It’s Melting!

MSTA 2020
March 7th, 2020
Who’s in the room

- Gradel level
- Chemistry level
- PBL comfort
Our classroom

- Co-teaching model
- District chemistry option
- Classroom population
What is PBL?

Project Based Learning (PBL) is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects.

(https://www.pblworks.org/what-is-pbl)
Why PBL in the classroom

- Get students designing investigations in a chemistry setting
- Moving away from your traditional conformational lab
- Focused on design thinking
- Sustained investigations and data collection
Challenges with PBL in chemistry

- Student safety
- Need to over plan and prepare
- Handling of materials
- Cost
- Disposal
- Student dynamics
- Time
The standards

**DCIs**

PS1.A: STRUCTURE AND PROPERTIES OF MATTER

PS2.B: TYPES OF INTERACTIONS

**SEPs**

- Defining Problems Planning & carrying out investigations
- Analyzing & interpreting data
- Using mathematics & computational thinking
- Engaging in argument from evidence
- Obtaining, evaluating & communicating information

**CCCs**

Patterns

System and system models
Possible Topics

- Phase Change/Energy Transfer
- Atomic Structure, Periodic Table, and Trends
- Types of Compounds/Substances
Presenting the problem

- Phenomenon
- Local focus - meaningfulness to kids
Presenting the problem - building the background knowledge

● Expert panel
  ○ Administrators
  ○ Head custodian
  ○ Head of district building and grounds

● Student Research
Setting the stage for success

- Grouping students
- Team binder
- Progress grid

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Office hours

https://www.pblworks.org/
What we are asking students to do

- Work successfully in a group
- Presentation skills
- Conduct safe experiments in the chemistry classroom
### Unit 4 - Ice Melt (4 Weeks)

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Phenomena Video</td>
<td>Review DBQ</td>
<td>Expert Panel Interview</td>
<td>Research question presentations</td>
<td>Project Overview Groups Assigned Introduce Goal Progress Charts Group Binders</td>
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<td></td>
<td>Complete observation sheet, QFT</td>
<td>Introduce Question and Project Scope</td>
<td>Work on assigned research question</td>
<td>Refine Problem/brainstorm next steps</td>
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<td></td>
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<td>Brainstorm and assign research questions</td>
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<td>2</td>
<td>Investigation Plans/KPs</td>
<td>Investigation Plans/KPs</td>
<td>Investigation Plans/KPs</td>
<td>Reflect Update Goal Progress Prep Materials Mess About</td>
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<td>KP Due</td>
<td>Due Investigation Plan</td>
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<td>Meaning About</td>
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<tr>
<td>3</td>
<td>Testing</td>
<td>Testing</td>
<td>Testing</td>
<td>Data Analysis</td>
<td>Introduce Proposal/Poster/Presentations</td>
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<td></td>
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<td>Due Investigation Plan</td>
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<td>Work on Proposals</td>
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<td>Data Analysis Due</td>
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What it looks like in the classroom for students

- Planning out their investigations - at least three different experiments
- Messing about & testing
- Collecting and analyzing data
- Forming an argument for a treatment option
End Product

- Lab notebook - individual
- Proposal paper - individual
- Presentation - group
- Poster - group
1) Gathered supplies (frozen petri dishes, measuring trays, scale, timer, funnel)

2) Measured out 1g of each type of salt (driveway heat, road runner, clean melt, rock salt)

3) Spread ice melt mixture on matching petri dish and wait 5 minutes

4) Pour melted water into funnels and then into graduated cylinder, and record mass of the water
Experiment 3:

- Average Temperature of Ice w/Different Salts (°C)
Qualitative:
- The substances created little divots in the snow and began to almost disappear as they went into it
- The Green Melt was easy to see because of its green color

Interpretation:
The Graph above shows the average effectiveness of each substance based off of a scale. The scale ranges from 0-10. 0 being not effective at all and 10 being completely effective.
We conducted this experiment over the course of 2 days. Driveway Heat and Green Melt on the first day, which was colder and had more snow. Then we did Clean melt and the control on the second day, which was warmer and had less snow.
What solution is best for F.H.P.S.?  
CALCIUM-CHLORIDE.

What is the best ice melt solution for F.H.C.?  
ENVIRONMENTALLY FRIENDLY

CLEAN MELT

Experiment #1:
- Clean melt won against all other types of salts.

Experiment #2:
- The current treatment: green melt was used. One the most expensive this is shown to be lower overall.

Experiment #3:
- Clean melt was used. This showed that you make it shown to be lower overall.
Making time for reflection

● Students
  ○ Team binder
  ○ Weekly self reflection - written in notebook
  ○ End of project
  ○ Peer evaluation

● Teachers
  ○ Constant check ins
  ○ End of unit reflection
  ○ Getting feedback from panel & students
SCECH: SCIENCE