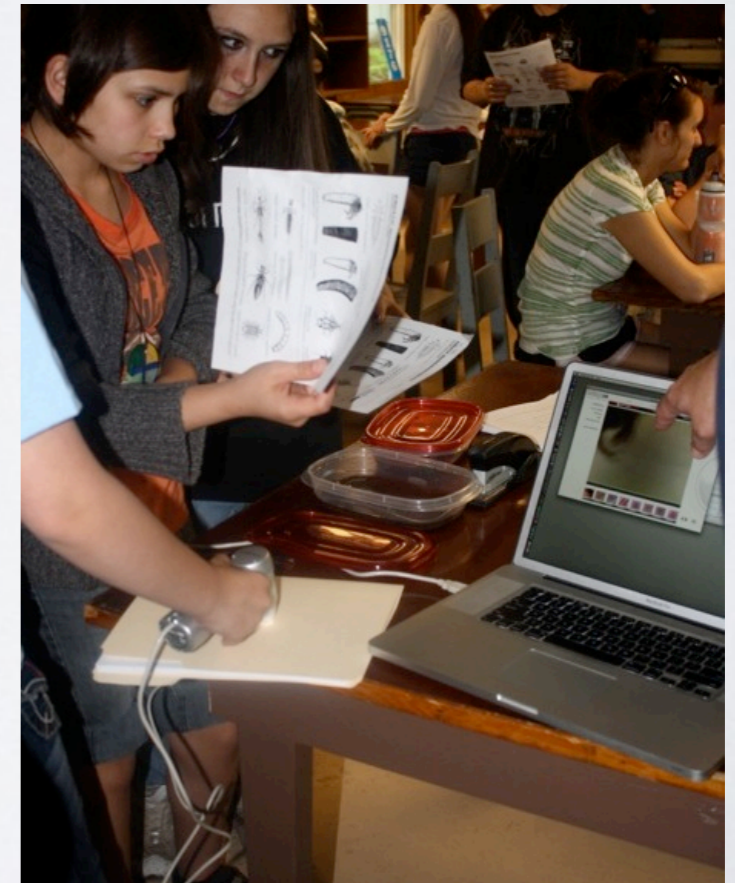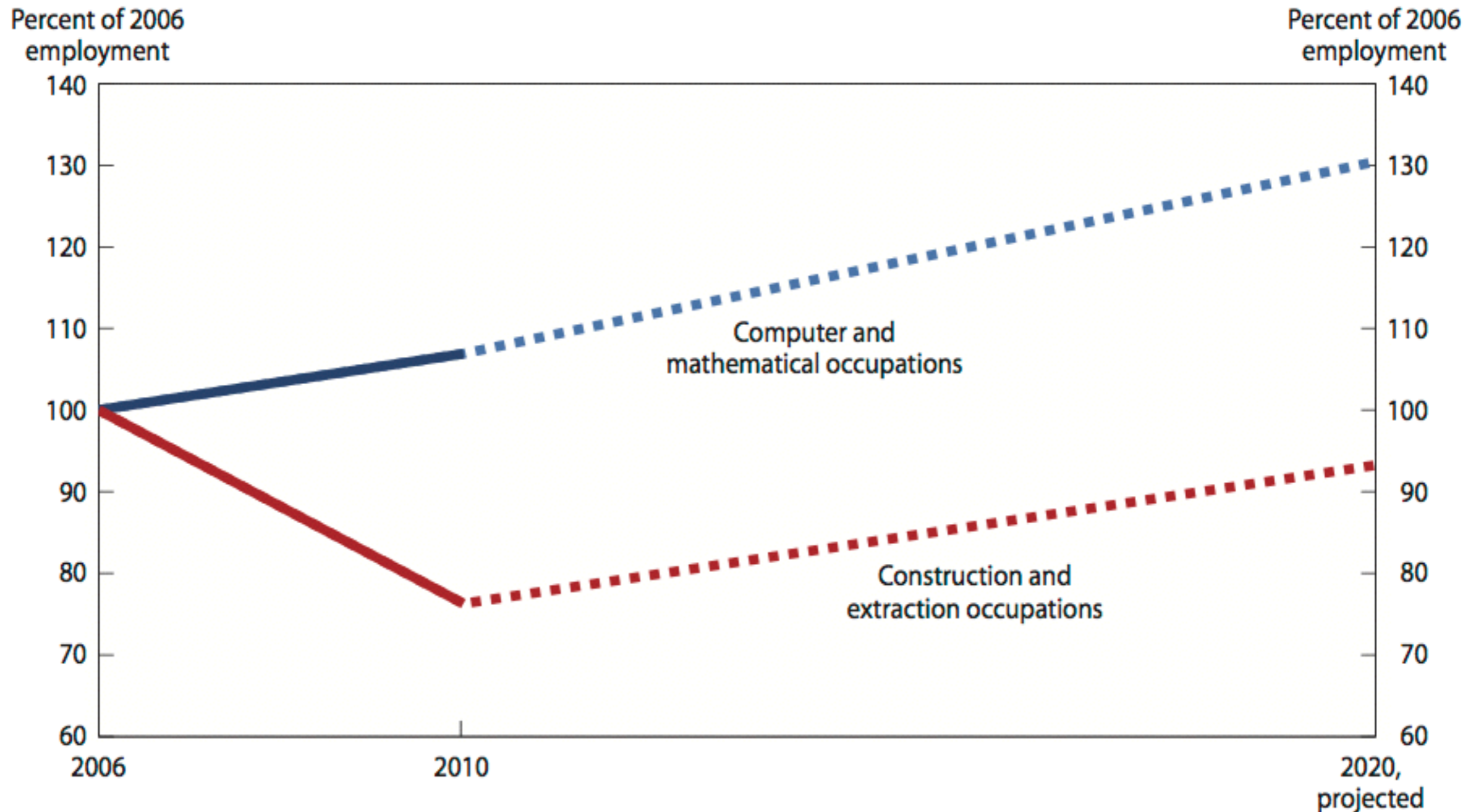# A Vision for Science Education in Michigan

OBJECTIVES

- Provide a potential vision of what science education could look like throughout the state.

- Address the potential for engaging science instruction to meet the state's mission of having every child career and college ready.

- Highlight components of science education that will need focus.

WHAT DO WE NEED?

Percent of 2006 employment

Computer and mathematical occupations

Construction and extraction occupations

2006 2010 2020, projected

NOTE: BLS does not project specific data for each of the years between 2010 and 2020. Interim years to the 2020 projection point are expressed by a dashed straight line only.

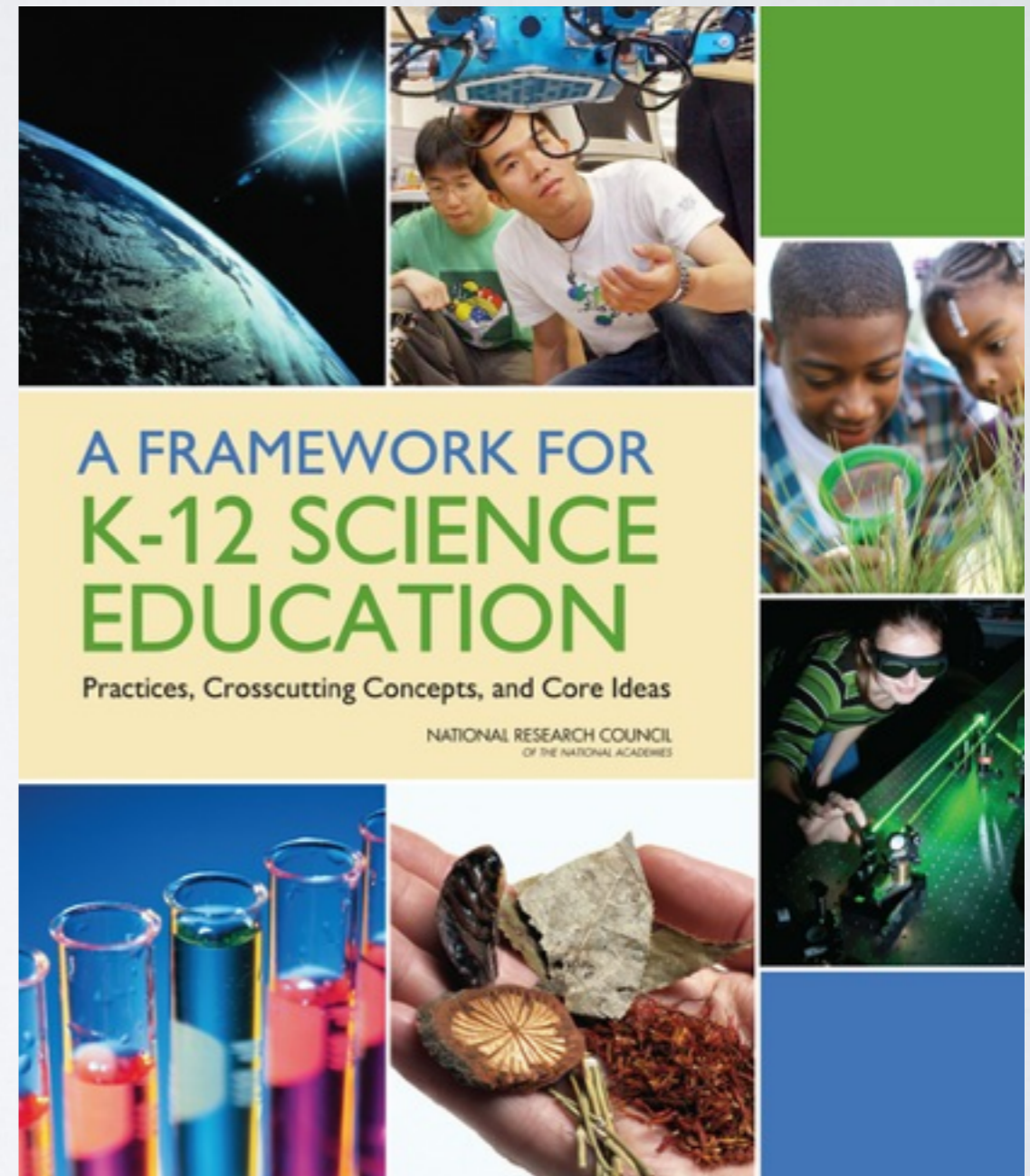SOURCE: U.S. Bureau of Labor Statistics.

WHAT DO WE NEED?

Job openings by major occupational group, projected 2010–20, in thousands of openings

Occupational group	Openings
Office and administrative support	7,450
Sales and related	6,454
Food preparation and serving related	5,103
Transportation and material moving	3,597
Healthcare practitioners and technical	3,591
Education, training, and library	3,398
Construction and extraction	2,760
Personal care and service	2,583
Management	2,568
Business and financial operations	2,555
Production	2,231
Healthcare support	2,042
Installation, maintenance, and repair	2,026
Building and grounds cleaning and maintenance	1,655
Computer and mathematical	1,438
Protective service	1,196
Community and social service	1,098
Arts, design, entertainment, sports, and media	1,067
Architecture and engineering	798
Life, physical, and social science	546
Legal	344
Farming, fishing, and forestry	291

From growth
From replacement needs

- Job information for STEM

- Needs for science literacy

- Innovations

WHAT WORKS?

- Research on science education

- Input from business, industry, and higher education

- Examination of current status and nostalgic policies that are detrimental to desired outcomes

A FRAMEWORK FOR
K-12 SCIENCE
EDUCATION
Practices, Crosscutting Concepts, and Core Ideas
NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

WHEN (AND HOW) DO WE START?

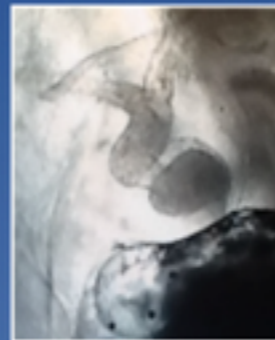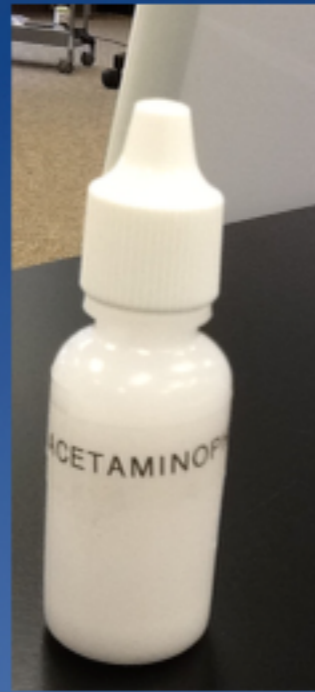# ELEMENTARY SCHOOL: THINKING AND ACTING LIKE SCIENTISTS

Question How do three different types of painkillers affect the heart rate of the xenopus tadpole?

Observation

Ibuprofen Data Table

Trials	Culture Water	Ibuprofen	Qualitative Data/Notes
1	126 bpm	102 bpm	Very high heart rate
2	102 bpm	114 bpm	Great visual of heart beating
3	84 bpm	84 bpm	Could see blood flowing, hard to see heart
4	84 bpm	84 bpm	
5	72 bpm	78 bpm	Lower heart rate
6	90 bpm	84 bpm	Could see lungs great
7	90 bpm	90 bpm	
8	84 bpm	90 bpm	Could see blood flowing
9	84 bpm	96 bpm	Great visual of heart
10	90 bpm	90 bpm	No change
Average	90.6	91.2	

WHAT DO WE SEE FROM STUDENTS?

- Predictions
- Sources of Error
- Confidence in results
- Future questions to investigate

Claim: I claim that when introduced to the xenopus tadpole, these painkillers will most likely make the heart rate go up, or it will stay the same, but rarely go down.

Evidence: Almost all of my trials support my claim; they all either stayed the same, or went up. For the example 24/30 trials either went up or stayed the same, and the average of all the trials is 87.2 in water, and 91.8 when the painkiller is introduced.

Reasoning: I did ten trials for each type of medicine, so my investigation was a fair test, and I looked for all potential sources of error, and if there was one, I restarted, so I am strongly confident in my investigation. I had also known from second hand research that these medicines had no known stimulants or depressants, so it wouldn't make much of a difference.

CONNECTING SCIENTIFIC PRACTICES WITH MATH AND ELA SKILLS
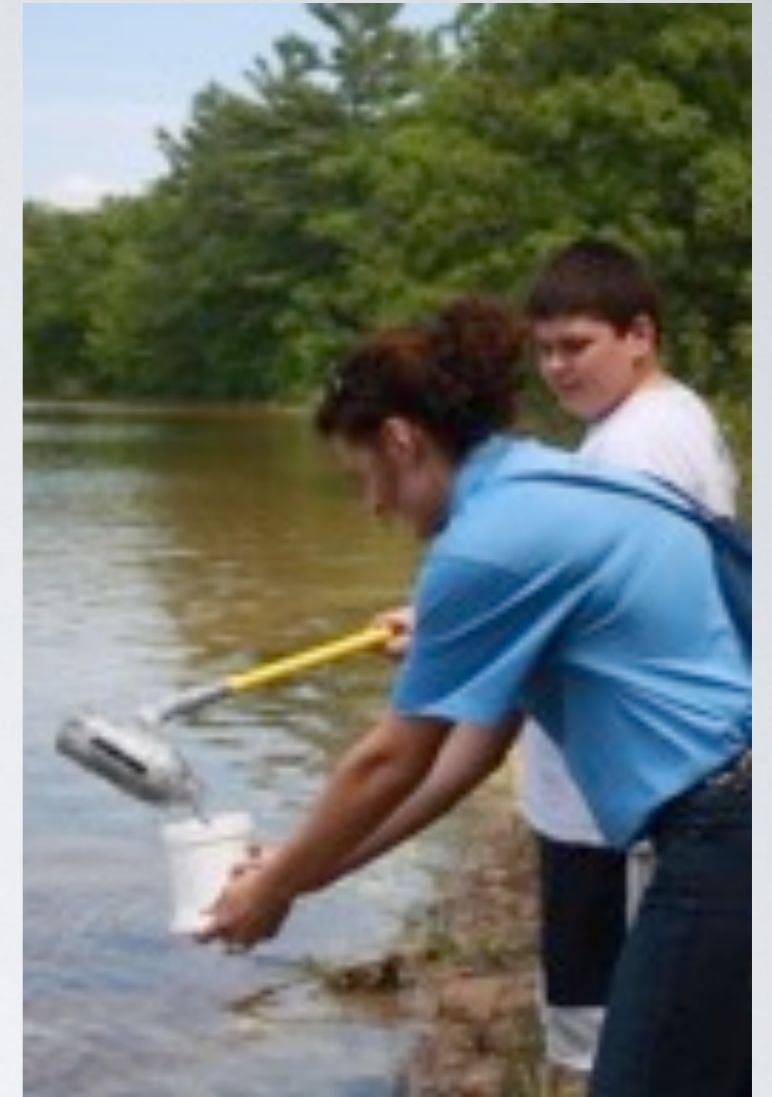
DEEPENING SCIENTIFIC PRACTICES THROUGH AUTHENTIC INVESTIGATIONS AND COLLABORATION

HOW DO WE INTEGRATE THE SCIENCES WITH STEM FIELDS?

PROJECT-BASED LEARNING WITH AUTHENTIC PROBLEMS

How do we prevent invasive species in our lakes?

How did native peoples use plants to sustain themselves?

Can we provide electricity to remote areas through renewable energies?

EXPANDING THE SCOPE OF DESIGN AND INVESTIGATION

ACHIEVING THE VISION