

## Las Cruces Academy students and a teacher build a great device for learning science...and many skills



### Executive summary:

- Students at the Las Cruces Academy, a small private school in Mesilla, NM, designed and built a device to teach the chemistry of the elements with hands-on controls
- It's 3 years of project-based learning; we chose to make everything from scratch, from the display case to the programming. We used class time in a technology course and spare time
- Students learned construction, aesthetic design, wiring, electronics, Python programming, researching the scientific literature, communication, public speaking, and project management.
- Our school enables this kind of learning and outreach with our curriculum, our expert teachers, and our students with their culture of taking on novel ways to learn
- We're most eager to share the use of our light-up periodic table, as well as to share the project-based methods and skills
- The accompanying DVD has much detail of how it all worked out, as well as access to all 315 of the fine short stories about the elements that our students researched, wrote, tuned up, and recorded
- An 8-minute video is readily available as a summary, at [https://youtu.be/urcldu2K\\_WU](https://youtu.be/urcldu2K_WU)

***We call it the light-up periodic table of the chemical elements. It's a hands-on device for anyone to learn about the chemical elements in a self-guided tour.*** Using just a few buttons and a small display to make choices, the user sees the big chart light up behind a chosen element and hears a short story – one of 315 different ones – about the element or a group of elements. Our students, variously in grades 4 -8 over the 3 years of design and construction, worked with our technology teacher to make the device from scratch. Students learned and used skills in construction, wiring, electronics, computing, project management, research into the scientific literature, writing, public speaking, and basic perseverance in the face of problems to overcome.

The DVD that we've included has the periodic table in action, and much more information.

**Who are we? How did we make the light-up periodic table? Why did we make it? How are we sharing it?**

***WHO: The Las Cruces Academy, or LCA, is a small private school emphasizing science, math, languages in a complete curriculum.*** We have small class sizes, expert teachers in individual subjects, a curriculum

close to the International Baccalaureate, and a mission of educating children to grow academically, physically, and socially to become wise and compassionate community leaders. Our school, in its 8<sup>th</sup> year of classes that now cover early kindergarten through 8<sup>th</sup> grade, is in Mesilla, NM. Learn more about us on our website, <https://lascrucesacademy.org>. You'll meet all the students who worked on the device in the accompanying documents and videos on the DVD we've put with this press release.

The credits:

Students who worked on it from start to finish: Arabella Camunez and Frankie Holguin

Students who worked on this early on for a year or two but left before it was finished: Louis Pate, Ayanna Leal, Alegra Reinhold, Andres Alba, and Syan Pai

Students who joined the final year and a half of the project: Xitlali Gonzalez and Kira Durrett

Students who did occasional work: Adrienne, Benjamin Post, Tianna Armendariz

Advisor: Dr. Vincent P. Gutschick- **contact him at [vince@lascrucesacademy.org](mailto:vince@lascrucesacademy.org) or (575) 571-2269**

***HOW: We began making the LUPT, as we'll call it, in December, 2013, in a class for 4<sup>th</sup>- and 5<sup>th</sup>-grade students***, in which they developed individual projects. The projects, ranging from artistic design through electronics, computing, and science, merged; we also began a technology class for middle school in 2014. The technology class met – and still meets – twice weekly. We supplemented the class work with some after-school work and some weekend work by technology teacher Dr. Vince Gutschick. The core idea, a big chart with highlighting by LEDs, was inspired by a simpler device for public science communication at the Arecibo Radio Observatory in Puerto Rico. We went on to design and build a much more powerful and flexible device.

We could have gone with a computer monitor run by a standard computer that accesses the Web for canned information about the elements. We decided to write all the content on our own, using the chart mounted in a big shadow box, our own lighting scheme, a tiny but powerful Raspberry Pi computer, and lots of reading, writing, programming, wiring of lights and a complex logic board we built from 23 integrated circuits, 4 simple control buttons to “talk” to the computer, and a small display presenting the options. Along the way, students learned how it all works, in incredible detail. They often vied to do the hands-on wiring, soldering, programming, and testing. Among the highly rewarding outcomes was the set of 315 narrations that the students researched, wrote, tuned up, adjusted for length, recorded, and transferred to the Raspberry Pi.

***WHY: Project-based learning is among the best type of learning.*** Moreover, this project fits right into multiple goals of the LCA: teaching science to our students, doing outreach to other students and to the adult community, giving students the opportunities to communicate and lead.

***How are we sharing it?*** The light-up periodic table is meant to be used by one and all. It sits in our school lobby at 1755 Avenida de Mercado, Mesilla. Moving it is a challenge, given its 112 friction-fit Molex connections, so we'd move it rarely. Come see us; call our Head of School, Dr. Lou Ellen Kay, at (575) 521-9384 or our Board Chair and teacher, Dr. Vince Gutschick, at (575) 571-2269 to set up a visit. We can also visit your school or other site to tell the story, not only of the great final product but also of the pieces of our learning process; we're pleased to share how we did it, in part or in whole.

**Learn about the wealth of detailed work that went into making the light-up periodic table**This press release is a summary. The DVD we've included has the story in detail. It also has access to all 315 of the student-written and –recorded narrations about the chemical elements. The narrations can be played individually or with a version of the Python program that controls the actual periodic table. The program and the installation instructions are provided in both Windows and Linux versions. Enjoy!