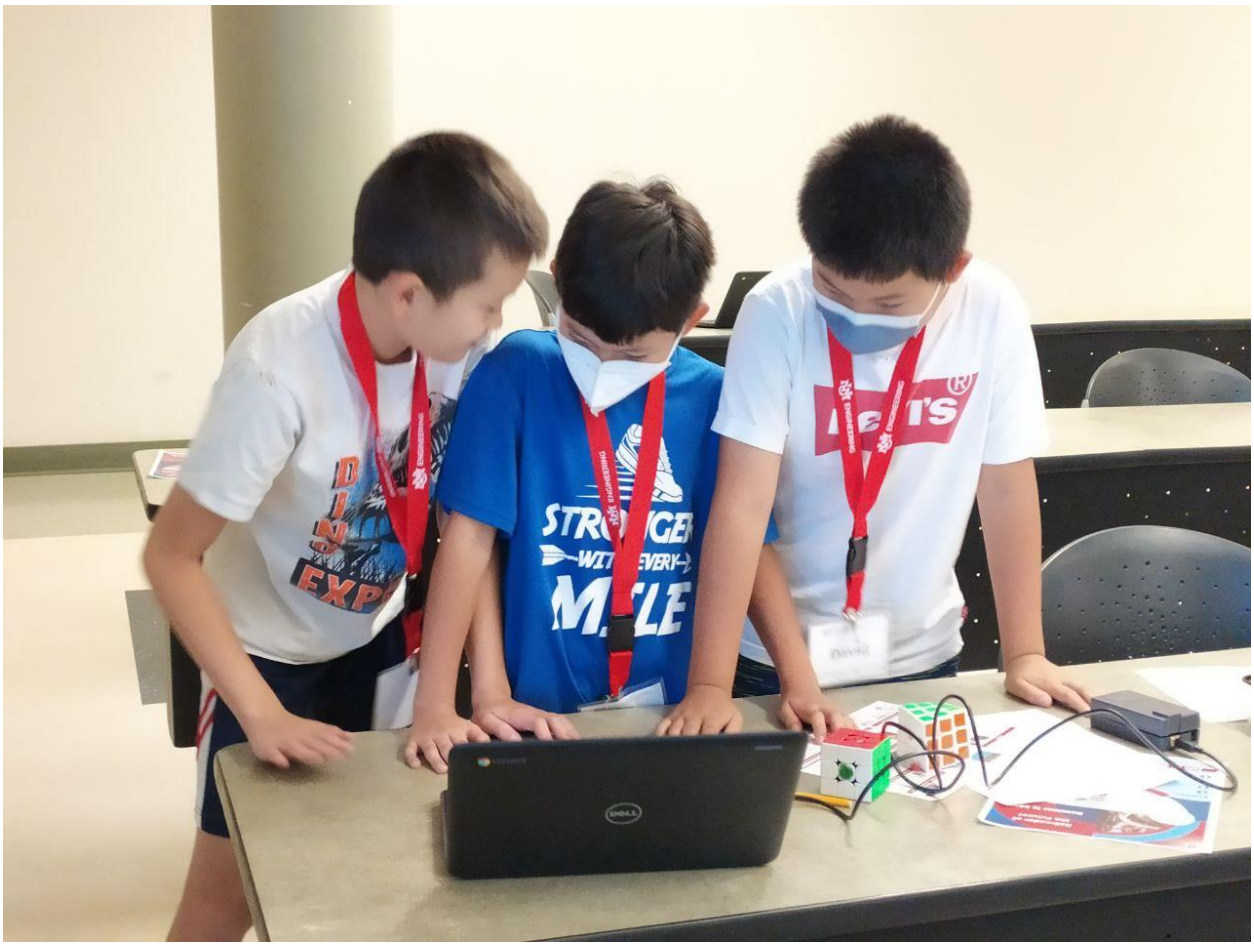
LEWIS-1 Education module

University of New Mexico

SMILab, UNM SOE



Appendix

Overview

Explaining engineering concepts to the general populace can be burdensome. In many cases, this process can be a practice in futility. This is especially true when the educator puts an emphasis on engineering theories. To mitigate this effect, educators should incorporate activities that require hands-on learning. Although the integration of complex STEM-based theories can be difficult, a simple device can make incorporating STEM theories in the general populace attainable. One device that fits this parameter is the Low-cost, Efficient Wireless Intelligent Sensor (LEWIS). LEWIS sensors do the same calculations as any other state-of-the-art sensor, but with a fraction of the cost. LEWIS sensors can be easily made and disposed of as needed, making them an excellent option. This is vital as the general populace tends to have means of destruction. In this education module, we will be focusing on using a LEWIS-1 sensor in the state of New Mexico (NM). It is also particularly fitting since New Mexico notoriously struggles with academic excellence at the K-8 level (figure 1) and at the 9-12 level (figure 2) of education. While the LEWIS project is based out of the University of New Mexico's Civil Engineering Lab in collaboration with SMI Labs, these modules are applicable to any country that has the required prerequisites (materials, etc.).

Introduction

LEWIS sensors have a multitude of engineering applications. However, for this module, LEWIS-1 sensors will be used in a classroom setting. LEWIS-1 sensors calculate the acceleration of the X/Y/Z axes of any object over time. For example, a LEWIS-1 sensor could calculate the acceleration of an airplane's takeoff, ride, and landing. Although the applications of a LEWIS sensor are numerous. For our means, we will be using the LEWIS sensors to test their functionality. This module will help guide educators through the creation and use of a sensor while in a preliminary class.

Overview of Activity Table

Location	UNM campus/ any auditorium
Duration	1 day – 9:00-12:00
Number of students	10-25
Number of educators (UNM mentors, volunteers)	5-10
Stakeholders' involvement	University of New Mexico
Preplanning required (Y/N)	Y

Objective

Getting people interested in sensors/sensor technology by demonstrating potential applications of the technology in a fun and interactive way. Sensors can be lackluster, and so it is our objective to keep people engaged throughout the field trip. Ideally, people will see a broader view of STEM applications and pursue a career in STEM.

Timeline

Table 2. Schedule

Task	Time
Introduction to Smart Sensors/uses of sensors	9:00-9:30
Building LEWIS sensor/ deploying sensor	9:30-10:30
Experiment with LEIWS	10:30-11:30
Q&A	11:30-12:00

Procedure

First, the people will be introduced to LEWIS1. They'll learn about the parts and how they work together. A live demonstration will be given where they'll get to see how movement affects the graph and test it for themselves. Mentors for this class should have a basic understanding of engineering and have attended a previous LEWIS training or be trained by someone who has. After being introduced to the equipment, the children will start to build the LEWIS's with the instructions provided. Instructors will supervise to ensure that the students are fabricating the LEWIS's properly. After the LEWIS's are created, students will then graph the Rail-Runner ride using a LEWIS sensor and a laptop.

- Introduce LEWIS1 with demonstration
- Build LEWIS1 with groups
- Plotting data
- Regroup and analyze the graphs

Materials

- 4-5 hotspots
- 5-10 LEWIS 1 packets
- 5-10 Laptops with USB adapter
- Instructions for LEWIS fabrication and software installation

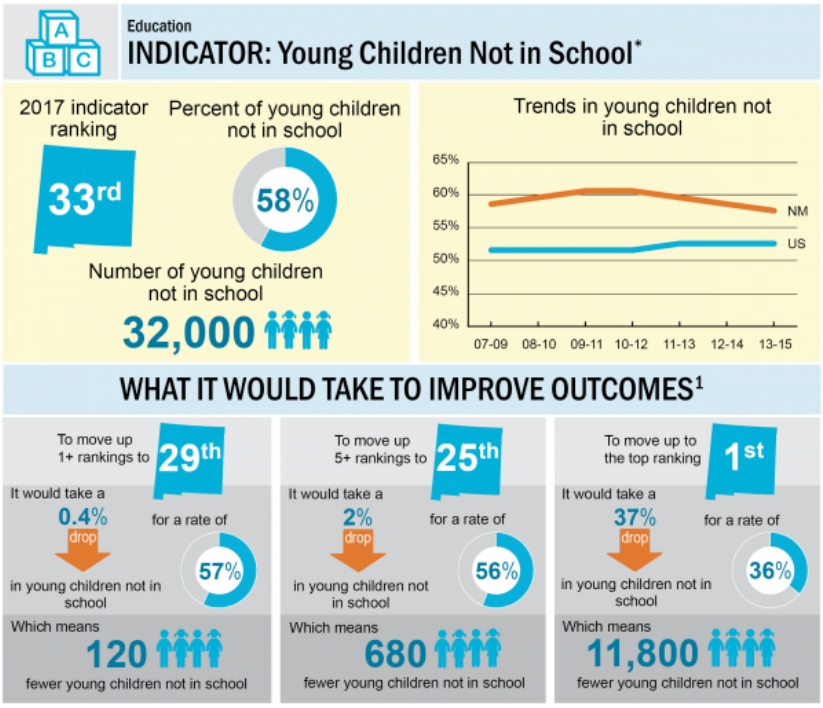
Contact Information

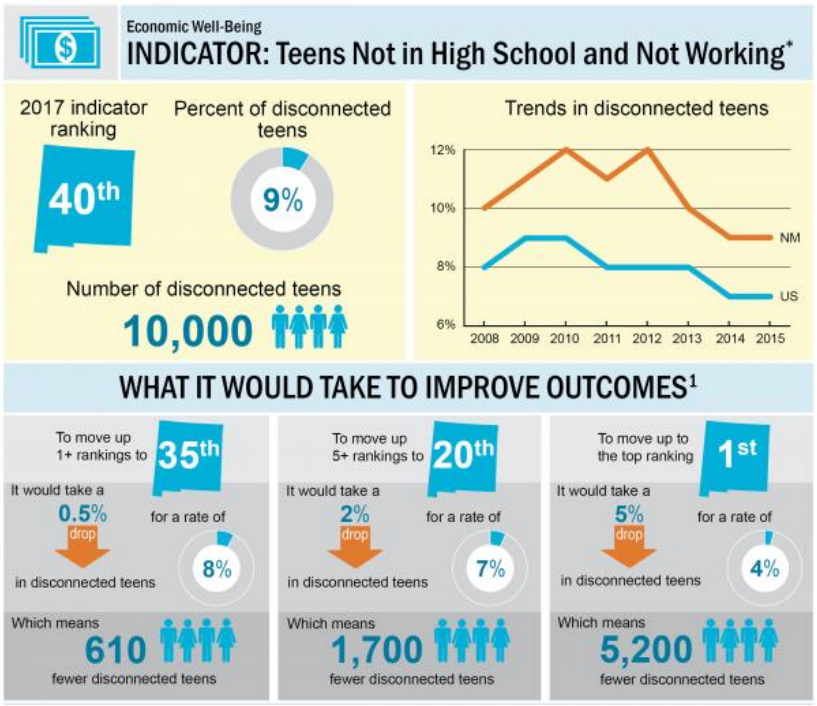
If you are interested in one of the most diverse, collaborative, and inspiring programs to help build up the future STEM professionals and encourage them to be engineers and railroaders of the future, please contact us!

Contact information:

Website:	https://smartrailroads.org/
Tramway website:	https://sandiapeak.com/
Mahsa Sanei:	msanei@unm.edu
Fernando Moreu:	fmoreu@unm.edu
SMILabs:	http://smilab.unm.edu/
UNM School of Engineering:	https://engineering.unm.edu/

References





New Mexico Voices for Children. (2020, February 14). Retrieved August 5, 2022, from https://www.nmvoices.org/