

**Testimony for U.S. House of Representatives
Committee on Science and Technology
Subcommittee on Research and Science Education**

Beyond the Classroom: Informal STEM Education

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2318 Rayburn House Office Building

Robert M. Lippincott

Good morning, Chairman Lipinski, Ranking Member Ehlers and esteemed members of the sub-committee. My name is Rob Lippincott, and I am Senior Vice President-Education for PBS - the Public Broadcasting Service. As a former teacher, I greatly appreciate the opportunity to answer some of what I consider to be one of the most important questions in education today – what is the most effective role of informal environments in STEM Education?

There has never been a more critical time for both formal and informal science education and the continuing need to improve the quality of math and science education we provide our young people. Public broadcasting was founded to lead in the development of educational media, particularly informal education.

I will use my time today to give you a few digital glimpses of some of the important work PBS and the public media community is doing with respect to:

- The role of digital and electronic media in educating students
 - “on the air” with our traditional television programming;
 - “online” with some very exciting new media programming;
- The role informal education plays in broadening participation and promoting diversity in STEM fields
 - “on the ground” with a “360 degree” approach to community engagement;
 - Impact of research to build, deliver and assess programs;
 - The importance of teacher professional development to raise teacher effectiveness
- The role of partnerships with formal and informal education institutions

The Role Digital and Electronic Media in STEM Education – On the Air

PBS’ best known role in informal education is an open, universally available broadcast invitation, designed to do exactly what the newest of the 6 Strands of Science Learning recommends in the recent National Academies of Science study – *Learning Science in Informal Environments: People Places and Pursuits*: to “experience excitement, interest, and motivation to learn about phenomena in the natural and physical world.”

We like to say that “we educate with everything that we do” and as a system-wide survey shows, more than 97% of the 174 Public Broadcasting Service licensees use technology to deliver education services. For instance, Alabama Public television offers every

teacher in the state access to an array of media resources and professional development in a web service called “APTPlus”.

There are many more examples as public broadcasting has been a leader in educational television for more than 50 years. With its 356 member stations and our partnerships with community organizations and institutions of higher education in virtually every state in the nation, PBS offers all Americans the opportunity to explore new ideas and new worlds through television and online content. Available free of charge to 99 percent of America’s television households, PBS reaches more than 65 million people each week - 14 million of them children – and invites them to experience the worlds of science, history, nature and public affairs.

Among the many award winning science television programs you may recognize – NOVA, Nature, Design Squad, Curious George, and, most recently, Sid the Science Kid – are leaders and models. We even have Neil deGrasse Tyson, named the “sexiest astrophysicist alive” by People magazine, hosting NOVA Science Now.

The Role of Digital and Electronic Media in STEM Education – Online

Television and on-air programs, however, are a small part of the entire informal education story. On-line broadband access and digital media is dramatically changing the opportunities and challenges the nation’s educators have to improve STEM education.

PBS has two new online initiatives which I find compelling: the PBS Kids GO! Broadband “channel” and a project we call EDCAR, the Educational Digital Content Asset Repository.

The online sites which collectively comprise www.pbskids.org draw a growing audience – now over 9 million 2-8 year olds every month. The latest experiment with the 6-8 year olds in this audience is called PBS Kids GO!, which presents an online media portal including full length TV episodes, clips and games. I believe that this is the first glimpse of what “television” will look like for all ages soon. Let me show you a short sample: *(PBS Kids GO! Clip)*.

As you can see, kids are not just watching TV, but playing with the characters, learning through games and exploring ideas – this set of tools is a powerful first step in building STEM savvy citizens!

I believe that we need to give students at every age and their teachers increased access to this kind of learning resource. EDCAR is the project to build a comprehensive public media database of the video and related digital resources that public media producers and our partners in the museum, university, media and research communities are creating across the nation. By collecting, organizing and aligning these resources to learning standards, we can create the best STEM learning tools for use in school, at home and in every learning setting. This project is underway with several dozen PBS stations and their partners. Let me give a very brief example of some work we are testing with teachers: *(EDCAR clip)*.

Research has shown the promise of systems like this and PBS is pursuing a first offering focused on STEM skills for middle school learners. PBS and stations need a core of national standards – in the words of the Council of Chief State School Officers – “fewer, higher, clearer” academic standards to focus upon. And we need the help of the educational research community to reveal the most critical goals and best practices for us to target.

EDCAR will provide a unified reservoir of online content and services, accessible and relevant to all of America’s. These materials are produced by producers, member stations and partners across the public media community. The individual media assets and the array of related media which comprises their educational context, offers every teacher and student a comprehensive curricular supplement in every subject from pre-school, to elementary school and through secondary school. The service is presented locally. It is designed to assist educators achieve measurable improvements in student achievement and be consistent and supportive of the standards set by state and local educators.

With each member station working with the corresponding state education agency, all of the content will be directed to the most critical targets of each community’s instructional core – with particular focus on those students at risk in our urban and rural areas. The state education agencies will provide the standards which the media addresses and will lead the implementation of the media services in its schools and classrooms. The learning goals identified by the state education agencies will specify the digital media produced by public media providers to fill out the repository, allowing teachers in every part of the country to find and effectively use the content that meets their students’ learning needs.

Role of Informal Education in Broadening Participation and Promoting Diversity - On the Ground

But in order to truly make a difference in informal educational efforts, we also need to go well beyond the “push” technologies of television and online program delivery. Our best example is PBS Kids Raising Readers which targets early childhood literacy where our best evidence of learning gains come from what we have called a “360 degree” approach to children – literally surrounding them at home, school and at play with learning opportunities and media. We hope to duplicate this success across STEM disciplines.

PBS KIDS Raising Readers literacy initiative, generously supported by the US Department of Education in a partnership with the Corporation for Public Broadcasting targeted specifically at underserved populations and minority groups. Appendix A reveals a full discussion of how PBS stations partner with schools, colleges and community organizations nationwide (*Public Television Stations: A Trusted Source for Educating America*, Jan 2008).

The long-term goal is to achieve measurable results in improving literacy skills of children in low-income families. We are working in 20 low socio-economic strata

markets in order to build successful models that can be replicated across the country. PBS is also eager to spread this success to STEM –to use these proven best practices in programming and engagement to broaden participation and promote diversity in every STEM discipline and field of activity.

The Role of Research

Educational media providers have learned to base all of their programming on learning research, rigorously testing every part of broadcast and online offerings. They must also now work with states to align media with recognized curricula and state standards to ensure that these materials are suited for use in formal as well as informal settings.

PBS measures the impact of its children’s series to ensure that they are accomplishing their goals. Very recent findings from key studies on two children’s series designed to teach early literacy skills – SuperWhy! and Between the Lions – show clear, measurable gains in every area targeted. The test results show that PBS is able to move the needle and improve the abilities of kids to learn. Again, we will be working to duplicate this success with literacy in targeted STEM disciplines.

The Role of Teacher Professional Development

But if we want to change learning – both formal and informal – in a lasting way, we need to prepare our teachers and care givers so that they are equipped and excited about sharing science. We need to invite them to become guides and coaches for learners and teachers of every STEM field.

We have some history in teacher professional development, but our most recent work is what I find the most promising. Most recently, we are building “how to” courses for pre-school and after-school teachers – care givers, parents and early educators – to help them make every environment a learning environment. Let me show you just a moment of what teachers see: (PBS TeacherLine “setting up your room” clip).

PBS TeacherLine, an online professional development program funded through a US department of Education Ready to Teach grant, has the goal of making professional development accessible, affordable and engaging for teachers and care givers. I believe that this kind of “anytime/anywhere” professional development – we have called it “pajama-compatible” can help inspire and guide formal and informal STEM learning at every age and in every discipline.

We offer more than 135 courses – 35 in Science disciplines and 35 in Math. We work with 23 colleges and universities in all 50 states, through 66 PBS stations. (See Appendix B for a selected list of PBS TeacherLine partner universities and community organizations). More than 42,000 educators have taken a course since 2004. Graduate credit-bearing courses help teachers remain certified. A growing set of tools support teacher leaders in their professional learning communities. Recently published research (in the *Journal of Computing in Teacher Education*, Fall 2008) attests to the effectiveness of this medium to build teachers’ “competence and confidence in instructional technology integration”.

The Role of Partnerships

A consistent theme I hope you have heard is “partnership”. PBS and its member stations are only part of any collective effort to build a scientifically literate community.

The federal partnership is crucial in this process. PBS has received generous support from the Department of Education for our *Ready to Learn* and *Ready to Teach* initiatives. Last year the *Ready to Compete Act* which reauthorizes both of these programs, was introduced by Congressman John Yarmuth from Kentucky. We hope it will be introduced again in this new Congress and receive the strong support we believe it deserves.

The kind of research, truly a scientific discipline and a burdensome cost to producers, is critical to establishing the techniques and practices public media producers need to serve educational goals. We continue to need academic and research partners in universities and key government agencies, including the National Science Foundation, the National Institutes for Health, NASA, and NOAA. We have good working relationships with each of these agencies and strongly support their programs.

Conclusion

I hope I have helped to make a case today for the importance of the role informal environments play as well as the urgency of the effort to target science, technology, engineering and mathematics learning. I see this as one of the most vital roles the public media community has to play: on the air, online, on the ground, guided by research, and actively supporting educators.

There is very promising evidence that media is a powerful way to facilitate learning in and out of the classroom. We need to apply the lessons we have learning producing appealing television programs, effective educational media resources and “360 degree” community engagement for topics like literacy to the urgent problems of STEM education.

I want to close by once again expressing my appreciation to the Subcommittee for the opportunity to appear today to discuss the role of informal science education. The Academies’ new report suggests that there is strong evidence that we are on the right track. But I think we would all agree that we still have a long way to go to ensure all of our students have the scientific and technical literacy and know-how needed to compete in today’s highly competitive marketplace. PBS and its members are committed to playing an appropriate role using our resources and access via the audiences we serve.

Thank you.