Health in Our Hands: What controls my health? A community inspired approach to teaching and learning science

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Let our journey begin!
What is *Health in Our Hands*?

- Funded by the National Institute of Health **Science Education Partnership Award** (SEPA) [http://nihsepa.org/](http://nihsepa.org/)

- **Goals:**
  - Develop middle school *curriculum*;
  - Engage *students, family and community through partnership*;
  - Reduce *achievement gap* through emphasis on science career
  - Disseminate materials.

- **Partners:**
  - **Academic partners:** Lead Organization: CREATE for STEM Institute, MSU; University of Michigan - Schools of Public Health and Engineering; Concord Consortium
  - **In Flint:** Flint Community Schools; Community-Based Organization Partners (CBOP); Sloan Museum; Flint Public Library
  - **In Detroit:** University Prep Science and Math Middle School; Friends of Parkside; Charles H. Wright African American Museum; Michigan Science Center; Detroit Public Library
Gene-environment interactions and natural selection to address health

The Framework for k-12 science education
Why a new approach?

Poor understanding of core ideas in science
(Emmons, Lees, & Kelemen, 2018)

Decline in students’ interests, motivation, and excitement of learning science

Irrelevance of science for daily life
(Fortus, 2014; Vedder-Weiss & Fortus, 2013)
Why a new approach?

Persistent achievement gap

Science achievement gaps begin early, persist and are largely explained by modifiable factors
Morgan, Farkas, Hillemeier, Maczuga, 2016
Health in Our Hands (HiOH)
A new approach to teaching and learning science

- A community inspired project-based learning approach to science teaching and learning.

- A middle school science curriculum that focuses on the disciplinary core idea of gene-environment interactions and their effect on health, diabetes and addiction, that impact students, families, and communities.
HiOH
Three components:

- Curriculum development & pedagogical support
- School administration
- Community engagement

What
How
HiOH
Three components:

Curriculum development & pedagogical support

School administration

Community engagement

What

How
Health in Our Hands
Overview

Teacher PD & extensive support

Project based learning

NGSS aligned
MS-LS1-5 -
Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
<table>
<thead>
<tr>
<th>Disciplinary Core Idea</th>
<th>Diabetes Unit</th>
<th>Addiction Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>From Molecules to Organisms: Structures and Processes:</strong></td>
<td>MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.</td>
<td>MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</td>
</tr>
<tr>
<td></td>
<td>MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</td>
<td>MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.</td>
</tr>
<tr>
<td><strong>Ecosystem: Interactions, Energy, and Dynamics</strong></td>
<td>MS-LS2-2. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</td>
<td>MS-LS2-2. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</td>
</tr>
<tr>
<td></td>
<td>MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</td>
<td>MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</td>
</tr>
<tr>
<td><strong>Heredity: Inheritance and variation of Traits:</strong></td>
<td>MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</td>
<td>MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.</td>
</tr>
<tr>
<td></td>
<td>MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</td>
<td>MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</td>
</tr>
<tr>
<td><strong>Biological Evolution: Unity and Diversity</strong></td>
<td>MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment.</td>
<td>MS-LS4-4. Construct an explanation based on evidence that describes how genetic variation of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment.</td>
</tr>
<tr>
<td></td>
<td>MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.</td>
<td></td>
</tr>
</tbody>
</table>
Health in Our Hands Overview

- Teacher PD & extensive support
- Project based learning
- NGSS aligned
Project-based Learning (PBL)

Project based learning is a comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems (Krajcik & Shin, 2014)

WHY?
1. It is grounded in the literature and engages learners overtime
2. PBL uses theories of learning in its approach
3. PBL can be used for aligning curriculum to NGSS
HiOH & Project-based Learning (PBL)

- Pursue solutions to a meaningful question
- Explore the question by participating in authentic, situated inquiry to “figure out” why phenomena occurs
# Health in Our Hands: What controls my health?

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Driving Questions</th>
<th>Learning Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1</td>
<td>Why does Monique have diabetes?</td>
<td>Introduction</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>How can we describe Monique’s diabetes?</td>
<td>Diabetes</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>How does Monique’s family affect her diabetes?</td>
<td>Genetic component</td>
</tr>
<tr>
<td>Lesson 4</td>
<td>How does where Monique lives and what she does affect her health?</td>
<td>Environmental component</td>
</tr>
<tr>
<td>Lesson 5</td>
<td>How do Monique’s characteristics and environment affect her health?</td>
<td>Genes-environment interaction</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>What can Monique do to make her environment healthier?</td>
<td>Individual action</td>
</tr>
<tr>
<td>Lesson 7</td>
<td>How can we work together to make our environment healthier?</td>
<td>Collective action</td>
</tr>
<tr>
<td>Lesson 8</td>
<td>How is our community affected by what we inherit, where we live, and what we eat?</td>
<td>Population over time</td>
</tr>
</tbody>
</table>
# Health in Our Hands: How can looking for thrills make me miserable?

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Driving Questions</th>
<th>Learning Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1</td>
<td>Why do we look for thrills?</td>
<td>Introduction</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>Why do we feel excited when looking for thrills?</td>
<td>Reward Pathway</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>How did we start looking for thrills?</td>
<td>Natural selection</td>
</tr>
<tr>
<td>Lesson 4</td>
<td>Is the need for thrills written in our genes?</td>
<td>Genetic component</td>
</tr>
<tr>
<td>Lesson 5</td>
<td>How can addictive substances, such as drugs, hijack our brains?</td>
<td>Environmental component</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>How can looking for thrills make me miserable?</td>
<td>Environmental mismatch</td>
</tr>
<tr>
<td>Lesson 7</td>
<td>Are we all at risk for addiction?</td>
<td>Genes-environment interaction</td>
</tr>
<tr>
<td>Lesson 8</td>
<td>What can we do to reduce the risk for addictions for ourselves and our community?</td>
<td>Individual and collective action</td>
</tr>
</tbody>
</table>
Use learning technologies and other scaffolds to help students participate in activities.

- On-line simulations
- Concord Consortium
- Sage Modeler
- Concord Consortium

Use RoadMap Launcher and Intergalactic Mobile Learning Center.
Create artifacts that address the driving question and explain the phenomena.
HiOH & Project-based Learning (PBL)

Engage in collaborative activities to find solutions
Community Action Projects

Community action projects
The community action projects
Bringing together science and society

Science
Reinforce the science

Society
Demonstrate the relevance of science to real life

Using science to create personal and collective social change
### Research questions for the community action projects

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does raising students’ awareness to the amount of sugar they eat affect their food choices?</td>
<td></td>
</tr>
<tr>
<td>How does watching TV and playing video games affect children’s healthy lifestyle?</td>
<td></td>
</tr>
</tbody>
</table>
| 1. How do smoothies affect your health?  
2. How can healthy smoothies attract consumers? |  |
| How does my neighborhood affect my exercise and walking habits? |  |
| What are the barriers to healthy eating, and how do these barriers affect children’s eating habits? |  |
| How does social media affect our feelings? |  |
### Community Action Projects

<table>
<thead>
<tr>
<th>What</th>
<th>Academically challenging</th>
<th>Address students’ background</th>
<th>Empower for action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Science</strong> - The projects stem from students’ scientific models.</td>
<td>Relevance to students’ life - The projects are focused on health issues in students’ environment.</td>
<td>Critical thinking - The students critically investigate their community</td>
<td></td>
</tr>
<tr>
<td><strong>Inquiry</strong> - The students engage in the practices advocated by NGSS: asking questions; planning and conducting an investigation; collecting data through a multiple methods; analyzing and interpreting data; constructing explanations; engaging in argument from evidence; and communicating information.</td>
<td>Family &amp; community – Family and community members provide funds of knowledge</td>
<td>Science communication – The students communicate scientific knowledge to the broader public.</td>
<td></td>
</tr>
<tr>
<td><strong>Multi-literacies</strong> – Each project involves writing, reading, science, math, arts and design.</td>
<td>Introduction to careers – Project introduce students to health-related or STEM career</td>
<td>Advocacy - Students advocate for changes that can improve the wellness of their community based on their research.</td>
<td></td>
</tr>
</tbody>
</table>
Health in Our Hands
Overview

Teacher PD & extensive support

NGSS aligned

Project based learning
HiOH
Three components:

Curriculum development & pedagogical support
Community engagement
School administration

What
How
District agenda:
▶ Improve Flint students’ science achievements
2015-16 M-STEP Data

4th-grade

Overall Performance: 287 Students Tested

- 1% 0.0%: 0 Students
- 0.7% 0.7%: 2 Students
- 99% 88.5%: 264 Students

- 4 Students
- 3 Students

7th-grade

Overall Performance: 223 Students Tested

- 2% 0.9%: 2 Students
- 1.3% 1.3%: 3 Students
- 98% 94.2%: 218 Students

- 4 Students
- 3 Students

11th-grade

Overall Performance: 197 Students Tested

- 7% 0.0%: 0 Students
- 6.6% 6.6%: 13 Students
- 93% 18.3%: 184 Students

- 4 Students
- 3 Students

Below Proficiency:

- 26 Students
- 8 Students
- 48 Students
District agenda:

- Improve Flint students’ science achievements
- Improve teachers’ experience with Next Generation Science Standards (NGSS) aligned curriculum
District
Setting the stage for collaboration

District agenda:
▶ Improve Flint students’ science achievements
▶ Improve teachers’ experience with Next Generation Science Standards (NGSS) aligned curriculum

Common agenda:
• Improve teaching and learning in the STEM disciplines for all students through research and development efforts
• Reduce disparities in education and health
• Sustainability
Mutually reinforced activities

- Recruiting schools, principals & teachers
- Integrating curriculum in the school system
- Teacher professional development & ongoing support
- Sustainability efforts
  - Greater Flint Health in Our Hands initiative
- Collaborating in curriculum development
HiOH
Three components:

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Community engagement

How
What
How
A strategic health & science education partnership to **design**, **enact** and **sustain** a middle school science curriculum

**Community-based participatory research (CBPR)** is a partnership approach to research

**The aim of CBPR** is to improve the health and quality of life of community members (Israel et al., 1998) by:

- increasing knowledge and understanding of a given phenomenon and
- integrating the knowledge gained with interventions and policy and social change
A strategic health & science education partnership to **design**, **enact** and **sustain** a middle school science curriculum

**CBPR Principles** -

1. **Acknowledges** community as a unit of identity..
2. **Builds** on strengths and resources within the community…
3. **Facilitates** a collaborative, equitable partnership in all phases of research
4. **Fosters** co-learning and capacity building among all partners…
5. **Integrates** and achieves a balance between knowledge generation and intervention
6. **Focuses** on the local relevance of public health problems
7. **Involves** systems development
8. **Disseminates** results to all partners
9. **Involves** a long-term process and commitment to sustainability…
Who is the community?

- Large city/regional organizations
  - CBOP, CRIM Foundation, AmeriCorps, FoodCorps members

- Community-based and faith-based organizations

- Families & residents of Flint
  - Schools, Sloan Museum, Flint Public Library, UM & MSU students
Setting the stage for collaboration

**Community agenda:**
- Improve the well being of residents
- Improve participation and involvement of residents in research and public policy
- Bridging academia and community

**Common agenda:**
- Make science relevant to students by connecting learning experiences to students' culture and community
- Balance the need for standards-based science curricula while being responsive to community needs
- Sustainability
Mutually reinforced activities

- Collaborating in curriculum development
- Providing support to the community projects
- Sustainability efforts
  - HiOH-Flint
  - Genesee Partnership
- Hosting and participating in the Final Event
Examples of community partners roles:

- Nutrition researchers from Michigan State University and Michigan Department of Education adapted their project – Smarter Lunchrooms –

- **FoodCorps members** provided help with nutrition education, gardening, and cafeteria interventions.

- **Community leaders, AmeriCorps volunteers, and university researchers** served as judges, speakers, and in other volunteer capacities during the Health Summits
Mutually reinforced activities

- Collaborating in curriculum development
- Providing support to the community projects
- Sustainability efforts
  - HiOH-Flint
  - Genesee Partnership
- Hosting and participating in the Final Event
Health In Our Hands-Flint/Genesee Partnership

Community, health, and education organizations:

- Dedicated to achieving success and sustainability of Health In Our Hands in Flint and beyond. We
- Identify classroom mentors,
- Organize community-based activities linked with the curriculum, and
- Support the future growth and development of the learning program.

Vision
Youth empowered by science to improve health, advance careers, and promote community well-being.

Planning committee organization members
Community Based Organization Partners of Flint, Flint Community Schools, Carman-Ainsworth Community Schools, Genesee County Health Department, Genesee Intermediate School District, Genesys Health System, Greater Flint Health Coalition, Health Alliance Plan, Michigan State University-CREATE for STEM Institute & Extension, University of Michigan-Flint Discovering Place, and University of Michigan School of Public Health
HiOH
Three components:

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Community engagement
What are students’ learning outcomes following engagement in HiOH?
Design-Based Research (DBR) approach

The systematic adjustments of various aspects of the designed context, so that each adjustment serves as a type of experimentation that allows the researchers to test and generate theory in a naturalistic context (Barab & Squire, 2004).

<table>
<thead>
<tr>
<th>Unit</th>
<th>Year</th>
<th>Enactment description</th>
<th>Number of students</th>
<th>Number of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>July 2015</td>
<td>Learning Experiments – Museum summer camp, Detroit</td>
<td>Detroit =15</td>
<td>Detroit = 1</td>
</tr>
<tr>
<td></td>
<td>2015-2016</td>
<td>Pilot testing 6th grade Flint &amp; Detroit</td>
<td>Flint = 44</td>
<td>n=1 teacher</td>
</tr>
<tr>
<td></td>
<td>2016-2017</td>
<td>1st Field testing District wide enactment 6th grade Flint</td>
<td>n=345 students</td>
<td>Detroit = 85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot testing focus on scaffolds 6th grade Flint</td>
<td>Detroit n=88 students</td>
<td>n=1 teacher</td>
</tr>
<tr>
<td></td>
<td>2017-2018</td>
<td>2nd Field testing District wide enactment 6th grade Flint</td>
<td>n=309</td>
<td>n=1 teacher</td>
</tr>
<tr>
<td></td>
<td>2018-2019</td>
<td>3rd Field testing District wide enactment 6th grade Flint</td>
<td>n=322</td>
<td>n=7 total teachers</td>
</tr>
<tr>
<td>Addiction unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2016-2017</td>
<td>Pilot testing 7th grade Detroit</td>
<td>n=90</td>
<td>n=1 teacher</td>
</tr>
<tr>
<td></td>
<td>2017-2018</td>
<td>1st Field testing 7th grade Carman Ainsworth</td>
<td>n=90</td>
<td>n=1 teacher</td>
</tr>
<tr>
<td></td>
<td>2018-2019</td>
<td>2nd Field testing 7th grade Carman Ainsworth</td>
<td>n=233</td>
<td>n=3 teachers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8th grade Flint</td>
<td>n=75</td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>Sources of data</td>
<td>Diabetes</td>
<td>Addiction</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td><strong>Students</strong></td>
<td>1. Post enactment interviews</td>
<td>Videos n=77 ranging 15-35 min</td>
<td>Videos n=11 ranging 15-35 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Judges interviews at final presentation</td>
<td>Videos Approximately 4 hours videos of judges talking to students</td>
<td>Videos Approximately 2 hours videos of judges talking to students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Final presentation artifacts (posters, videos, etc.)</td>
<td>Written</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Class observations</td>
<td>Videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Models and additional class artifacts</td>
<td>Written</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>6. Students’ models throughout the entire unit</td>
<td>Written</td>
<td></td>
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<tr>
<td></td>
<td>7. Students pre-post 3D assessments &amp; pre-post surveys of attitudes towards science</td>
<td>Written</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>Sources of data</td>
<td>Diabetes</td>
<td>Addiction</td>
<td></td>
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<td>--------------</td>
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<td></td>
</tr>
<tr>
<td>Teachers</td>
<td>1. Post enactment interviews</td>
<td>Videos 16 interviews app. 45-75 min</td>
<td>Videos 2 interviews app. 60 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Online correspondences</td>
<td>Written All written emails and text messages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Teacher PD</td>
<td>Videos 2.5 days of PD over three field tasting meetings during the enactments PLCs during third field testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>1. Judges’ interviews of students at summit event</td>
<td>Videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Judge’s written reflections at summit event</td>
<td>Written</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Event questionnaire</td>
<td>Written</td>
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</tbody>
</table>
Qualitative analysis

What are students’ learning outcomes following engagement in HiOH?

Data is analyzed in two phases of coding, and integrated principles of thematic analysis, a method for identifying, analyzing and reporting patterns (themes) within data (Braun & Clarke, 2006):

1. Familiarizing with data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report
From a student perspective outcomes

In our experiment, we first met with an urban planner, Mr. Rich Saffer, and learned about his job in the community. He gave each of us different types of GPS devices that recorded our routes for 24 hours. We wore them home around our necks and returned them the next day to record the data. This device recorded not only where we went but how we got there, either by car, bus, or by walking. Our distances and times were tracked into the Mr. Saffer downloaded all this information for us and even shared the results using Google Earth. This helped us back up our claims to the inquiry question with scientific data. The data is displayed in a pie chart. The chart shows the results of trips from school, trips from school to home, and places visited (on foot and by car). This data was then shown in a pie chart.

In the inquiry question, we also asked the students to rank the different factors that influence their decision to go for a walk in their neighborhood. The results are as follows:

- Empty Houses: 10.91% (6)
- Fast Cars Driving down...: 32.73% (18)
- Broken Sidewalks: 18.18% (10)
- Stranger Danger: 65.45% (36)
- Stray Dogs: 29.59% (16)
- Weather: 18.36% (9)
- Having a Warm Coat: 5.15% (3)

The table shows the percentage of students who ranked each factor as a reason for not walking in their neighborhood.
I really loved the research projects. The students that I interviewed were enthusiastic about taking charge of their health. I helped Idit develop the project where the students characterized their diets wino whole and processed foods. This project seemed to work well. The students were able to record what they ate for 4 days and to categorize their foods as whole and processed and calculated a percentage of each. They were able to clearly explain this to me and remembered what percent they ate. They were also able to define what is a whole and what is a processed food and to understand that eating more whole foods will improve their health. I asked the students if they knew what a whole or processed food was before the project and they said “a little” but that before they would just eat without thinking about it. I think it was overall successful.

Another project that worked very well was the students who tracked their activity with GPS. The students were VERY articulate and able to explain their project very well.

I am very moved by the presentations. I am finding myself filled with energy and hope after watching these children take their health in their own hands. I will never forget the genuine interest these children expressed while exhibiting their projects. Many kids came up to me eager to show off their knowledge and their collected data. This excitement and feeling I have walking out of this room is why I chose public health. It was an honor to come today. Thank you.
1. **Students merge science and lived experience – science and life are intertwined** - The students demonstrate an understanding of the science within a social context. They combine scientific knowledge, understanding, and practices within both a scientific context and a social context.

2. **Students demonstrate positive attitudes and motivation towards learning science** - Students indicate experiencing various emotions and feelings throughout their learning, such as: excitement, joy, enthusiasm, curiosity. Learning science is often described as “fun”. Students also demonstrate positive attitudes towards science, and motivation to learn about additional phenomenon the same manner.

3. **Students develop personal competencies: collaborators, experts, agents of change** - Students demonstrate social and personal skills, that enable them to communicate and work collaboratively with others. They become confident in their abilities to lead changes in their personal lives and that of their families and communities.
4. Students realize the relevance and interaction of science to self, family and community - Students acknowledge the relevance and importance of scientific understanding to themselves, their families and their community.

5. Students provide science-based social critique and suggestions to improve their lives and the health of their community - Students provide a social critique of their own community based on an understanding of the science behind the phenomenon, and its application onto a social context. They are able to provide evidence-based suggestions to solve a real-world problem that prevail in their own personal lives, families and community.

6. Students experience the multi-disciplinary of science based issues -
Our team members:

**Michigan State University** – CREATE for STEM: Joe Krajcik, Renee Bayer, Tali Tal, Jane Lee, Louise Mead, Deborah Peek-Brown, Idit Adler

**University of Michigan** - School of Public Health: Toby Citrin, Stephen Modell, Ella Greene-Moton; School of Engineering: Elliot Soloway, Josh Meyer

**Community-based organizations** – Community-Based Organization Partners (CBOP); Sloan Museum; Flint Public Library. University Prep Science and Math Middle School; Friends of Parkside; Charles H. Wright African American Museum; Michigan Science Center; Detroit Public Library

**Concord Consortium** - Frieda Reichsman

**Flint, Detroit and Carman-Ainsworth Community Schools** – Stephanie Elder, Nadina Aversa, Taylor Chapman; 6th grade teachers: Kathleen O’Connor, Scott Davis, Karen Christian, Sue Anderson, Bryan Yuille, Darlene McClendon, Catanja Harrison, Melanie Hemphill, Annette Sparks, Kathy Savoie, David Sutton, Kelly Blondin, Whitney Schnell, Tom Lafferty; 7th grade teacher: Adam Cassel, Melissa Warburton, Chanel Maloney; 8th grade teacher: Diane Baker-Williams; and our WONDERFUL Flint, Detroit and Carman Ainsworth students!

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Our journey has just begun...