

Never Stop Learning!

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from QEX, November 2007

Although for many of us it has been a long time since we have seen the inside of a classroom (at least from the students' perspective), we should never say we are done with school, or have learned all that we can learn about a subject. Education is a life-long process. One of the things that has helped hold my interest in Amateur Radio for so many years is that there always seems to be something new to learn about. Whether it is a mode that I have not yet tried, construction techniques with new types of components or some different operating techniques, there always seems to be something else to learn.

In early August I had the opportunity to participate in an ARRL Teachers' Institute on Wireless Technology, conducted by Mark Spencer, WA8SME, at ARRL Headquarters. Mark taught the course at HQ for several years, and last year he also conducted several Institutes around the US.

The TI is a week-long, in-residence learning opportunity designed for motivated teachers and other school staff who want to learn more about wireless technology and bring that knowledge to their students. A variety of topics are covered during the 4 days of the TI, including basic wireless technology literacy, electronics, and the science of radio; bringing space into the classroom; ham radio operation; introduction to microcontrollers; and basic robotics. This is part of ARRL's Education and Technology Program, bringing wireless technology education to schools. It isn't teaching Amateur Radio licensing classes, and teachers who participate in the TI and/or who implement the program in their schools do not have to be licensed hams. Many of the participants are hams, however, or earn licenses after becoming

involved in the ETP.

During this four-day program, Mark teaches how to instruct various age groups about electronics and wireless technology. His demonstrations and activities are focused on the ARRL Education and Technology classroom curriculum, but could be used in a wide variety of settings. In my case, I plan to use some of the techniques in my work with Scout groups, teaching Radio Merit Badge classes, and also adapting some of the techniques to license classes when I help a local radio club teach the Technician license material.

Early in the week, Mark does the “magnet through a copper or aluminum pipe” demonstration. I’ve read about this demonstration, and understand the principles upon which it is based, but that didn’t quite prepare me for how dramatically slower the magnet falls through the conductive pipes than it does in free-fall, or through a PVC pipe, for example.

Mark has designed and built a number of “Exploration Boards” or “Experiment Boards” for teachers to use. For example, there is an Ohm’s Law Exploration Board that includes an on-board digital VOM and various two and three-pin connectors. Mark even provides an envelope full of various resistors already wired into the mating connectors. By plugging in resistors and connecting jumpers, you can measure the voltage and current at various points in the circuit. By recording the values given on the digital display, you have a very effective demonstration of Ohm’s Law.

Another board provides a circuit to allow teachers to explore basic resonant circuits and some DSP basics. Still another board provides various signals in a circuit that allows you to demonstrate frequency and wavelength relationships and even mix signals to demonstrate modulation (and demodulation).

A highlight of the course for me was learning to program a BASIC Stamp and seeing

how the microcontroller could be used to sense some condition and then control an output. I've read many articles about using microcontrollers (and edited a few for publication), and I've done some BASIC programming over the years, but I had never actually written a program and copied it into the microcontroller. The hands-on learning approach is a lot more fun than simply reading about it, or listening to a lecture.

I guess that's the point. When we are trying to teach something about our hobby and share our passions with others, no matter their age, a hands-on, actually-doing-something approach beats just telling them about it every time. That's probably not news to any of our readers, but maybe it will help us to pause and think about it for a moment. What demonstrations or techniques have you used to teach a class or help a newcomer understand the concepts of your passions? What might you do to make them more effective? Why not share that information with others? We would welcome your ideas.

I'd like to close with a more direct plug for the ARRL Education and Technology Program. If you are interested in sharing the excitement of wireless technology and electronics in general, and Amateur Radio specifically, this program is worthy of your support. The ARRL Development Office would be happy to provide you with more information about how your contribution can help sustain this valuable program.