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# **BEST** (Bringing Elementary School Teachers) **Science Activities** **and Storylines PERIOD**

By Kent Lui

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# I'm Kent!

- Science teacher for 16 years,  
Department Head for the last 4 years.
- Senior Physics/Chemistry, Science 8-10,  
Applied Interdisciplinary Design,  
STEM/STEAM
- REAL Science Challenge





## Initial Ideas

- myPITA conference  
(October 2020)
- Informal Poll of  
Burnaby Elementary  
School Teachers

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**Think of the ideal science  
lesson.**

**What barriers are preventing  
you from doing it?**

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# RESULTS

1. Lack of materials, resources, equipment
2. Lack of knowledge
3. Lack of time
4. Diverse learners



–  
Describe what pro-d you  
would find **most useful for**  
**your science classroom?**

# RESULTS

1. Hands-on
2. Engaging
3. Easy and Inexpensive
4. Connected to Curriculum

Others: support teaching split grades, support on teaching science skills, deepen own scientific knowledge



## Sharing Session

- My goals. My approach.
- Strategies (ex. CER) and Activities
- Questions and links.



# CHAPTER 1

# MY GOALS, MY PHILOSOPHY

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With regards to science education, **what are your goals?**

# — Make Science REAL

Develop...

- Science Thinkers
- Science Doers
- Activists
- World Changers

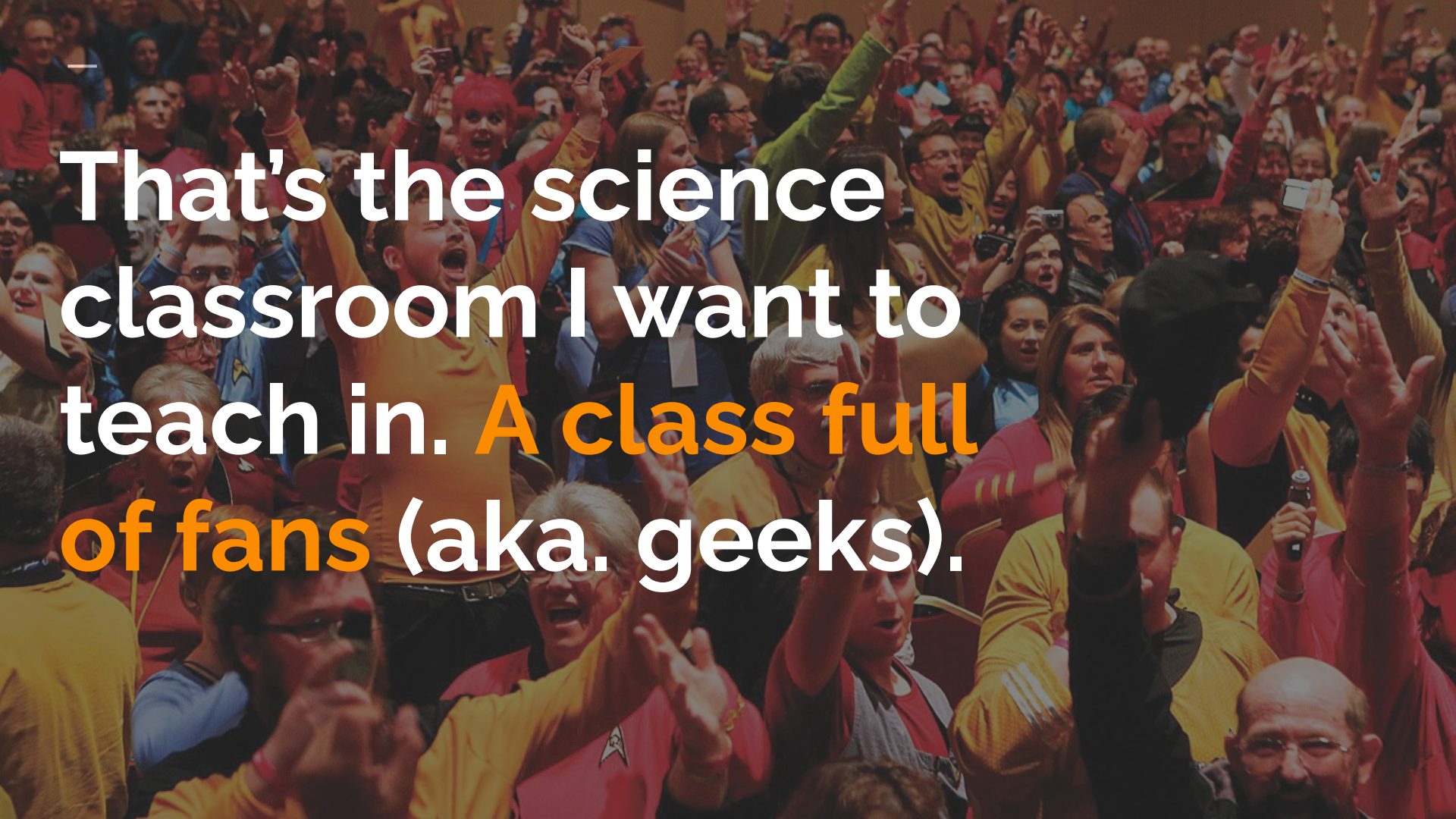












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That's the science  
classroom I want to  
teach in. **A class full  
of fans** (aka. geeks).

*Students are expected to be able to do*

## **Questioning and predicting**

- Demonstrate a sustained intellectual curiosity
- Make observations aimed at identifying patterns and relationships about the natural world
- Formulate multiple hypotheses and predictions

## **Planning and conducting**

- Collaboratively and individually plan investigations and lab experiments, to collect and analyze data
- Assess risks and address ethical concerns of their own methods and those of others
- Select and use appropriate equipment and techniques to collect and record data
- Ensure that safety and ethical guidelines are followed

**It's not just about  
fostering community.**

**It's part of our curriculum**



SCIENCE THE  
SHIT OUT OF IT



#THEMARTIAN

Science is **SKILLS**  
taught in **CONTEXT** (in  
other words, science is  
**ABOUT THE WORLD**)

—  
**What do you tend to  
highlight in science?**

**Is it skills or  
content? If skills,  
which ones?**

## **CHAPTER 2**

# **MY SECOND CLASS OF THE YEAR**

# Teach CER



/klām/  
The Answer  
<what I know>



/ˈevədəns/  
The Supporting Details  
<how do I know>



/rēz(ə)niNG/  
The Connections  
<why do I know>



**WARM UP**

Red Jellybeans are...



## Claim

Red Jellybeans are the best.





## Evidence

- Sales data
- Taste tests

## Reasoning

- Lots of holidays that use “red” colour.
- Hard-wired to taste “red” flavour





# CER + Ig Nobel Prize

## What is CER?

(An Ig Nobel\* Explanation)



CER is a format for writing explanations. **C** - Claim  
**E** - Evidence  
**R** - Reasoning



### Example of CER

In 2015, Michael L. Smith, won an Ig Nobel\* Prize for determining the most painful body part to receive a honey bee sting.



**Research question: which part of the body does a honey bee sting hurt the most?**



### Claim

*a one sentence answer to the research question*

**The nostril is the most painful location for a honey bee sting. The upper lip is 2nd most painful.**



### Evidence

*provide measurements or observations that support claim*

**Mr. Smith stung himself with honey bees. On a scale of 1-10, he noticed stings at the nostril and upper lip had an average pain rating of 9 and 8.7 respectively.**



### Reasoning

*use scientific principles to explain why the evidence supports the claim*

**Possible reasons: (1) Pain is more intense at locations with thinner skin. (2) Reaction to pain is greater at "important" body locations like "openings" (ex. lips, nostrils) for protection. (3) Measured neural activity show increased sensitivity at thumb, tongue, lips, and digits.**



*\*Harvard awards the Ig Nobel prize to science that makes people laugh. It is a spoof of the Nobel Prize, an annual award given to great scientific advancements.*

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## What is CER?

(An Ig Nobel\* Explanation)



CER is a format for writing explanations. **C** - Claim  
**E** - Evidence  
**R** - Reasoning



### Example of CER

In 2015, a group of scientists won an Ig Nobel\* Prize in Physics for discovering that white horses are more "horsefly-proof".



**Research question: What is the effect of horse color on horsefly attraction?**



### Claim

*a one sentence answer to the research question*

**Horseflies are less attracted to white horses than dark horses.**



### Evidence

*provide measurements or observations that support claim*

**Brown horses stay 2.2X longer in horsefly-free shady forest than white horses. Brown test surfaces trapped 21 horseflies while white test surfaces attracted 1 horsefly. Black horse models trapped 25.5X more horseflies than white horse models.**



### Reasoning

*use scientific principles to explain why the evidence supports the claim*

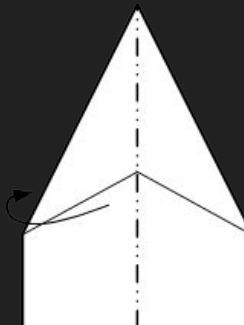
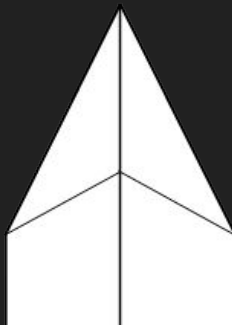
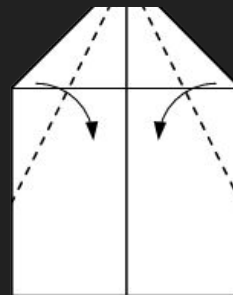
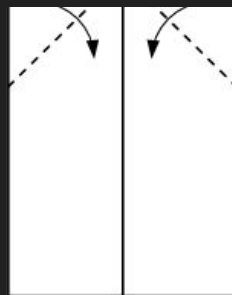
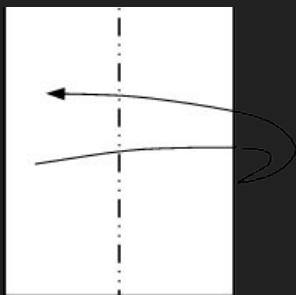
**Horseflies are attracted to higher polarization of light reflected from dark surfaces. Since white animals reflect light with lower polarization, fewer horseflies are attracted to white horses.**



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# CER + Paper Airplanes + Fair Tests



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Got Questions?

**CHAPTER 3**  
**TOP FIVES**

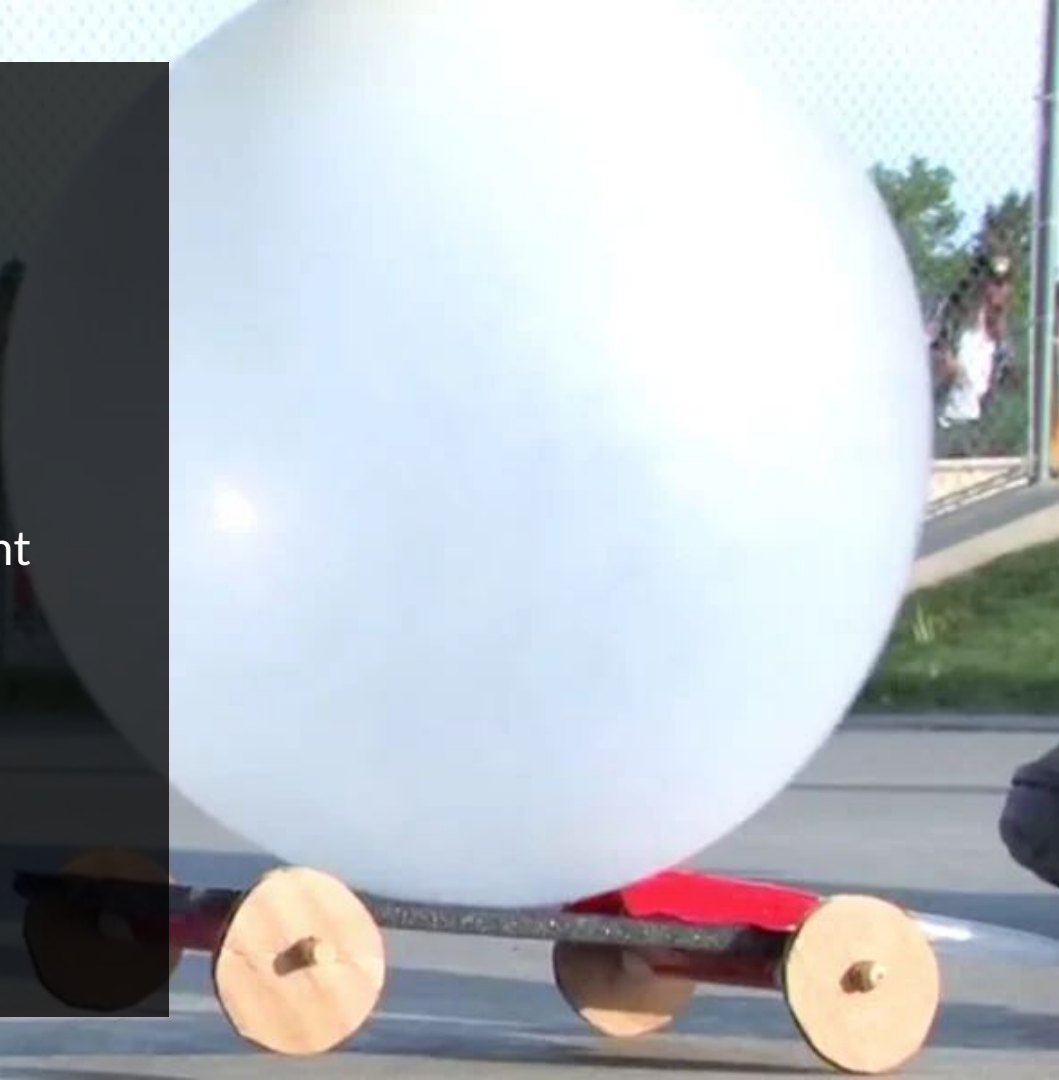
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# Top Five: Build and Tests

1. Balloon Powered Cars
2. Marshmallow Spaghetti Tower
3. Film Canisters Mytery
4. Pendulum Lab
5. Solar Oven

## Balloon Powered Car

- Get the maximum displacement using balloons only.



## The Right Type

- Range of results can occur.
- Results can be measured objectively.
- Result can always be improved upon.

**Ex. solar oven**





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**Build it.**  
**Test it.**  
**Repeat.**





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## Top Five: Works in Progress

1. Sharpiegate - How do you remove permanent marker?
2. Broken Jello - What fruits don't go well with Jello?
3. Fruit Battery - What fruits (besides lemons) can make batteries?
4. Colored Pop - which heats up faster?
5. Bread Lab - how might I keep bread from going stale?

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# Notable: Has a Place

1. Gummi Bear Osmosis
2. Sempahore
3. Oobleck
4. Bread Density (Bake or Buy)
5. Making Paper
6. Paper Clip and Nerve cells

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Got Questions?

**CHAPTER 4**  
**CONNECTING VIA**  
**STORYLINES**

# Start with a Phenomenon

Phenomenon:  
Doritos on a  
Beach



Boat carrying  
large containers



Containers with bags of  
chips on the beach

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# Connect: to Self

*What I just learned makes me think about...  
because...*

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# Connect: To Action

*What can we do to improve the world? (ACTIVISM!)*

# Phenomena Everywhere

1. Black History Month
2. Valentine's Day
3. World Wildlife Day
4. St. Patrick's Day
5. International Women's day



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Got Questions?

SCIENCE THE  
SHIT OUT OF IT



#THEMARTIAN

**THANK YOU!**

**Contact:**

[realsciencechallenge@gmail.com](mailto:realsciencechallenge@gmail.com)

**Handouts and Feedback:**

[www.realsciencechallenge.com/teachers](http://www.realsciencechallenge.com/teachers)