JOM, Vol. 67, No. 5, 2015
DOI: 10.1007/s11837-015-1404-x

JOM themagazine

meet a member

Robert Shull Leads an "Adventure in Science"

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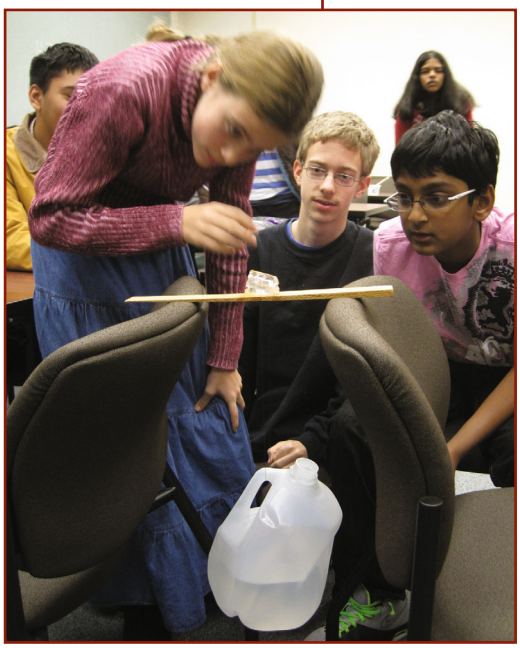
The telescope was primitive by any standard, consisting essentially of a cardboard tube and mirrors. But, when Robert D. Shull put it in the hands of one young boy participating in an Adventure in Science (AIS) program in the mid-1980s, it became a wondrous key to unlocking that student's future career as an astrophysicist.



Simple experiments like testing the stress effect on melting ice are designed to awaken AIS students to the possibilities of science around them. Shull feels that a significant contribution of AIS is "to improve the scientific competency of the general public."

It's those types of stories—dozens and dozens of them—that have kept Shull motivated to volunteer countless hours to AIS, an all-volunteer science outreach program, for more than 35 years.

On most Saturday mornings from October to mid-March, small groups of students ages 8 to 14 gather in six different AIS locations in Maryland to experiment and explore the fun of science. Leading each two-hour session is a professional scientist or technical expert who explains the scientific significance of what the students are experiencing as they launch model rockets, disassemble lawn mower motors, dissect cow hearts, and conduct other investigations into the science surrounding them in the world. The capstone event of the AIS year is structured like a scientific meeting, with every student giving an oral presentation on a project completed in a particular area of interest. "It is awesome at the end of the program year to see the poise of some young child making a scientific presentation that days before had elicited fear in him or her," said Shull, a Fellow with the National Institute of Standards and Technology (NIST) and 2007 TMS president.

Robert Shull (center) teaches an AIS session on the properties of metals.

Shull is currently the president of the AIS Board of Directors and helps manage the program that meets at NIST facilities in Gaithersburg, Maryland. He first got involved when, as the father of two small children, a local newspaper article caught his eye about a science enrichment program started in the basement of a retired NASA scientist. "Despite having to wait two years to enroll my son in the program, I liked the idea of it and volunteered to teach several sessions that year at a new site which had just opened up at the NBS (National Bureau of Standards, the precursor of NIST)." When the person who had been managing the NBS/NIST site left the area, Shull agreed to take over. He acknowledges that he was somewhat hesitant once he realized the full extent of the commitment, but "there was a dire need for someone to take on that responsibility so that the NBS site, which handled the largest number of students at that time, did not fail."

One of the first challenges that Shull tackled was making sure enough volunteers were willing and available to keep AIS

going. "I realized that if you kept the time commitment small, people would volunteer again and again," he said. "For the bigger jobs, if the number of volunteers is large, the work load for each becomes smaller, which reduces the probability of 'burning people out.' Shull also made it a requirement for parents to volunteer even a little time in support roles. He credits his "many hands make light work" philosophy for helping the AIS program grow from 80 students to its current roster of 250, with the number of concurrent sessions offered at the NBS/NIST site expanding from two to five.

Shull believes that an important milestone in ensuring the program's long-term viability was a memorandum of understanding signed with the Maryland State 4H in 1990 to help spread and strengthen AIS. "The 4H organization is the educational arm of the Agricultural Extension Service of the U.S. Department of Agriculture (USDA) and has agents in every county of every state whose mission is to educate the youth of America," explained Shull. "Being part of the USDA, it has historically focused on educating youth in agricultural topics, like food and animal science. The 4H organization was seeking a way to broaden the science it taught, and saw the AIS program as a good vehicle for accomplishing that objective. I would advise any TMS member interested in starting a similar outreach program to contact the local 4H to obtain assistance with meeting space, insurance, teacher training, and organizational details."

Beyond just getting larger, AIS has evolved in other ways, notes Shull. For instance, in 1980, approximately 10 percent of the participants were female. Today, that number stands at more than 50 percent. "Another major change is that the students now are much more computer proficient than in 1980," said Shull, "so, we can conduct more application sessions, including computer control of robotic devices."

AIS students gain hands-on experience in understanding fluorescence and spectroscopy.

Based on the many anecdotes and testimonials that have come Shull's way over the years, a number of AIS students have gone on to pursue science and engineering careers as adults. Shull stresses, however, that feeding the STEM (science, technology, engineering, mathematics) pipeline is just one aspect of the AIS mission. "One of the aims of the AIS program is to improve the general scientific literacy in the United States," said Shull. "I have jokingly stated in the past that I had 'failed' with my own son and daughter because they did not go into STEM professions. However, they have remarked to me that they constantly encounter scientific questions in their careers and daily life, and partially because of their exposure in AIS, they can both figure out the science and talk intelligently about those questions. I would argue that they are not isolated examples."

For information on starting an AIS program in your community, contact the 4H Adventure in Science organization through the website at www.adventureinscience.org.

member news

Jonathan Madison Receives BEYA Award

Jonathan D. Madison, Sandia National Laboratories, Albuquerque, was the recipient of a Black Engineer of the Year Award (BEYA) for Most Promising Scientist. A senior member of Sandia's technical staff, Madison was cited for "his pioneering work on computational materials and data science."

BEYA is a program of the Career Communications Group, a national media company focused on advocating for corporate diversity. Madison was formally recognized at the 2015 BEYA Conference Gala on February 7.

Jonathan Madison is a highly active TMS volunteer who was recently featured as a "real-life materials superhero" in TMS's educational outreach project, *Comic-tanium*™.