Better Educated Teachers Graduate Better Educated Students

The Teachers Institute gives teachers a real world approach to teaching science and technology.

Mark Spencer, WA8SME

Recent research indicates that students taught by teachers who have a deeper understanding of their subjects outperform students taught by less knowledgeable teachers. Therefore, investing in our teachers is one way to improve student performance.

Increasingly the education literature and media coverage of local school activities includes the term "STEM" or Science, Technology, Engineering and Mathematics. There has been a resurgence of emphasis on STEM education in response to the economic challenges we face from our high technology competitors overseas. This concern is far reaching, spurring initiatives at all levels, from the federal government, to school districts, to individual teachers, parents and even the students themselves. One such call to action, "Let's Solve This" (**letssolvethis. com/exxonmobil**) is a partnership between ExxonMobil and the National Math and Science Initiative that offers information for students, parents and teachers in the hope of strengthening math and science education in the US.

Today the prevailing wisdom is that STEM instruction should focus specifically on the *connection* between science, technology, engineering and mathematics, rather than on these content areas independently. It is the teacher's role to make these connections for students. To do so, teachers need to know the science and math content, and understand the relevant technologies in sufficient detail.

Meeting the STEM Challenge

To meet this challenge the ARRL® Education & Technology Program has been offering the Teachers Institute (TI) for the past 9 years. From the first pilot TI conducted in 2004, this in-service training program, supported entirely by donations, continues to evolve and to flourish. While donation levels have suffered recently due to the economic climate, two basic TIs and one TI-2 (an advanced TI for teachers who have completed the introductory seminar) are planned for this summer (see the box on this page for information).

The curricula of the TI courses are constantly

2013 Teachers Institute Schedule

Date	Location
TI-1 Introduction to Wireless Technology	
July 8-11	ARRL Headquarters, Newington, CT
July 15-18	Parallax, Inc, Rocklin, CA
TI-2 Remote Sensing and Data Gathering*	
July 22-25	TBD

*Contingent on receipt of funding.

"The workshop was right on the mark with the curriculum that I wanted to bring into the classroom...It provided both the knowledge and a cost effective way to do so."
— A TI attendee.

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being updated and refined to keep them relevant to the needs of today's teachers and students. This year, a TI-2 entitled *Remote Sensing and Data Gathering* is being tentatively planned. There has been rising interest among educators in high altitude balloons and robotic deployment of sensors to study remote and inhospitable environments. These kinds of activities are good examples of content that links science and math with technology and engineering in real world applications of fundamental concepts.

Design Your Own Mars Rover

The TI-2 *Remote Sensing* course focuses on the basic electronics behind the sensors, the analog to digital conversion of sensor data, the microcontroller programming involved in accessing the sensors and the use of radio (packet radio-like data links) to connect those sensor outputs to the user. Once the basics of remote sensing are introduced, the teachers will explore numerous deployment systems they might use in their classrooms including land and water robots, buoys, balloons and satellites.

The end goal of the TI-2 *Remote Sensing* course is to provide the in-depth knowledge

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and tools teachers need to help their students actually "do" remote sensing from start to finish. They will develop the sensor packages, collect the accumulated data and perform the math to understand the data. The aim is that the students themselves will be using technology to do research, rather than just passively watching someone else's activity.

The ARRL Teachers Institute is an intensive, expenses paid, 4 day in-service opportunity. It is designed to help participating teachers develop a deeper understanding of basic electronics, the science of radio, space technology, microcontroller programming and basic robotics. It also shows them how to make the connections between science and math concepts as well as the engineering and technical applications of those concepts — in other words, real STEM instruction that will result in *real* student learning.

"I have been to numerous training workshops, most sponsored by Fortune 100 companies. This one is right there with the best. Thanks for a terrific learning experience!"
— A TI attendee.

If you think a program like this would benefit your local school, encourage a talented teacher to consider attending a TI this summer. The schedule, application and the program specifics can be found at **www.arrl. org/teachers-institute-on-wireless-technology**.

If you need additional information, please contact ARRL Education Services Manager Debra Johnson at **djohnson@arrl.org** or at 860-594-0296.

Finally, please support ARRL's Education & Technology Program and the Teachers Institute with a donation at **www.arrl.org/ education-and-technology-fund**.

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