

Building a Public Health Laboratory STEM Program for High School Students in New Jersey

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Objective

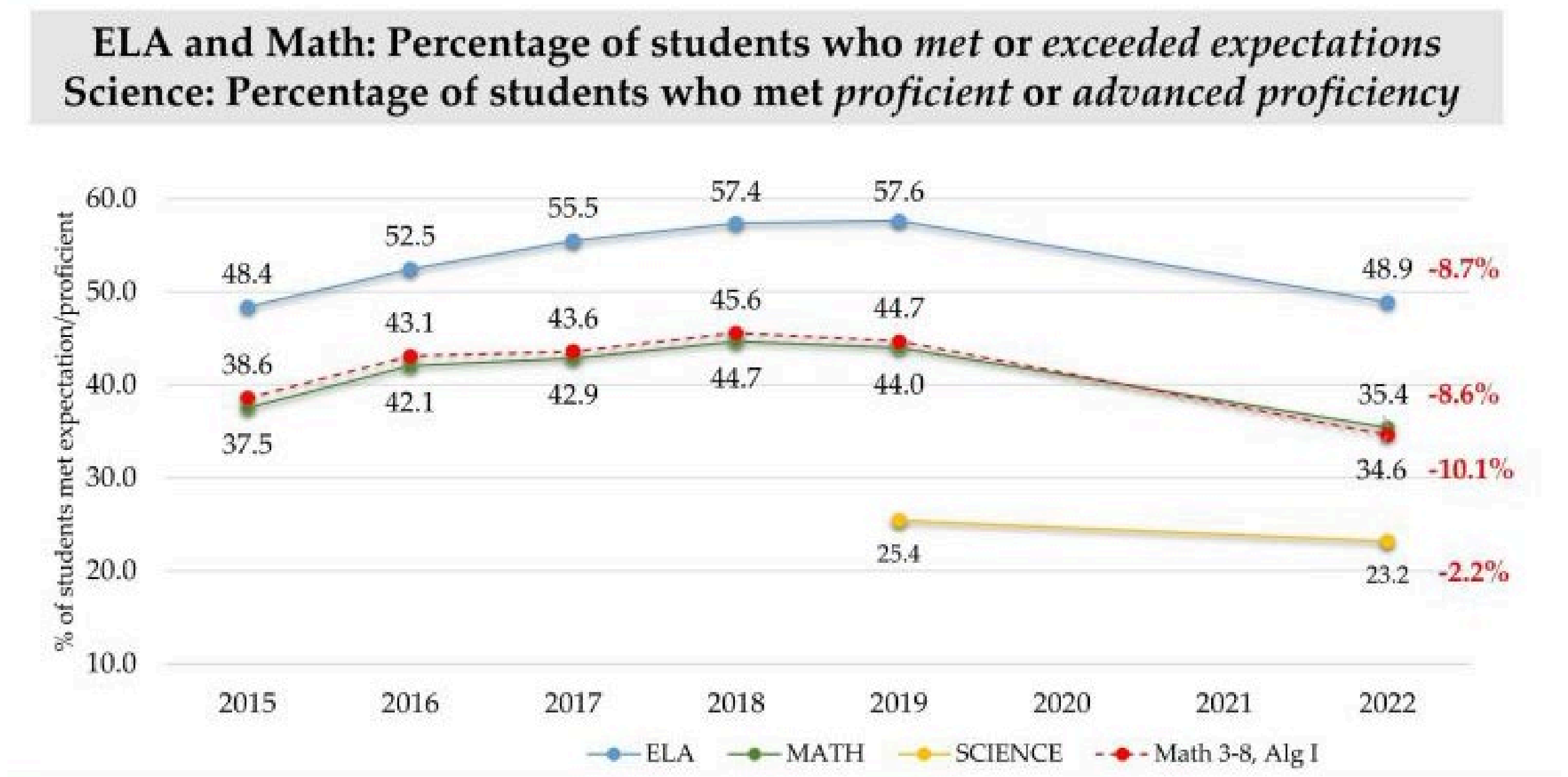
Create a STEM Program in New Jersey that:

- Provides Trenton area students with experiences that reflect STEM skills needed in a modern-day laboratory
- Partners with existing Community Based Organizations (CBOs) to contribute to STEM education
- Demonstrates STEM at work in public service to inspire students
- Builds a sustainable internal infrastructure i.e. STEM Committee partners
- Serves the Trenton community

Motivation

A high percentage of students in New Jersey public schools are struggling to meet math and science proficiency expectations as demonstrated by standardized tests.

Student Group	Valid Scores	State Mean Scale Score	% Level 1: Did not yet meet expectations	% Level 2: Partially met expectations	% Level 3: Approached expectations	% Level 4: Met expectations	% Level 5: Exceeded expectations	State: % of testers met or exceeded expectations
Statewide	100,459	754	13%	12%	20%	36%	19%	55%

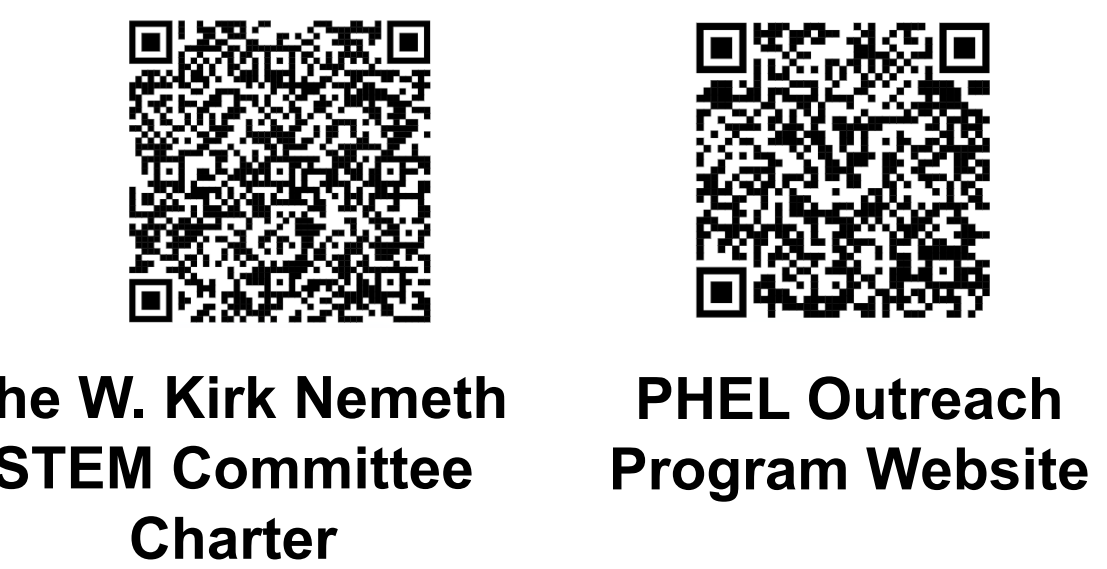
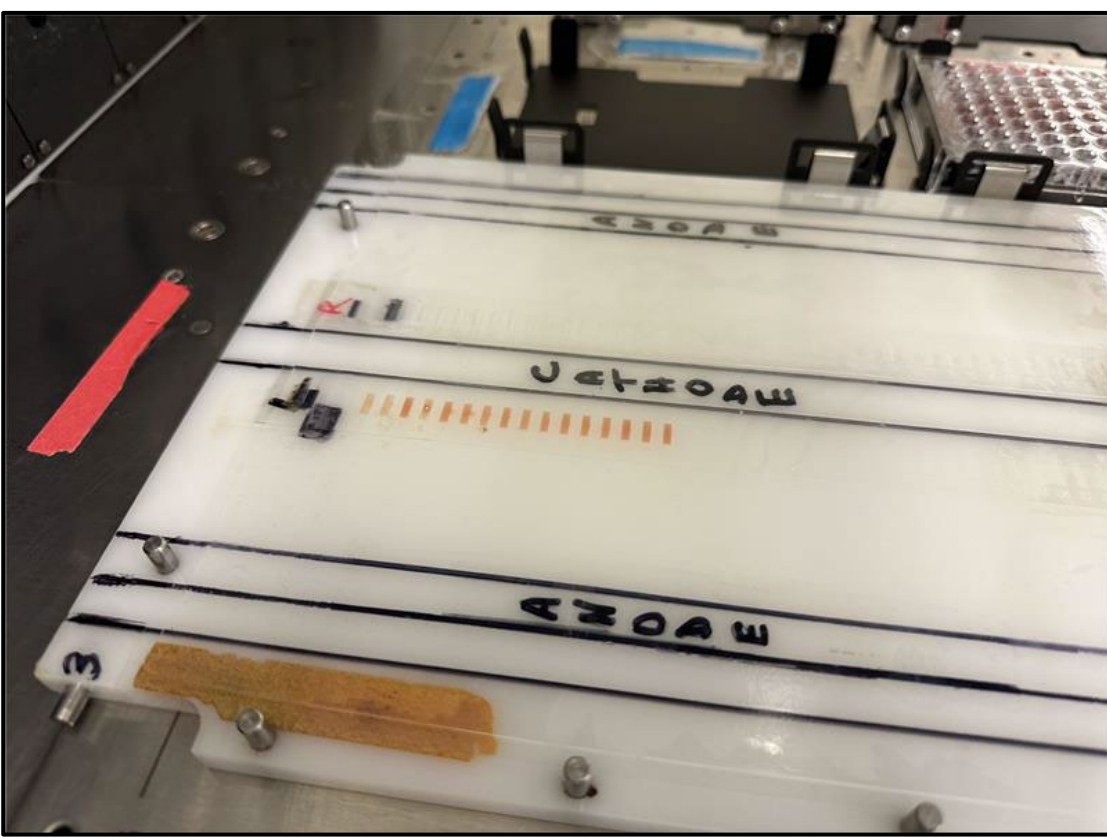
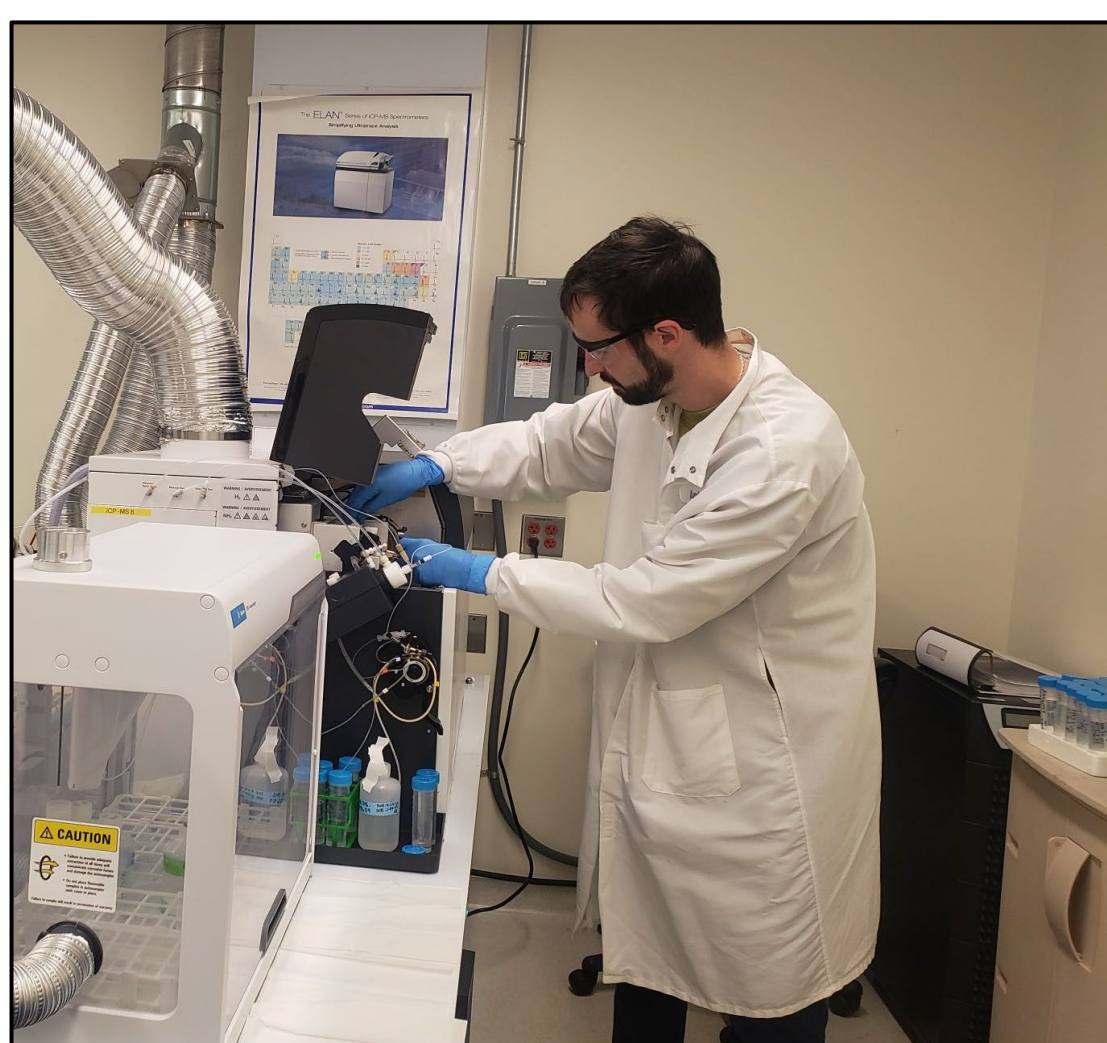
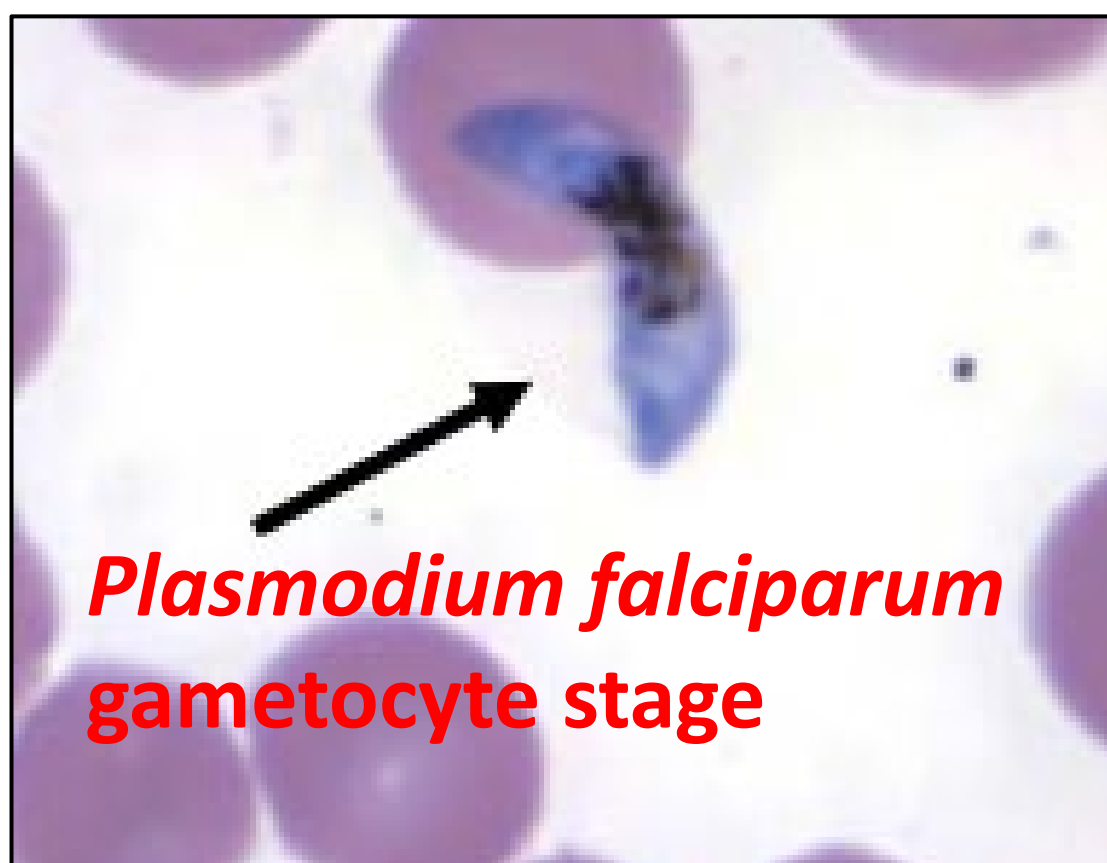
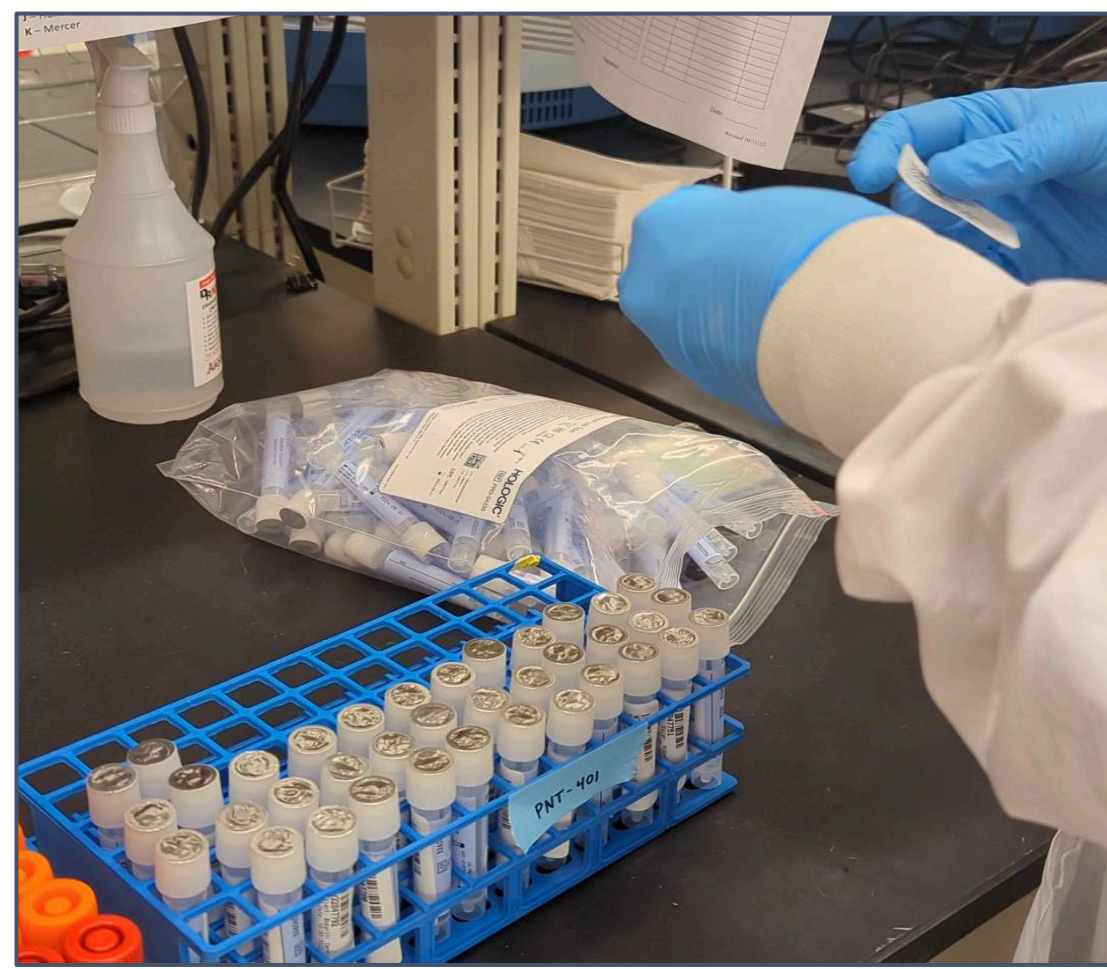


According to the K-12 CS framework, eighth grade students should understand the basics of computer systems, networking, data analysis, and programming algorithms but this is largely not the case.

The New Jersey Department of Health Public Health & Environmental Laboratories, in collaboration with our partners in the Trenton Area STEM Council, is undertaking a joint effort to demonstrate STEM principles at work in the laboratory for public benefit, in the hopes that we can inspire students to pursue careers in science.

Planned Activities

- STEM Committee was formed of scientists with expertise in Environmental Chemistry, Bioinformatics, Parasitology, Informatics, and Newborn Screening.
- The PHEL Outreach team led the committee with interns assisting to conduct business meetings and follow-up on Action Items.
- The STEM Committee formed a Charter.
- The STEM Committee joined the Trenton Area STEM Council and is partnering with two Council members to conduct a one-day, hands on session at PHEL – Boys and Girls Club and Rutgers 4H Club.



- DNA/RNA Extraction and Sequencing**
 - Students perform DNA extraction, compare sequences to references, and identify variants.
- Vector borne Parasite Infections**
 - Students screen mock blood samples, observe infected vs. uninfected cells under a microscope, and identify parasite stages related to human infections.
- Biomonitoring/Chemical Terrorism**
 - Students modify R code, analyze pre-collected data, and create reports with graphs, tables, and figures.
- Metals Laboratory**
 - Students are taught process of testing water samples using ICP-MS, measure lead concentrations, and fit concentration curves.
- Newborn Screening**
 - Students use mock blood samples, load gels, simulate running them, and interpret results based on varied outcomes

References

“Framework Statements by Grade Band.” *K12cs.org*, k12cs.org/framework-statements-by-grade-band/
National Science Foundation (2024). *The State of U.S. Science and Engineering 2024*. <https://ncses.nsf.gov/pubs/nsb20243/talent-u-s-and-global-stem-education-and-labor-force>
“Office of Innovation”. *New Jersey Department of Education*. Retrieved June 17, 2024 from <https://www.nj.gov/education/innovation>
“Performance Reports”. *New Jersey Department of Education*, Accessed 31 Jan. 2025. <https://rc.doe.state.nj.us/>

Community Collaborators

PHEL STEM Committee

- Susan Mikorski
- Satyam Patel
- Tyler Mizglewski
- Victoria Floriani
- Nicholas Palmateer
- Elisabeth Cook
- Shiv Verma
- Andrew Steffens



Rutgers 4H Program

A collaborative initiative between Rutgers and Millhill. This Program offers everyone in grades K–13 the chance to explore countless opportunities in science, arts, foods, outdoor adventure, and more.

nj4h.rutgers.edu



Boys and Girls Club of Mercer County

Boys & Girls Clubs provide a safe place for millions of youth each year, giving them an opportunity to discover their great futures.

bgcmercer.org



STEM Committee PHEL Interns “Administrators”



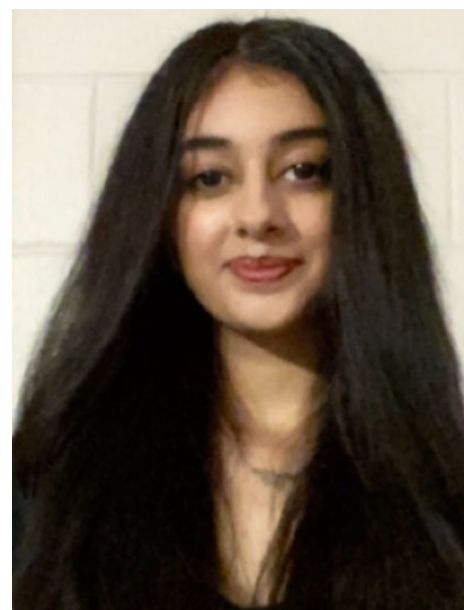
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