Plugging the Leaky STEM Pipeline

How Out-of-School Time learning can excite youth about science

The 21st century workforce requires greater expertise in science and technology than ever before. While all students are exposed to basic science, technology, engineering and mathematics (STEM) learning at school, students lose interest at every stage of the pathway through education to career: the STEM education pipeline is leaky. Minority, low-income and female students are especially likely to turn away from STEM.

East End House and numerous community partners joined together for a roundtable discussion to address this challenge in conjunction with the Cambridge Science Festival on April 18, 2013.

Eric Lander, Founding Director of the Broad Institute of MIT and Harvard, opened the conversation by detailing the national importance of STEM education. Cambridge Mayor Henrietta Davis noted, “East End House is in the right business at the right time,” and added insight about how Cambridge is one of four pilot cities in the White House-initiated Activate Local Communities inclusion network. Daniel Weinstock of Cambridge Agenda for Children and Tracy Callahan of the Biogen Idec Community Lab also shared their perspectives on the importance of STEM learning for young people.

Major Themes

Science is changing and expanding:
In today’s world, science isn’t just microscopes and lab coats. Science and technology skills are applicable in almost every field, from urban gardening to fashion design. There are exciting opportunities for engaging youth with some of these creative applications of science.

Afterschool STEM provides opportunities for deeper exploration:
Out of School Time (OST) programs can excite children with in-depth projects that complement school learning. This enrichment time allows for skill development and concept mastery.

We need more research about afterschool STEM learning:
While there is general agreement that OST STEM learning is highly promising, there is a shortage of data. We need more research to identify best-practices and enhance efficacy.

STEM learning should be participatory:
Students are more engaged when they are actually doing science rather than simply learning about it. The science of sports and games is especially promising.

Partnership and collaboration are essential:
Politicians, funders, researchers, academics, professionals, nonprofits, parents and community members must all be partners in addressing the STEM pipeline.
Panel Discussion

Claudia Lach, Principal of Lach Consulting and Training, facilitated a panel discussion of experts who shared their perspectives on why we need to excite young people about STEM and promising avenues for doing so.

LARRY SUTER is a Visiting Scholar at the University of Michigan, as well as a former Program Director at the National Science Foundation and Statistician at the National Center for Education Statistics. Dr. Suter presented statistics of the STEM pipeline:

- Out of over 4,000,000 9th graders in 2001, only 7% had graduated with STEM degrees by 2011.
- U.S. students rank 20th in science ability out of the 30 OECD countries taking the PISA exam.
- Girls are more likely to believe they are not good at math, and the gender gap grows as students age.
- Hispanic and Black students are more likely to feel that science is useful, but report higher levels of anxiety in science class than their white peers.
- About 45% of students with high interest in science in grade 7 hold a STEM job by age 40.

G. MICHAEL BARNETT is an Associate Professor of Science Education and Technology at the Lynch School of Education, Boston College. Professor Barnett shared his knowledge of urban STEM education:

- Urban families often don’t have STEM parents who know how to encourage their children’s interests.
- 40% of STEM majors turn away from STEM in their first year of college.
- 73% of students leave the STEM field because of bad teachers. Investing in educators has a big impact on students.
- This generation wants to help others. It is important to show how science can contribute to social and environmental justice.

CHARLIE HUTCHINSON is the Director of the National Partnership for After School Science (NPASS) and a Senior Research Associate at the Education Development Center. Mr. Hutchinson shared his perspective and challenged the STEM Pipeline metaphor:

- Children need a solid science background at an early age. By high school, it’s too late.
- Afterschool provides valuable time for children to develop interest and identity in science. It nurtures important qualities including: observing, testing, questioning, explaining and problem solving.
- The metaphor of a pipeline assumes that only the 4.2% of students who graduate with STEM degrees are successful. Instead of a pipeline, STEM education can be seen as a watershed with many streams leading to productive careers including technological and scientific aspects.

KATIE MAGRANE is the Executive Director of the Massachusetts Afterschool Partnership (MAP). She shared about current initiatives in public policy relating to STEM education:

- The state and the Obama administration view STEM education as a vital workforce and defense issue.
- The Massachusetts Department of Higher Education’s STEM Pipeline Fund works for improved STEM instruction and an increased number of students interested in STEM.
- Lt. Governor Murray leads a STEM Advisory Council working to ensure students receive educations that prepare them for STEM careers.
- There are hopeful initiatives in Congress, including the Stepping up to STEM Act of 2013.

East End House would like to thank everyone who attended and the following groups who made this discussion possible: the Biogen Idec Community Lab, Cambridge Agenda for Children, Cambridge Science Festival, Education Development Center (EDC), Massachusetts Afterschool Partnership (MAP), and Program in Education, Afterschool and Resiliency (PEAR), a program at Harvard University and McLean Hospital.