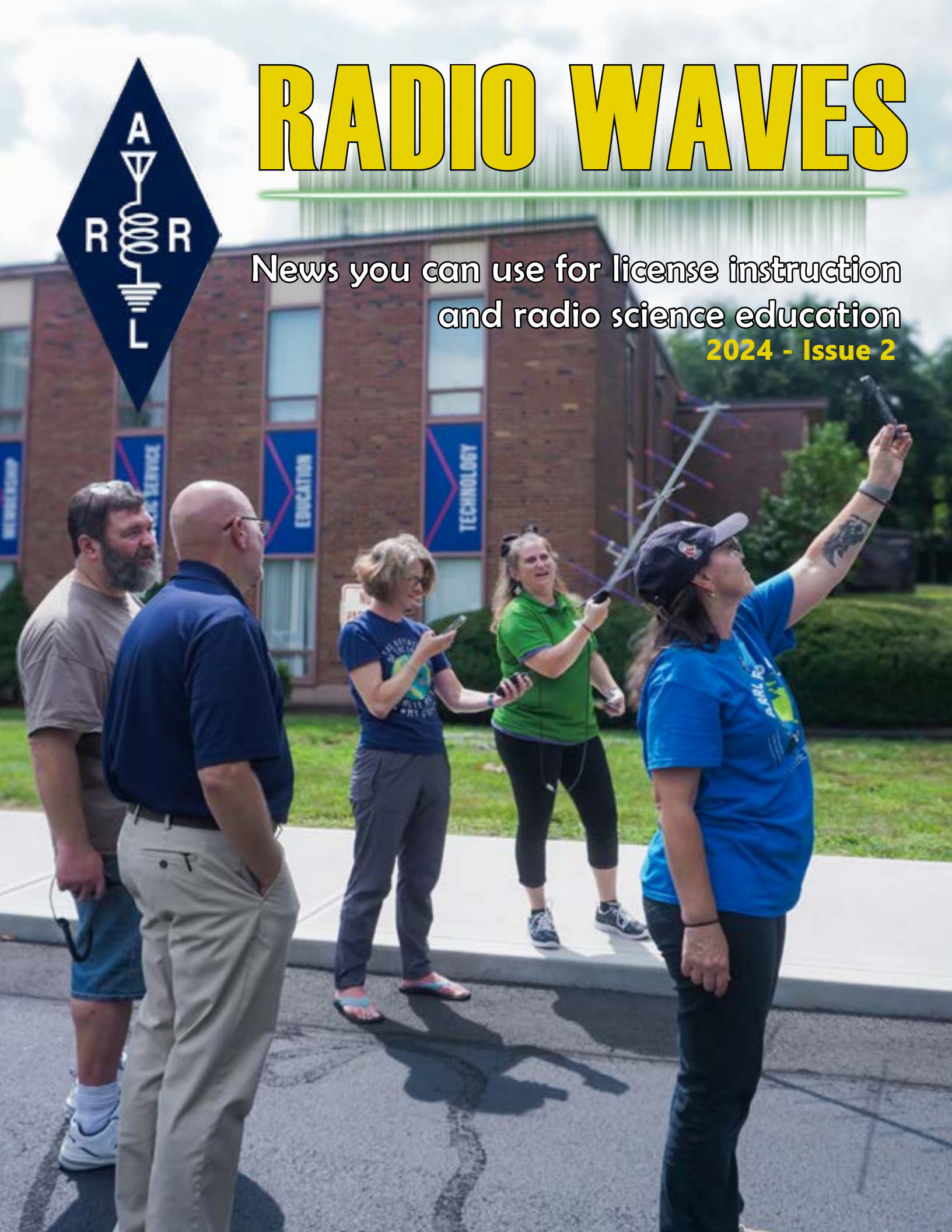
RADIO WAVES

News you can use for license instruction and radio science education

2024 - Issue 2



Read a note from ARRL National Instructor Gordon West, WB6NOA, at the end of this issue!

In this issue...

ARRL's first session of TI-3 Space launched this July. Rachel Jones, KO4HLC, solders solar panels for the pico balloon payload. Ray Cirmo, KC1QLS, lends a hand with the lesson. See more TI photos on page 8.

Teacher Spotlight: Scott Valenta (W9DU)

Interviewed by Eliza Croarkin, KC1TAP
Submitted 2024

Scott teaches 6th — 8th grade science at St. John the Baptist Catholic School, KE9AWT, in Winfield, Illinois. He is a TI-1 and TI-2 graduate.

Had you ever heard of amateur radio before attending Teachers Institute 1? How did you find out about the online application?

I grew up in a ham radio household. My dad is a radio engineer by trade, and my house growing up was full of radio equipment. My older brother took to it, asking my dad questions, getting his license, and eventually getting his doctorate in electrical engineering. I on the other hand, was more interested in sports, video games, and fishing and became a biologist instead. Radio didn't seem like my thing. A few years ago, I found a Reddit post by a local ham club advertising their weekend training class. I like trying out new things and figured, why not? What is there to lose? I could brag about it to my dad and brother at Thanksgiving. During the training, I found myself incredibly fascinated and saw lots of potential for doing cool and innovative things with my students. The club informed me that ARRL was the place to start for more information on radio, so I ended up there and stumbled across TI.

Ham radio is a multifaceted hobby. Which aspects of ham radio were most interesting to you both personally and professionally?

I can be a bit of an introvert, so while some operators love filling out the contact log, I'm much happier exploring the science side of things, receiving data from satellites, creating remote sensors, and seeing what is out there with an SDR. Truthfully, I think my favorite aspect of radio is seeing what students get in to. Last year, I had a student who found radio and CW interesting and made a project for the Science Fair on how antenna length increases the distance with the coherer effect (bascially a primitive morse code device). Some projects I'm currently working on (with student help) involve creating an ADS-B flight tracker, getting a permanent GOES receiver setup, and tinkering with Meshtastic®.

How did what you learned in TI-1 impact your teaching and school as a whole?

TI-1 showed me the immense potential of ham radio in education. I attended in October and came out saying to myself, "I need to incorporate this now". Truthfully attending TI absolutely transformed my teaching and my school. As an educator, you get those units that are just a chore to get through because typically they lack pizazz and fun/interesting labs. And if they're hard for you, you know they're hard for students to get through. Ham radio has helped to get students (and me!) interested. Astronomy was boring. Now we track satellites, monitor space weather, and will soon be listening to Jupiter. Electricity lessons focused on simple stuff like light bulb

“If you want your school and your teaching to stand out, TI will absolutely give you the toolset to do so”
- Scott Valenta

(From left to right) Drew Mortensen, AC3DS, Steve Goodgame, K5ATA, Wayne Greene, KB4DSF, Everton Henriques, KD2ZZT, and Scott Valenta, W9DU, smile after their TI-2 session finishes.

circuits. Now we work with transistors, potentiometers, Arduino boards and more, actually building things. We’re a private school, so attracting students is a must. If you want your school and your teaching to stand out, TI will absolutely give you the toolset to do so.

How did TI-2’s lectures and activities add to your previous understanding of radio technology?

TI-2 was an incredible experience for me, but not for the reasons I thought it would be. TI-2 ended up being all about the people. The ham radio community is full of people doing some absolutely amazing things with their students with radio. It’s a mix of educators getting their feet wet with radio. It was all about gaining knowledge and seeing how radio easily fit into the classroom. I went into TI-2 with all sorts of “buts” and “I can’ts”:

“I want to incorporate soldering, but I’m worried my junior high students will burn themselves.”
“I can’t solder very well, you do it to make sure it’s done right.”
“I need to work with a local club before we apply for an ARISS contact, we can’t do that on our own.”

Amazing educators like Drew Mortensen, AC3DS, and Everton Henriques, KD2ZZT, showed me that the only things limiting myself and my students were my own fears. You find out what incredible things other educators are doing with radio and their students, and I absolutely promise you, you can do that too! The people of TI-2 will help push you forward and inspire you. There are classrooms all over the country doing that thing you want to try, so why not just try, too?

You have been able to set up a remote testing session for your students. How did you prepare your students for the test? What tips would you pass on to other teachers? Any specific study tips or activities?

I’m proud to say that in 2024, I had over half my 8th grade class get their license. By the time we started talking about getting licenses, I was only about 3 months out of TI. I thought about what worked for getting my Technician, General and Extra licenses. I read ARRL’s license manuals, and extensively prepped using HamStudy.org. Could I give a license manual to an 8th grader and expect it to be anything other than an expensive locker decoration? Probably not. Instead we did the following. I already

had lessons on electricity and waves scheduled for the second half of the year, so I basically had a large chunk of the information needed to sit for the Technician exam scheduled.

As we learned and did labs, I related concepts to radio and the exam. I pointed my students in the direction of YouTube Technician exam prep (including Dave Caslers and Ham Radio Crash Course) for them to use as a review, to catch up from being absent, and for extra help. Why not learn some exam-focused material when reviewing electricity principles?

Finally I decided to incorporate some prep time using HamStudy.org.This was perfect for concepts you’d naturally have trouble cleanly fitting into what you’re doing in the classroom, such as FCC rules and regulations. Finish early? Hop onto HamStudy.org. I decided to sweeten the pot by raffling off a few Baofengs for any students who passed.

Probably the best tip I could give an educator would be to test early in the year. Don’t make the mistake I did of treating the license test as a capstone to the year. This added unnecessary stress for students who felt if they didn’t pass the test then, they’d miss their chance to easily test. It also completely prevented our ability to celebrate and use our new licenses. I was helping kids pay their FCC fee while they were lining up for graduation. Get those licenses, and get kids using them.

We both know how beneficial radio can be for hands-on, student-centered learning across grade levels. Are there any challenges you have experienced or can foresee about bringing radio into the classroom?

Yes! I actually experienced quite a few challenges while incorporating radio into my classroom. I had a student who desperately wanted his license, but his parents refused on the grounds that they didn’t want to give the FCC his social security number to get his FRN. No amount of information or explanation could sway them. I think the right call here is to inform and not push.

Ham radio is so vast and deep in science, that one person could hardly understand everything perfectly. Prior to TI-2, I found my lack of knowledge so frustrating. I wanted to know. I wanted to be right. I wanted to be perfect. And if I wasn’t perfect, it wasn’t worth doing until I was. Just do it. Ham radio is all about learning by doing. I promise it’ll be okay.

I was fortunate to be awarded an ARRL ETP Station Grant. My school and administration were all for it. But when the equipment arrived, we experienced a lot of delays getting the antenna set up. My school had other priorities and challenges. Don’t let stuff like this delay you. There’s no need to wait to incorporate radio and get kids on the air. Use an HT or an SDR. The best time to incorporate radio was yesterday, the next best time is today. As I mentioned before, don’t wait until the end of the year to get licenses. You want kids celebrating and using them as soon as possible. A license unused is likely to remain unused.

Sharing New TI-3 Learning with My 2nd Graders

Kathy Lamont, KM4TAY
Submitted 2024

This fall, my second-grade students are learning about the job of a meteorologist as well as the scientific tools they use to predict our weather. We started our unit by looking at weather balloons and how the National Weather Service launches balloons twice a day to collect data through radiosondes. As soon as I pulled up sondehub.org to see the morning balloon launches in real time, my students were enthralled! They got to see one of the labeled chase cars start to track down a landing balloon. We'll be adding a "Duck, Duck, Fox" game to our morning so they can see how radio transmitters and other wireless devices can be tracked down. Both activities were shared with me this summer during the first class of the TI-3 Space.

The TI-3 class has dovetailed beautifully with my weather unit this fall. After practicing signal attenuation with a game of "Duck, Duck, Fox," during TI-3, we applied our transmitter hunting skills with a foxhunt through Newington, Connecticut. My students can easily play "Duck, Duck, Fox" and see how signals transmit while remaining in our classroom.

We also explored pico balloons this summer; we learned how to create a payload, solder solar panels for power, measure lift, and track our balloon. Now my second graders can't wait to launch their own!

My students will be able to apply many of the same skills that are required for launching a weather balloon. Because my students are young and we have class time constraints, they will focus more on the lift measurements, launch, and tracking.

Last spring, I wrote a grant through the ARRL Education and Technology Program and received a Geochron Atlas 4K. All of my K-5 students enjoyed looking at all the data involving wind, surface temperatures, cloud coverage, and hurricanes that can be found with the different layers offered by Geochron.My second graders will be analyzing this data and making predictions as we move through our weather unit this fall.

Each year that I have attended the Teachers Institute, I have come back with lessons I can directly apply to my K-5 classroom units. I am incredibly thankful for those who support the Teachers Institute so I can expand my understandings and share them with the next generation.

Greenville Junior High Students Explore Earth and Space with Geochron: Real-Time Learning in Action

Jackie Blumer, KC9LEH
Submitted 2024

The Geochron's ability to display real-time data has transformed the way my students engage with the world around them, bringing global events directly into our learning environment. It's a powerful resource that has enhanced our exploration of both atmospheric and space phenomena in ways that no textbook ever could.

We used the Geochron to track the path of Hurricane Francine as it made landfall on the Gulf Coast and worked its way across the U.S., eventually impacting us here in the Midwest. My students were fascinated with watching the storm's progression in real time, observing its movement across landmasses, and learning how different regions are affected by major weather events. This visual experience deepened their understanding of how hurricanes interact with the environment, helping them better grasp the science behind weather systems and the crucial role geography plays in shaping storm paths. The Geochron has turned what could have been abstract concepts into something immediate and tangible, making the science of meteorology come alive.

In addition to tracking weather events, the Geochron has become an indispensable part of our ongoing discussions about the International Space Station (ISS). As we prepare for our ARISS (Amateur Radio on the International Space Station) event, the Geochron allows us to follow the ISS's orbit in real time. My students love seeing exactly where the ISS is at any given moment, and it's sparked some incredible conversations about satellite technology, space exploration, and how astronauts aboard the station communicate with Earth. The ability to tie what we're learning in the classroom to real-world, real-time data has not only boosted engagement but also created a sense of anticipation and excitement as we look forward to our ARISS contact.

The Geochron has proven to be far more than just a classroom tool. It's a window into the dynamic processes that shape our planet and our place in the universe. It's been a game changer for my students, allowing them to connect with science in ways that are immediate, immersive, and inspiring. I'm deeply grateful to ARRL for making this incredible resource available, and I look forward to continuing to use it to fuel my students' curiosity and passion for science, space, and technology.

How the ARRL Teachers Institute Built an Elective Class and Club at My NY School

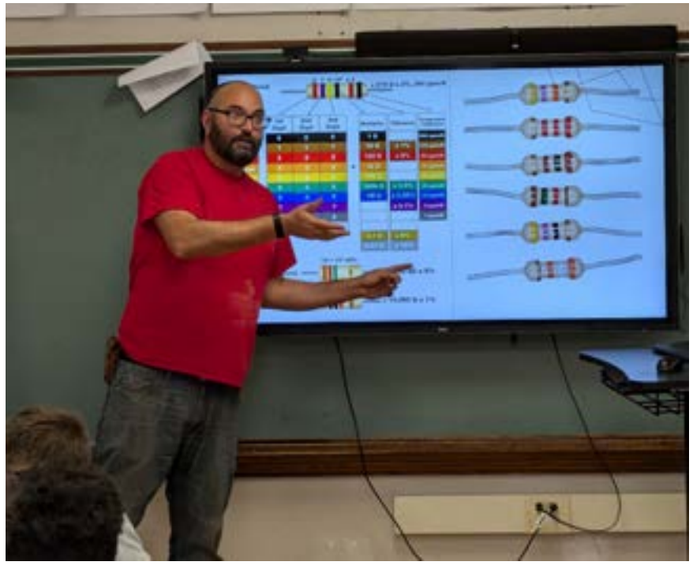
Christopher Romanchock, KD2PFE
Submitted 2024

I have 20 years of classroom teaching experience under my belt, at every level from 6th grade to graduate school. Offering a half year elective class to high school students should be a breeze, right? Not if it's an introduction to radio and I'm a social studies teacher!

I wanted to do justice to ham radio, which pushed me to apply for and attend the Teachers Institute at ARRL HQ last June, and thank goodness I did! The program was well designed to provide someone with a basic technological literacy the confidence to teach and demonstrate radio principals to students. We tackled some things I was already familiar with: foxhunting, Yagi antennas, and using a multimeter. But it also covered things that had always been like magic to me: soldering circuits, programing an Arduino, and making contact with amateur radio satellites. The best part of the week, however, was the chance to share ideas and strategies with a room full of teachers passionate about radio and profoundly knowledgeable about technology education.

I have arranged my half-year introduction class to prepare the 23 students enrolled for the test, but also to explain the radio concepts that I memorized for the exam and learned about later. The students have been incredibly excited about amateur radio—five have even asked me to help them learn CW. My principal and superintendent are both happy to see kids engaged in meaningful STEM projects and social media engagement on class photos keeps them smiling. Moreover, I have had amazing support from the ham radio community both locally and nationally in offering equipment, materials, and services to me and my students; everyone I speak to about the class is impressed with young people embracing our hobby and wants to help.

However, the class would never have happened without the experiences I had in Connecticut in June — I would have had neither the confidence nor the knowledge to be an effective teacher for my kids. If you are a teacher and have wondered if radio would be interesting to your students, I encourage to give it a try. If, like me, you love the hobby but are not sure you have the background to effectively incorporate it into your lessons, consider applying for the Teacher's Institute — it is a whirlwind of new experiences that will leave you ready to mint some new hams!



Behind the Scenes at Teachers Institute

Danielle Adler, K6FIN, and Michelle Gooding, KJ5GXS, try soldering at their stations in TI-1.

TI-1 students track a satellite pass with their instructor, Tommy Gober, N5DUX.

Megan Tucker, KQ4MAM, and Kathy Lamont, KM4TAY, consult the antenna manual alongside their TI-3 instructor, Wayne Greene, KB4DSF.

Find out how to support ARRL's education initiatives with either a one-time donation or learn more about Funding a Seat at TI!

Visit: https://www.arrl.org/education-and-technology-fund/

Students set up their circuit kits in TI-2: Remote Sensing and Data Gathering (above left). Dr Ronald Kumon, K8DTJ, makes a contact from W1AW at ARRL HQ (above right).

Success with Pre-Study & Demos:

A Note from ARRL National Instructor Gordon West, WB6NOA

I was honored when the League took over the publishing of my licensing test-prep books. I encourage all our valued instructors to log in to the Learning Center* and see everything from PowerPoint slides, circuit diagrams, and fun videos to keep our future ham students prepared to pass the test and join our hobby and service. ARRL-registered instructors now have access to my fresh new training aids.

Getting students to open their books before class is now easier with the pre-study quizzes I developed, which are available at arrl.org. This site is open to all for more details on programs that ARRL has for training.

For instructors, there are 50-minute ham radio audio outtakes, with my narration, for all three levels of licensing — from the sounds of an aurora contact to working the International Space Station. These audio tracks get students excited about hearing first hand all that they can experience with their new license or upgrade. I also released instructor guides for Technician and General licenses that are more than 30 pages to help instructors organize every class session following my three-test preparation books.

From how to make up powerful class flyers, to how to score manufacturer band plan charts and setting up the classroom tables, I give our valued instructors my 60 years of secrets to a successful class.

I include details for fun demonstrations with live and static gear to capture students' interest in not only passing the test, but actually getting on the air, where the real learning takes place.

Instructors and students can also "go direct" with me, Gordo, by phone (714-594-5000) or email (wb6noa@arrl.net)

Gordon West, WB6NOA
50(!) years of ARRL membership
Submitted 2024

Head to our ARRL Learning Center (LC) to check out Gordon West Amateur Radio License Prep for Students today!

*Please note: You must be logged in to the LC to view most digital content.

As seen in this issue of *Radio Waves*...

Did you know October is ETP grant month? Please check out ARRL's ETP Grants web page for more information about ETP School Station and ETP Progress grants.

A big thank you to all those who made this edition possible.

Radio Waves aims to showcase how educators and license class instructors are getting their students and local communities involved in ham radio. These efforts deserve to be documented and shared. The contributors are teachers and instructors who are currently bringing amateur radio into the classrooms and beyond, just like you.

Many instructors and teachers made mention of materials and resources created by ARRL. Click any bullet to learn more about the item.

- *ARRL Teachers Institute*
- *ARRL Scholarships*
- *ARRL Instructor Resources*
- *ARRL Teaching Lesson Plans*

Add Your Voice: Write a short narrative about a specific teaching struggle, success, or learning breakthrough. We are seeking submissions of 300 – 500 words, and you are highly encouraged to send any pictures of yourself, your students, and the activities you introduced. Submissions can be sent to our email: radiowaves@arrl.org. Please use our Model Release Form for photos. Explore our previous publications.

By submitting writing or photographs with completed model release forms, you grant ARRL permission to edit and use these materials for any publication purpose.

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