income and African-American children were large enough to put them on course to catch up with middle-class and European-American children. See Linebarger, D. L. (April 2009) *Evaluation of the Between the Lions Mississippi Literacy Initiative 2007–2008*. Philadelphia, PA: Children’s Media Lab, Annenberg School for Communication, University of Pennsylvania.

A longitudinal study conducted by Linebarger of 141 kindergarten children living in low-income, rural settings in the Appalachian region of the United States showed that children who used *SuperWHY!* for a four-week period at the beginning of the school year improved their early literacy skills continually throughout the academic year. She also found that higher levels of exposure (including viewing the program, engaging with classroom literacy materials, and playing a character’s game of the week online) added further benefits. See Linebarger, D. L. (2010). *Television’s impact on children’s reading skills: A longitudinal study*. Philadelphia, PA: Annenberg School for Communication, University of Pennsylvania.

2 The *NOVA Making Stuff* Season 2 series and website were shown to significantly increase public understanding that basic research leads to technological innovation. The series and the website engaged the public and made them excited about scientific innovation and more interested in learning about it. See Paulsen, C. A., Beauchamp, A., & Bylund, J. (2014). *NOVA Making Stuff Season 2: Summative evaluation report*. Concord, MA: Concord Evaluation Group.

Adults watching *NOVA scienceNOW* on TV and online reported that the program contributed to their sustained interest in current scientific research. They appreciated content that was related to an existing topic of interest, that was innovative and exciting, and that pushed the boundaries of their thinking. Participants increased their use of multimedia resources to learn about current science research. They were inspired to seek out additional information and to discuss stories from the series and website with family, friends and colleagues, and particularly their young children. Participants actively searched to join science cafes associated with *NOVA scienceNOW* in their area(s). See Bachrach, E. R., Parkinson, K., & Goodman, I. F. (2011). *NOVA scienceNOW Season 5 summative evaluation: Executive summary*. Cambridge, MA: Goodman Research Group, Inc.

Viewers of *NOVA scienceNOW* believe the program is successful in making science content approachable for all viewers. Science content knowledge increases as a result of watching, and knowledge gains remain over time. The topics featured in NSN often lead to later conversations with friends, family, or colleagues. During a three-month viewer study, almost all participants discussed at least one NSN topic with a friend, family member, or colleague. Interest in both biomedical topics and careers were positively influenced by the NSN activities (Peterman, K., Pressman, E., Goodman, I., 2007).

3 Orlando, E., Coddington, N., Herman, T., & Knestis, K. (2011). *WXXI/WSKG LSI (Local Service Initiative), Healthy You/Working on Wellness: Child obesity prevention in the western and southern regions of New York State, final evaluation report*. Syracuse, NY: Hezel Associates.

4 Goodman Research Group (March 2001). *Building Big outreach evaluation: Executive summary*. Cambridge, MA: Author.

5 Penuel, W. R., Bates, L., Gallagher, L. P., Pasnik, S., Llorentea, C., Townsend, E., Hupert, N., Domínguez, X., and VanderBorgh, M. (2012). Supplementing literacy instruction with a media-rich intervention: Results of a randomized controlled trial. *Early Childhood Research Quarterly* 27 (1), 115–127.

Credits:

6 Pasnik, S., & Llorente, C. (2013). *Preschool teachers can use a PBS KIDS transmedia curriculum supplement to support young children's mathematics learning: Results of a randomized controlled trial*. A report to the CPB-PBS Ready To Learn Initiative. Waltham, MA: Education Development Center & Menlo Park, CA: SRI International.

7 See, for example, the following studies on TeacherLine: Hezel Associates, LLC (2010). *Testing the efficacy and impact of a selected PBS TeacherLine course: Final report*. Prepared for PBS Teacherline. Syracuse, N.Y.: Author.

8 McCarthy, B., Tiu, M.; Li, J., Martinez, S., Tafoya, A., and Flaherty, J. (2011). *Evaluation of PBS TeacherLine Peer Connection Website*. A report prepared for the Public Broadcasting Service. Washington, D.C.: WestEd.

9 Overbaugh, R. & Lu, R. (2008). The impact of a NCLB-EETT funded professional development program on teacher self-efficacy and resultant implementation. *ISTE Journal of Research on Technology in Education*, 41 (1). Retrieved from <http://files.eric.ed.gov/fulltext/EJ810574.pdf>.

10 Lowther, D., Ross, C., Burgette, J., Huang, Y., Zoblotzky, T., & Sivin-Kachala, J. (2012). *Teaching climate change: Results from the Fall 2010 - Winter 2011 evaluation of PBS TeacherLine's Global Climate Change Education (GCCE) Professional Development*. Memphis, TN: Center for Research in Educational Policy.

11 Rockman, S. and Borland, J. (2006). *Using video in the science classroom: Report on a four-month study of teachers' use of DragonflyTV videos and educator guides*. San Francisco, CA: Rockman et al.

12 McCarthy, B., Michel, L., Tiu, M., Atienza, S., Rice, J., Nakamoto, J., & Tafoya, A. (2011). *An evaluation of The Electric Company summer learning program*. A report prepared for the Corporation for Public Broadcasting and the Public Broadcasting Service. Washington, DC: WestEd.

13 Paulsen, C.A., Green, S. & Carroll, S. (2011). *Design Squad Nation: Evaluation report*. Concord, MA: Concord Evaluation Group, LLC.

14 Hezel Associates (2008). *Project VITAL final summative evaluation report*. Prepared for PBS Channel Thirteen/WNET. Syracuse, NY: Author.

15 McCarthy, B., Atienza, S., & Tiu, M. (2012). *Evaluation of Boston University's Teaching Tips Modules for using PBS KIDS transmedia suites in kindergarten classrooms*. A report to the CPB-PBS Ready To Learn Initiative. San Francisco, CA: WestEd.

A complete bibliography of the studies examined in this report is available online at http://pbs.bento.storage.s3.amazonaws.com/hostedbento-prod/filer_public/PBSLM%20Marketing/PBS%20Learn%20More%20Bibliography.pdf

Editorial and Design: CommunicationWorks, LLC

Photos:

Cover, bottom row, second photo from left: CURIOUS GEORGE® & © 2014 Universal Studios and/or HMH. All Rights Reserved. FOR PROMOTIONAL USE ONLY

Page 2, last photo: DINOSAUR TRAIN™ & © The Jim Henson Company

Page 3, third photo from left: Courtesy of Theodore Roosevelt Birthplace National Historic Site

Page 6: Courtesy of WGBH

Page 9, first photo on left: SID THE SCIENCE KID™ and © 2012 The Jim Henson Company; fourth photo from left: Courtesy of © 2013, Feline Features LLC

Page 11: Courtesy of DSPHANDEL

Page 12, first photo on left: Courtesy of WGBH; last photo: Courtesy of Rex Miller

Page 13: ©PBS

Page 14: Courtesy of NASA

Page 20, second photo from left: Courtesy of WGBH

