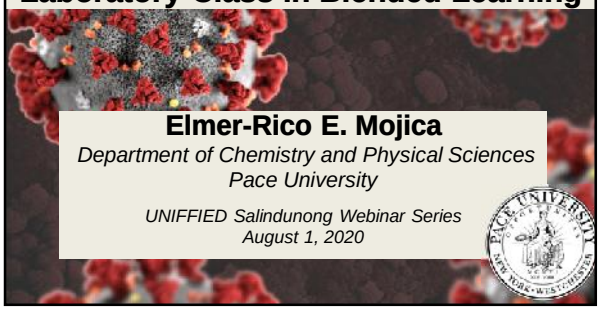
# Home-Based Experiments and Demonstrations to Fulfill the Laboratory Class in Blended Learning



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*UNIFFIED Salindunong Webinar Series*
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## Pace University


## 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 Class

- Laboratories are an essential component of science courses.
- The laboratory is an exciting place where students investigate, analyze, and reflect. They test and apply theories and make abstract concepts concrete.
- Experimentation provides students with real-world contexts to apply scientific concepts, develop critical thinking skills, and engage in scientific processes.

## Goals of Laboratory Class

•Develop intuition and deepen understanding of concepts.

•Apply concepts learned in class to new situations.

•Experience basic phenomena.

•Develop critical, quantitative thinking.

•Develop experimental and data analysis skills.

•Learn to use scientific apparatus.

*Science Teaching Reconsidered*, National Academy Press, 1997

## Goals of Laboratory Class

- Learn to estimate statistical errors and recognize systematic errors.
- Develop reporting skills (written and oral).
- Practice collaborative problem solving.
- Exercise curiosity and creativity by designing a procedure to test a hypothesis.
- Better appreciate the role of experimentation in science.
- Test important laws and rules.

*Science Teaching Reconsidered*, National Academy Press, 1997

## Laboratory Class Approach

- ***Expository*** –Students follow prescribed directions to verify a preordained results. (traditional instruction or cookbook approach)

- ***Inquiry*** – Students are provided with materials, information and a question to answer, but are given latitude tin how to go about designing the experiment or interpret the results which is not preordained (open-inquiry)

## Laboratory Class Approach

- ***Discovery*** – The instructor has a particular outcome in mind and directs student towards that outcome, encouraging students to make predictions, formulate hypothesis and design and evaluate the experiment themselves. (guided-inquiry)
- ***Problem Solving*** – Students are given more ownership over the process of discovery while incorporating a greater dimension of teamwork and interdependence

## 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

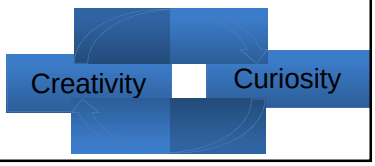
## Online Resources

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


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

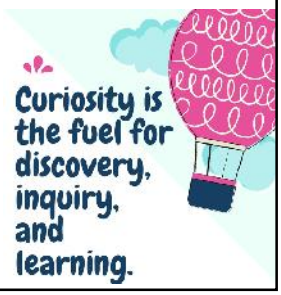
## Laboratory Best Alternative

- 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.

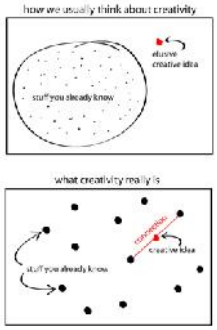



## Curiosity

- 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.

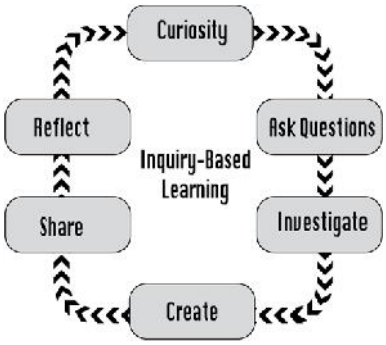



## Curiosity


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


## Curiosity




*Inspiring Curiosity: A Librarian's Guide to Inquiry-Based Learning* (ISTE 2018).

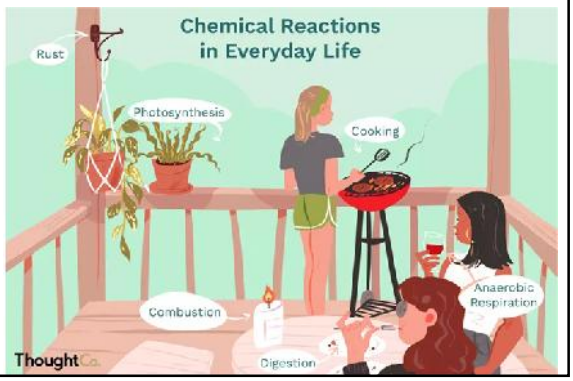
## Things to Consider

- 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

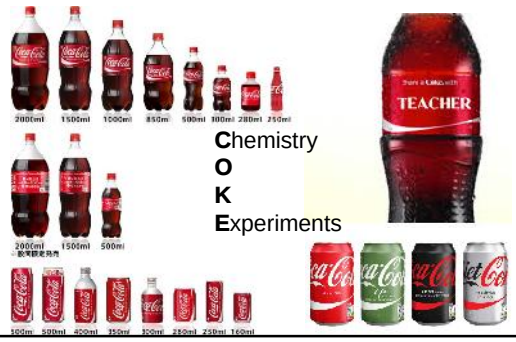
## Designing Home Experiments

- 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




## Coca-Cola



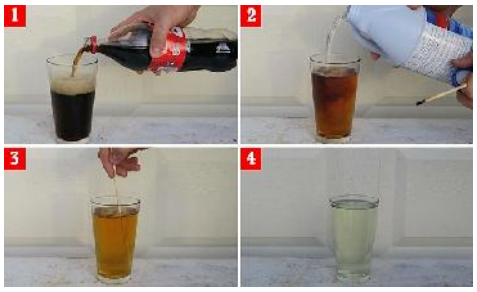

**C**hemistry
**O**
**K**
**E**xperiments

## Soaking in Coke


## Evaporating Coke


## Milk + Coke

## Bleach + Coke




## Floating/Sinking Coke

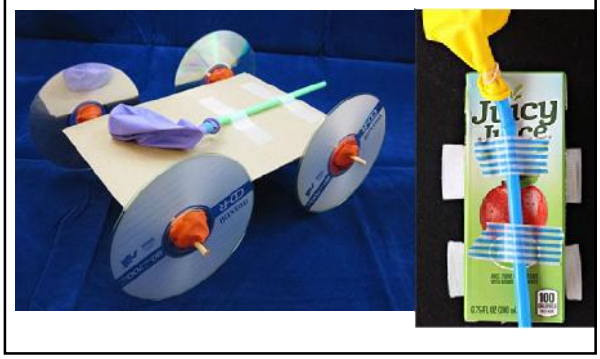
## Coke as Cleaning Agent


## Mentos + Coke

## Balloons

https://www.youtube.com/watch?v=X4vWDDmKQTM

## Balloons



## Balloons

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## Food Coloring

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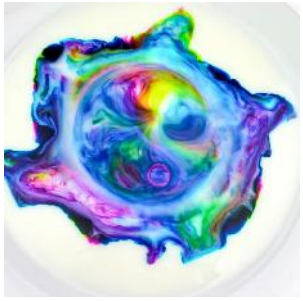
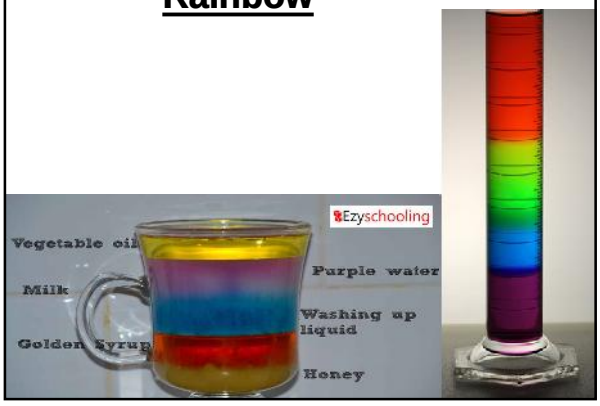
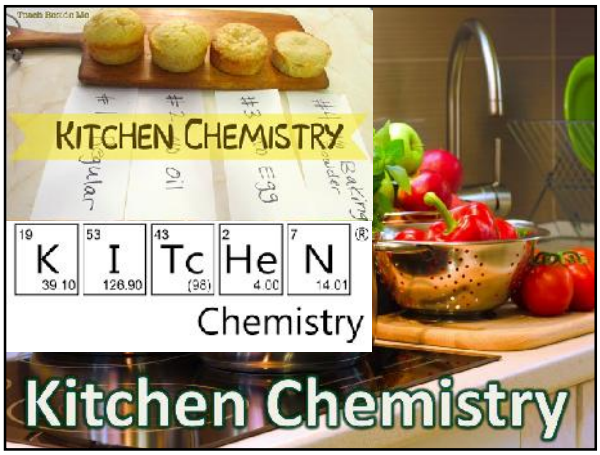


## Skittles and M&M

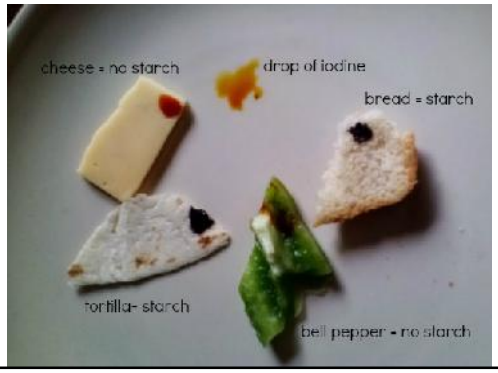
## Rainbow




## Kitchen Chemistry

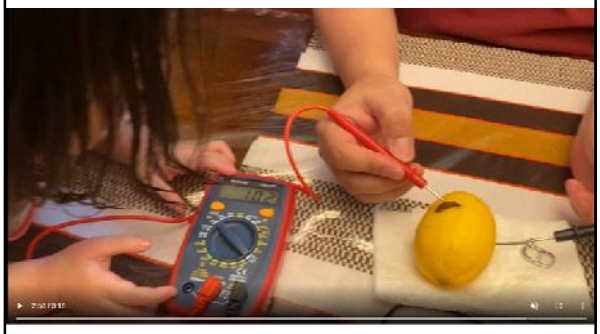
## Iodine Starch




## Lemon Battery?

## Potato Battery?

## Lemon Battery?



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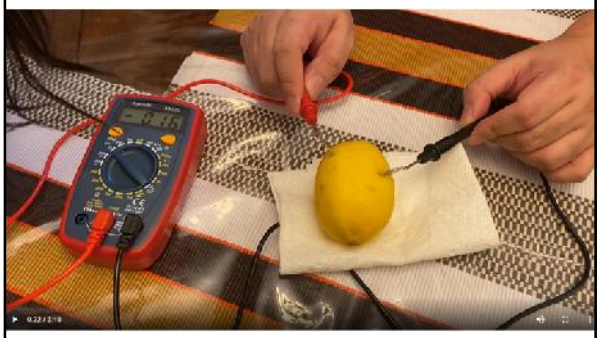
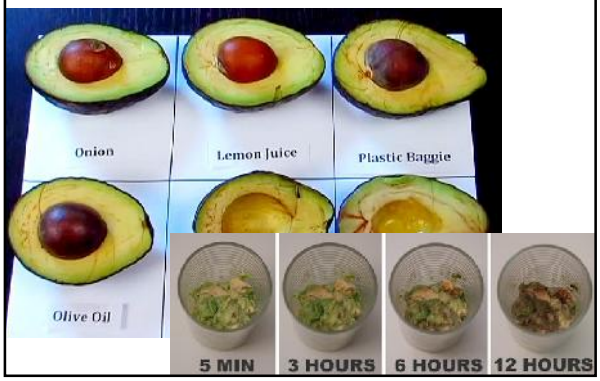


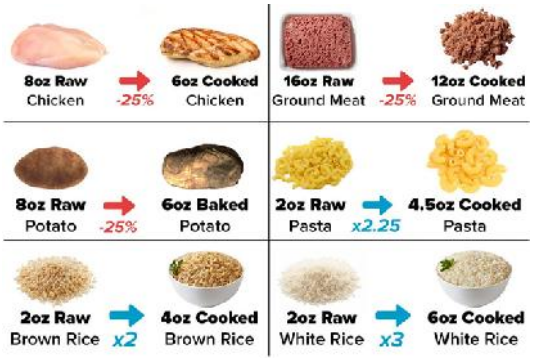
## Potato Battery?

## Avocado Browning



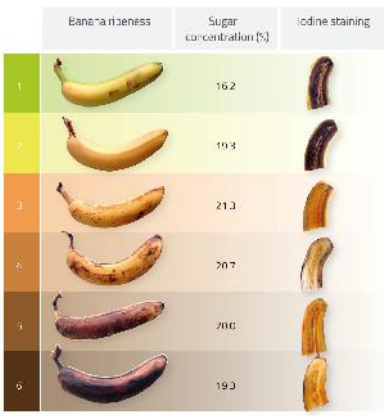

## Apple Browning


## Cooking




## Bigas to Kanin

## Ripening Banana

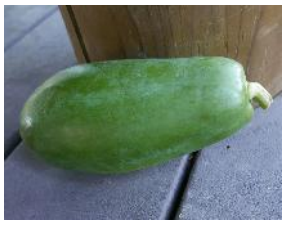



https://www.scienceinschool.org/content/go-bananas-biochemistry

## Fruit Ripening

## Carburo

## Meat Tenderizer



## Egg/Itlog

## Seafoods

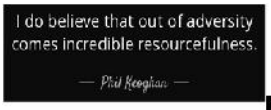
## Alternatives

- 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.

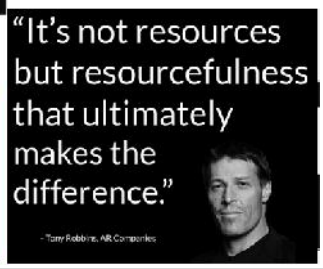
## Websites

- 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/

## Final Thoughts








## Acknowledgements

- UNIFFIED
- Everyone who attended the webinar