
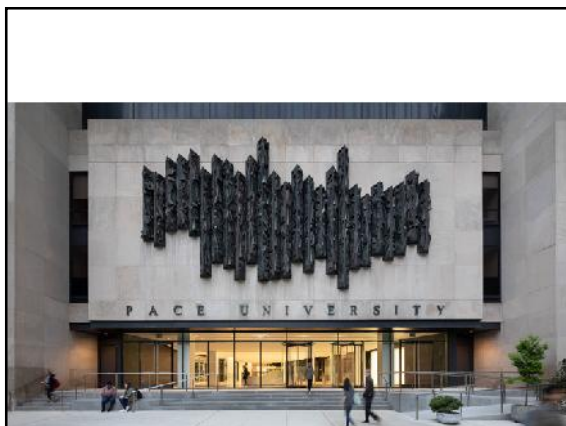

Ballkuro Online

Developing Lab Experiments Using Everyday Household Materials Via Distance Learning



Elmer-Rico E. Mojica, Ph.D
emojica@pace.edu
 Associate Professor
 Department of Chemistry and Physical Sciences
 Pace University, New York City, USA



Science

- It is the study of facts.
- It is about discovering the world around us, of knowing things, and having new and wonderful idea.
- Scientific learning that takes place in classrooms alone is not true learning.
- Hands-on learning is very important for fostering scientific learning in early childhood: science lab experiments.

Laboratory Experiments

- promote the development of scientific thinking in students.
- allow students to ask questions, probe for answers, conduct investigations, and collect data.
- do science in science labs than simply learning science through textbooks in classrooms.

Laboratory Experiments

- promote discovery and learning.
- It is something that teachers can't give to students.
- Students conduct experiments. They adopt alternatives, try to work out things in different areas and understand what works and what didn't really work.

Laboratory Experiments

- Students are viewed as active learners and not just passive recipients of knowledge.
- Students are given various opportunities to learn and experiment.
- Science experiments play a very crucial role in the on going intellectual development of children.
- In science laboratories, children get time, space, as well as resources to exercise their curiosity.

NSTA Declarations

Properly design laboratory experiments should

- have a definite purpose that is communicated clearly to students.
- focus on the processes of science as a way to convey content
- incorporate on-going student reflection and discussion
- enable students to develop safe and conscientious lab habits and procedures.

Preschool and Elementary

- Students should receive multiple opportunities every week to explore science labs.
- Laboratory investigations should provide all students with continuous opportunities to explore familiar phenomena and materials.

Middle and High School Levels

- Should have multiple opportunities every week to explore science labs (middle school)
- Should be in the science lab or field, collecting data every week while exploring science labs (high school)
- Lab investigations should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations.

College Levels

- Help students learn to work independently and collaboratively, incorporate and critique the published work of others in their communications, use scientific reasoning and appropriate laboratory techniques to define and solve problems, and draw and evaluate conclusions based on quantitative evidence.
- Labs should correlate closely with lectures and not be separate activities.

COVID-19 Pandemic

- Forced everyone to stay at home
- Shift to remote learning here in US
- Most schools closed in the Philippines
- Alternatives for lab experiments for those who did remote learning
 - Simulations
 - Lab Kits
 - Videos
 - No Lab

Online Class

Computer simulations provide alternatives to complex experiments that might be too large, expensive, or dangerous for physical manipulation or not feasible for a large number of students.

Lab kits, in combination with household items, provide the means to conduct experiments at home on a smaller scale and without the need for expensive equipment

Online Resources

Science: <https://phet.colorado.edu/>

PHET 750 million downloads SIMULATIONS TEACHING RESEARCH ACCESSIBILITY SPANISH



<https://www.labxchange.org/>
<https://libguides.mines.edu/oer/simulationslabs>
<https://www.walter-fendt.de/html5/phen/>

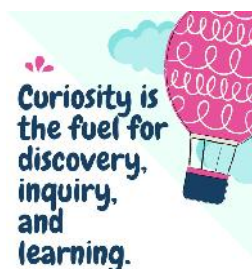
What is the best alternative for lab?

- Mimic commercial lab kits but use everyday household materials.
- By using these materials, teachers have to use their creativity and take advantage of students curiosity.
- Curiosity is the key to creativity.

Creativity  Curiosity

Curiosity

- Make students curious.
- Curiosity makes learning more effective and enjoyable.
- Curiosity is just as important as intelligence in determining how well students do in school.



“Creativity is simply connecting new dots in new ways.”

how we usually think about creativity

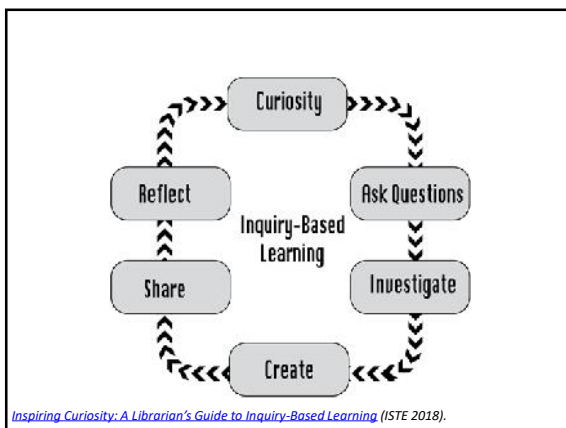
what creativity really is

<https://seewhathappensblog.com/2011/10/26/forget-creativity-lets-demand-curiosity/>

12 Benefits of Creativity

- Creativity allows you to express yourself
- Creativity is multi-disciplinary
- Creativity reduces stress and anxiety
- Creativity allows you to enter your happy zone and have fun!
- Creativity leads to feelings of accomplishment and pride
- Creativity can link you to others with the same passion
- Creativity promotes risk-taking & iteration
- Creativity is a pre-requisite for innovation
- Creativity allows you to think outside the box and problem-solving
- Creativity gives you a sense of purpose
- Creativity improves your ability to focus
- Creativity encourages us to be life-long learners

“Creativity now is as important in education as literacy and we should treat it with the same status.”
- Ken Robinson



- ### Things to Consider
- Avoid adapting the traditional lab experiments directly to online environment
 - Think SAFE (Safety, Affordability, Feasibility, “Engageability”)
 - Key to have a successful distance learning activity is its DESIGN.
 - Focus on learning objectives

- ### Designing Home Experiments
- Conceive: What do I wish to accomplish in this experiment/activity?
 - Design: How I will accomplish the experiment?
 - Implement: How it will done by the students?
 - Operate: Does it work the way it was planned?
-

Designing Home Experiments

Chemical Reactions in Everyday Life

Rust

Photosynthesis

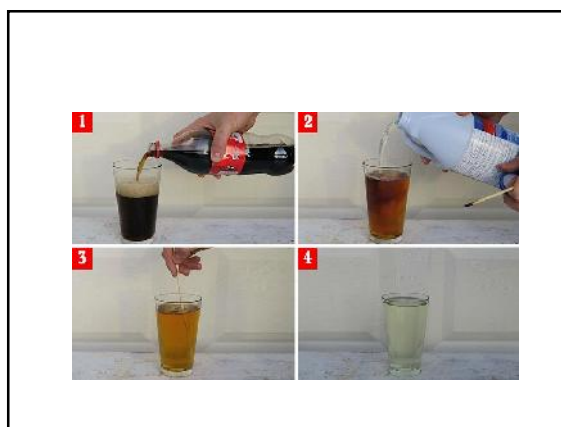
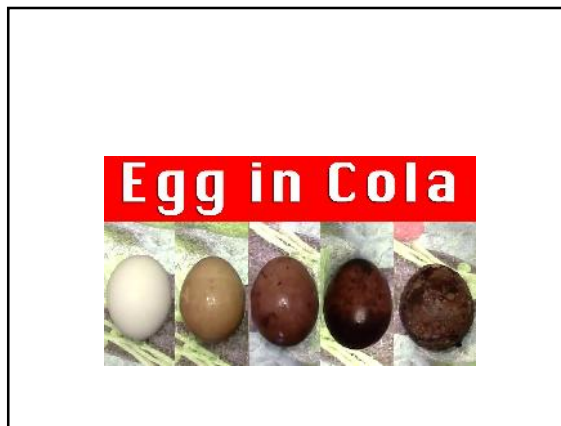
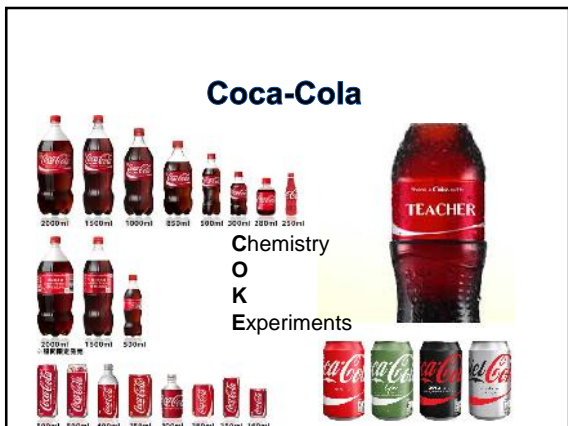
Cooking

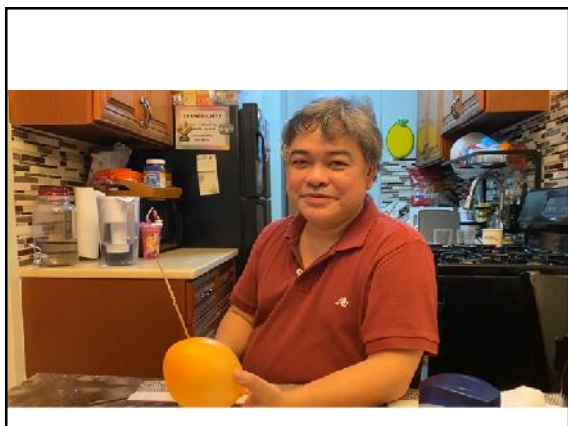
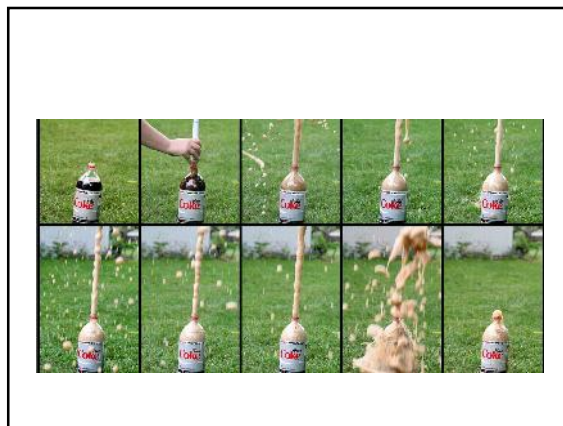
Combustion

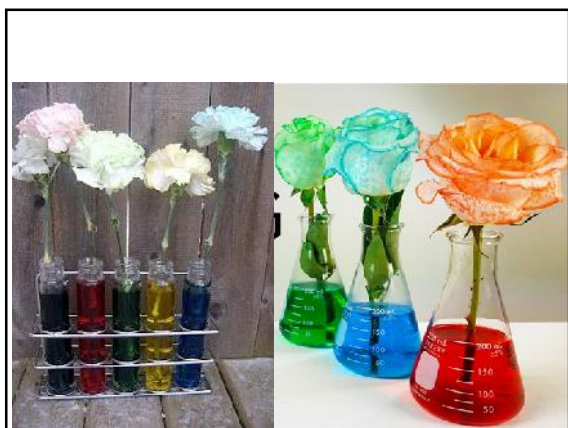
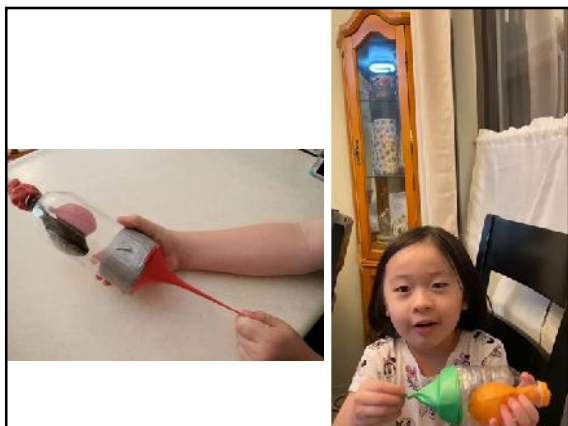
Digestion

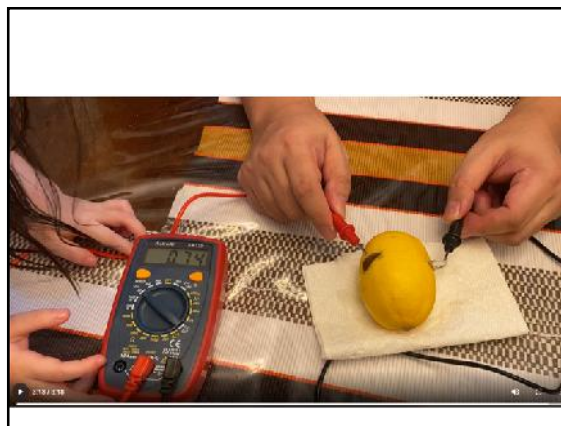
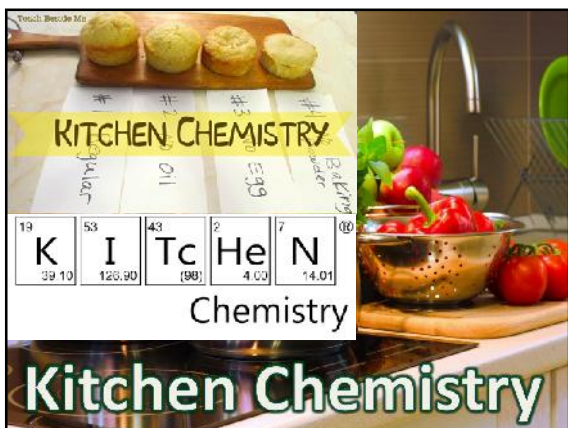
Anaerobic Respiration

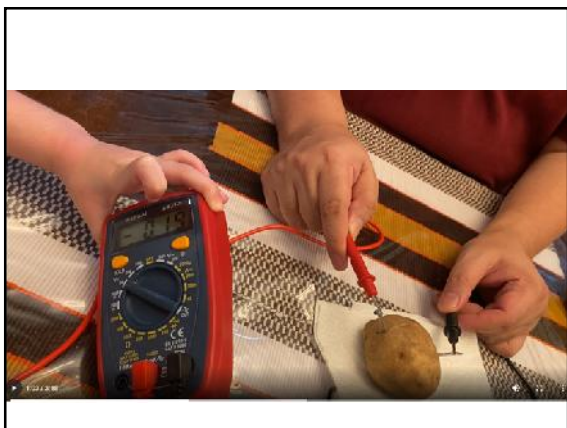
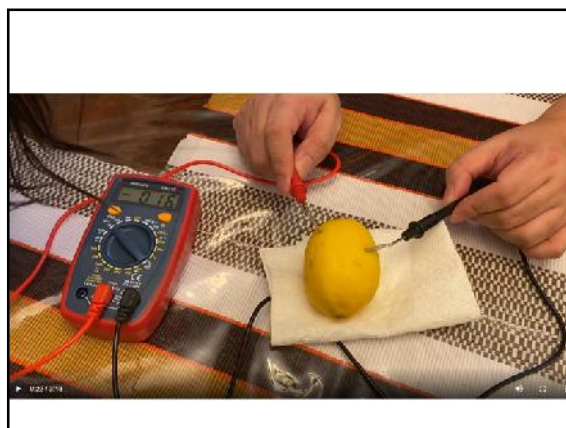
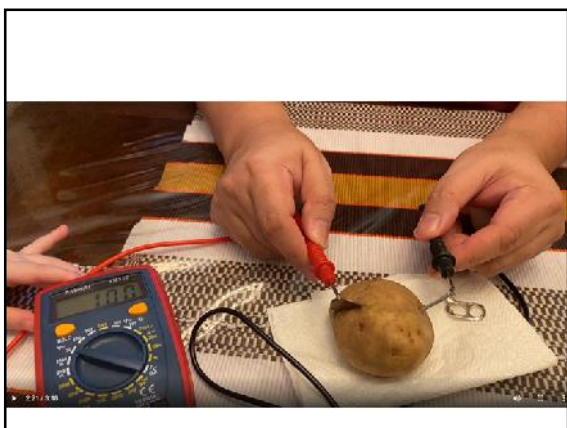
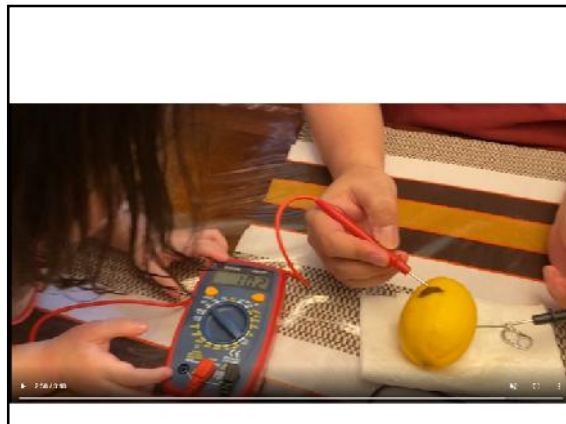
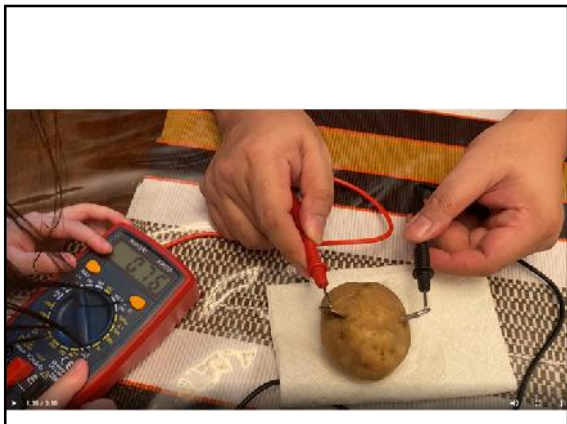
ThoughtCo

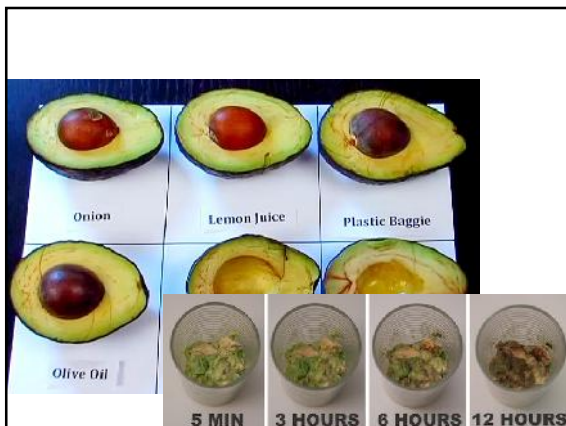












Banana ripeness	Sugar concentration (%)	Iodine staining
1	16.7	
2	19.3	
3	21.8	
4	20.7	
5	20.0	
6	19.8	

<https://www.scienceinschool.org/content/go-bananas-biochemistry>



Other Examples

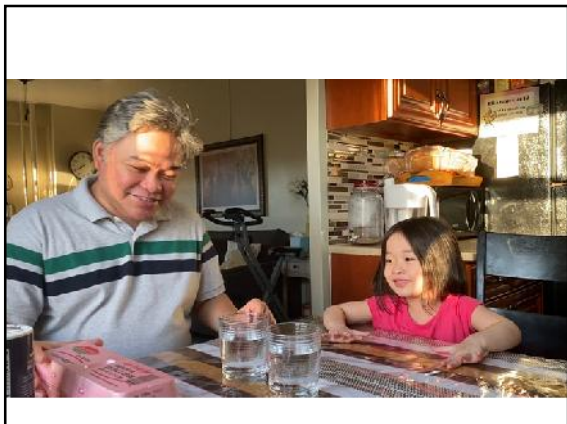
- Bigas to kanin
- Ripening of fruits (mapakla to matamis) use of carburo
- Pancake/hotcake
- Itlog
- Pinirito
- Nilagang karne (with papaya)
- Hipon (dark grey to orange)

Alternatives

- If materials cannot be supplied, teachers can perform the experiments, video it and show to the students.
- Better, just look for the videos in YouTube.
- You can look on other sites where the videos are available.
- To economize data plan (Internet use) make/find videos that are short.

Websites

- [Filipino Science Hub](#) 
- Pueblo Science 
- YouTube Channel: Craft for Kids, Raising da Vinci, MaxHax, Go Experimental, Malmesbury Education
- My personal webpage: <https://projectchemunity.weebly.com/>



Acknowledgements

- AFTA
- Audience

"It's not resources
but resourcefulness
that ultimately
makes the
difference."

— Tony Roberts, AFTA Co-Founder

EVAN CARMICHAEL

