

Science Encounters

Science Curriculum Project

October 25, 2019
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South Middlesex Opportunity Council

- SMOC's mission is to improve the quality of life of low-income and disadvantaged individuals and families by advocating for their needs and rights; providing services; educating the community; building a community of support; participating in coalitions with other advocates and searching for new resources and partnerships.



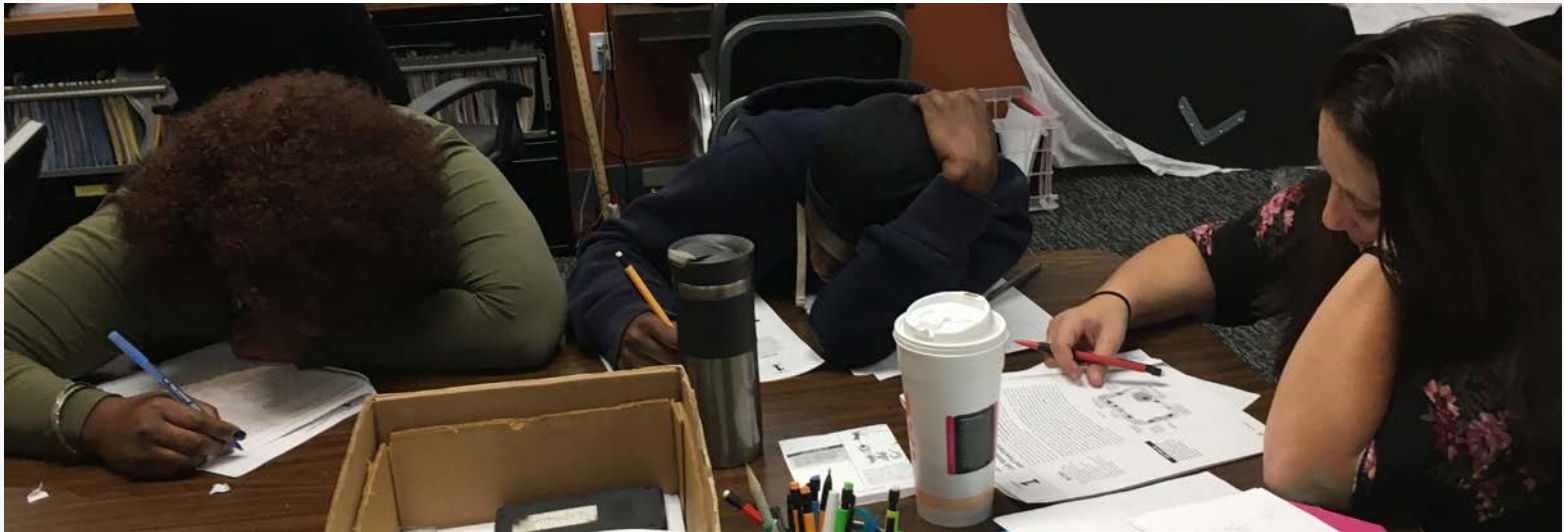
Joan Brack Adult Learning Center

- Joan Brack Adult Learning Center (JBALC) at South Middlesex Opportunity Council (SMOC)
- Daytime ESL and GED classes for adults in Metrowest
- GED classes are 20 hours per week
- GED students may be:
 - Addressing basic needs
 - Motivated by external factors



Why Science Encounters?

- Prior curriculum focused on individual reading



What is Science Encounters?

- New curriculum centered around in-class lab activities
 - Students *doing* science
 - RLOs (Reusable Learning Objects)
 - ECRIF methodology
(Encounter, Clarify, Remember, Internalize, Fluently use)

Project Structure

- 12 Week Curriculum
 - 2 hour class, once per week
 - 10 students
 - Different science topic each week
 - Level: upper middle school
- Key Lesson Components
 - Content lesson with quick assessments built in
 - Lab activity
 - Journal (for lab reports and reflective writing)

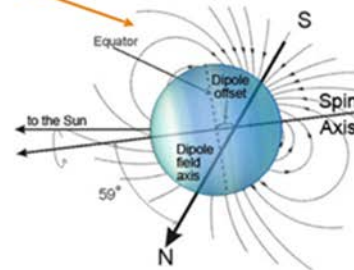
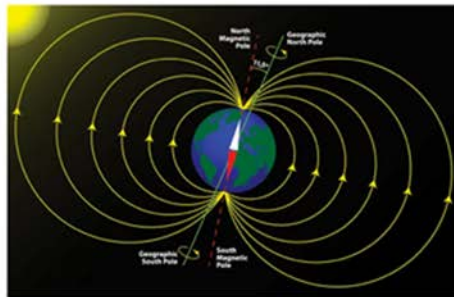
Curriculum Topics

1. Cells
2. Genetics
3. Evolution
4. States of Matter
5. Physical Properties
6. Chemical Properties
7. Molecules & Compounds
8. Weather
9. Visible Light
10. Force
11. Energy Resources
12. Magnetic and Electrical Forces

Topic Content

Magnetic Forces

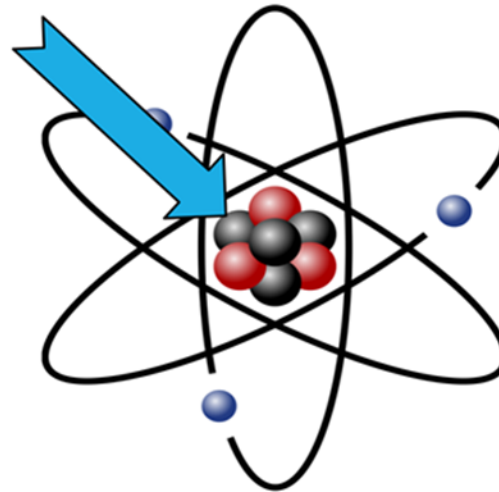
- The Earth has a magnetic field. Magnetic compasses point to the Earth's magnetic north pole.
- The planetary and magnetic poles do not necessarily line up. In fact, the planet Uranus has a difference of about 60 degrees!



Topic Content

Neutrons

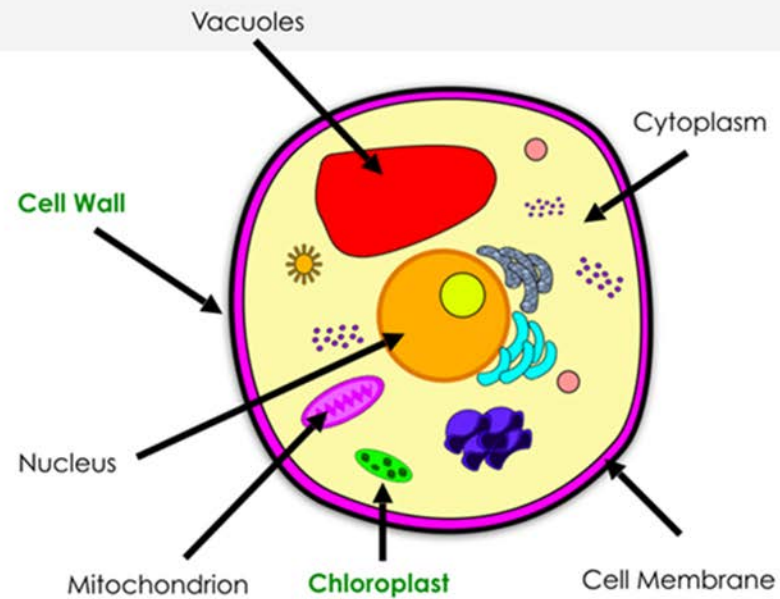
- No electrical charge
- Located inside the nucleus
- Included in the atom's mass
- 1 neutron = 1 atomic mass unit (amu)
- May not always be the same as the number of protons.



Topic Content

Plant Cells

- Cell Membrane
- **Cell Wall**
- Nucleus
- Cytoplasm
- Mitochondrion
- Vacuoles
- **Chloroplast**



Quick Assessments



Frequency Problem

The speed of a wave on a rope is 50 cm/s and its wavelength is 10 cm. What is its frequency?

- 1) Write the formula
- 2) Substitute and solve



Quick Sorting Activity

Decide if each situation is an example of kinetic or potential energy.

Situation	Potential	Kinetic
Standing on the end of a diving board.		
Falling from the top of a ladder.		
A rubber band pulled back as far as it can go.		

Lab Activities

Scientific Method as a framework for ALL lab activities

Independent vs. Dependent Variables

Independent variable – changed by the scientist during the experiment

Dependent variable – changes in response to the changing independent variable



Using the Scientific Method to Investigate...

Research Question: If we mix iron filings with glue, water, and borax...

Will the resulting substance be “magnetic”?



Lab Activities



Lab Activities



Solar Powered Wind Bag



Cloud in a Bottle



Cell Pizza

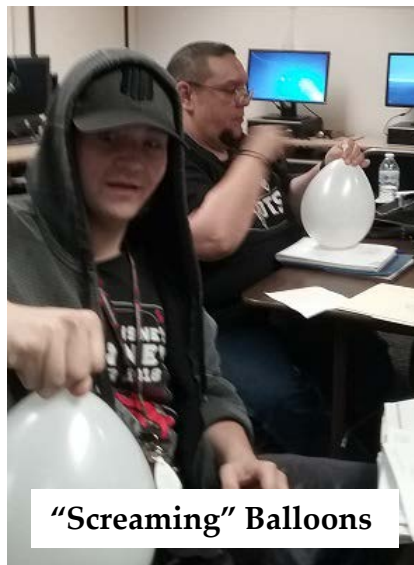


Making Observations

Lab Activities



Magnetic Slime

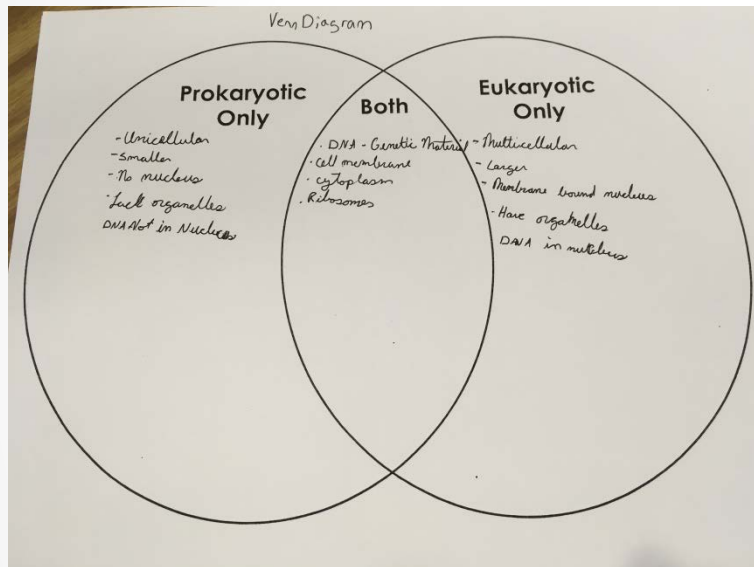


"Screaming" Balloons



Density Rainbow

Lab Notebooks



Phenylthiocarbamide/chemical PTC 2/20/19

Hypothesis

I do not believe I am a taster. I will not detect the chemical PTC from a piece of paper.

Experiment

I put a piece of paper in my mouth.

Observation & collect data

I could not taste PTC from the paper.

6 people tried & 4 people could taste it.
2 people could not.

Conclusion

I am not a taster. My conclusion was correctly predicted as stated in my hypothesis.

Student Successes

- Actively engaged with RLOs
- Used scientific method to complete labs
- Demonstrated understanding during in-class exercises, assessments, and practice tests
- All five students who took the science sub-test passed on the first attempt!

Student Enthusiasm

- Higher attendance
- Positive feedback
- Participation in labs even after passing the science sub-test
- “Attitudes towards science” survey

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
(Before pilot) School should have more science lessons each week.	0	4	1	2	0
(End of pilot) School should have more science lessons each week.	3	3	3	0	0

Challenges

- Measurement: pre and post surveys were not collected from all the same students
- Continuity: uneven attendance hampered ability to include linked topics
- Excluded Topics: not all science topics lend themselves to hands-on lab work
- Test Prep: added lesson component

Beyond Science Encounters

- New students experiencing lab activities and RLOs
- ECRIF methodology being used across subjects
- Developed interactive lesson plans with group activities for social studies and math