Clean Energy Literacy and Leadership: Engaging Youth In or After School

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Abstract

This poster describes the variations in outcomes of a university-based outreach program that was implemented either during the school day, where participation is more or less assigned, or afterschool, where participation is self-selected. In both implementation settings, students learned about critical environmental issues and engaged in hands-on, inquiry- and materials-based activities that familiarized them with key science and engineering practices. However, the program implementation varied across settings, due, in part, to student expectations and support from school faculty. While we found no difference in gains in any of our survey measures (values, competency beliefs, career affinity) students were much more likely to attend the in-school program and express appreciation of the instructional approach.

Research Questions

- ➔ What does program implementation look like?
- ➔ How was the program different/ similar in the two settings?
- ➔ How does the intervention experience differ for participants who are recruited through different strategies?
- ➔ Is there variation in impact related to student preparation and career trajectory as a result of the implementation of the program?

Learning Environment

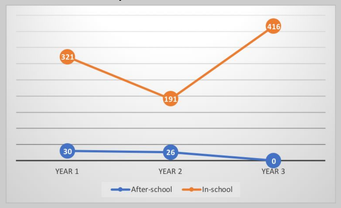
	Energy and Climate Change	Lead Levels in Soil	Air Quality in Community
			

	In-School	After-School
Schedule	2-3 sessions/week; 60-90 min. each	
Participation	Assigned	Selected
Support from classroom teacher	✚	⊘
Autonomy of CELL instructor	⊘	✚
Context Setting prior to start of program	✚	⊘
Graded	✚	⊘

Data Collection and Analysis

Data Collection:

- Surveys
  - Science Value
  - Competency Belief
  - Career Affinity
- Interviews
  - Focal Students
  - Student Groups
  - Classroom Instructors



Data Analysis:

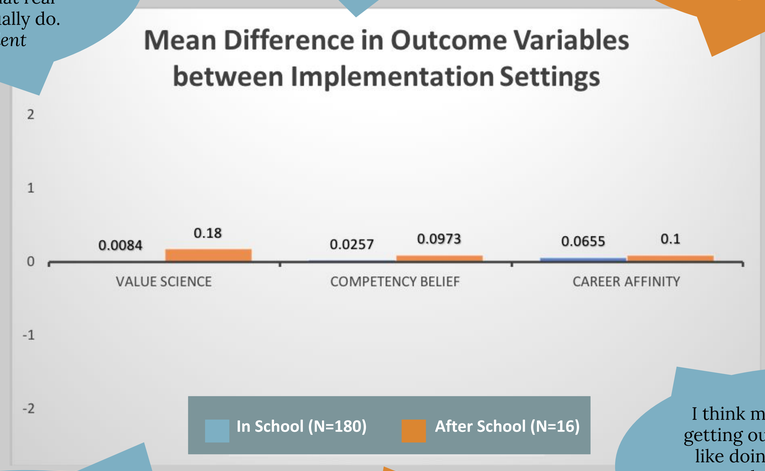
- Triangulation of:
  - Pre/Post Paired Sample T-tests
  - Thematic Coding of
    - interview data
    - program observation data

Results

My parents read the news all the time about like climate change and about how like the air pollution is getting worse...so I think [the program] kind of like helped me like learn more about the stuff that even my parents are learning about.
- *In school student*

It allows us to really delve deeper into what we really can do in science class in our possible future careers. It gives us an example of what real scientists might actually do.
- *In school student*

We're tired of [reading and writing] after school ends, because all we do in school is we write, and then we come over here and we have more, I'm like, I want to do more activities.
- *After school student*



EBAYS provides the students and myself with a view of real science. It sort of takes away the notion that science is not doable for certain people, that everyone can do science that there is that leverage with how much do you really want to know, if you want to know more, EBAYS can help you get there.
- *Classroom teacher*

In class, we do a lot of paperwork. Here, we can do more things, more activities.
- *After school student*

I think my favorite part was getting outdoors and actually like doing the experiments ourselves, instead of just having information given to us.
- *In school student*

Discussion

Students' perceptions of whether this program was science differed across settings. Consequently, so did their engagement in the program. In the school setting, the curriculum was different from the regular science experience and changed the perception of science from a school subject relying heavily on memorizing information, to a subject that had meaning in their own lives and in the world and could be more hands-on. On the other hand, in the afterschool setting, where students were comparing their experience to other afterschool offerings (e.g. playing sports, making t-shirts) the experience was considered as just more school. The value individuals associated with the experience seemed to be relative to what they considered as the alternative options for activity during the same time.

Key Takeaways

- ➔ CELL provided positive learning experiences that challenged notions and ways of relating to science.
- ➔ Students appreciated: 1) hands-on activities, 2) relevance of investigations to self and community
- ➔ Very low participation in the afterschool setting.
- ➔ Little difference in the impacts between the settings.

References

Cuff, Romero, Cannady, Nava, & Dorph, (2019). Fostering Environmental Activism through Community-Based Research Investigations. American Educational Research Association, 2019.

Cuff, K., Cannady, M., Dorph, R., Rodriguez, V. A., & Romero, V. (2016, February). Engaging Underrepresented Group Youth in Environmental Science Research Activities: Catalyst for Change. In *AGU Fall Meeting Abstracts.*

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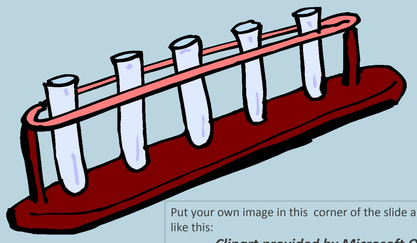

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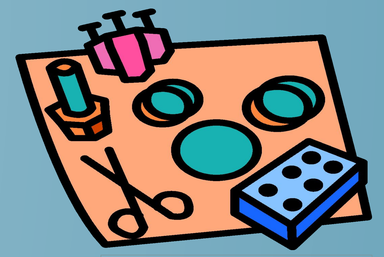
Your subtitle (if you have one) goes here

Your name (first and last) goes here

TIPS FOR FONTS: Choose clean, simple fonts like Ariel, Ariel Narrow, Times, Calibri, Trebuchet etc. Pick one font and stay consistent. Change the font size from section to section as needed to fit the space available. Apply the Goldilocks principle: not too big, not too small! ***Don't ever go under size 16***. You want the reader to be able to read all type from 6 feet away. NOTE: The font size in this text box is **24**!



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QUESTION or PURPOSE

Type your research Question or your engineering design Purpose here.

HYPOTHESIS/DESIGN CRITERIA

(keep the title above that applies to your project and delete the other)

Type your hypothesis or design goal here, and explain your reasoning for it, i.e., what did you learn from your background research that led you to develop your hypothesis or design criteria?

Tip: Don't let any of your text or pictures stray beyond the dotted lines separating the 3 sections. Click on and delete the dotted lines only when you are ready to print your poster.

MATERIALS & PROCEDURES

Type your Materials and Procedures like the example below. If your M&P are very lengthy, cut back on some of the detail. Your report will still show the additional detail if someone wants to see it.

MATERIALS:

- 2 1x1m pieces of plywood
- Pitching machine
- 4 new baseballs
- Batting cage
- 1 piece of 1x1m Styrofoam
- Tape measure
- Video camera
- Digital camera
- Radar gun
- 50 green garage sale labels
- 50 orange garage sale labels
- Tripod
- 2 clamps
- 1x1m thick piece of wood
- Sharpie marker
- 1 piece of 1x1m foam core
- Roll of duct tape
- 2 tubes of epoxy adhesive

PROCEDURE:

1. Duct tape 1x1m sheet of foam core to 1x1m piece of plywood
2. Attach the 1x1m piece of Styrofoam to the 1x1m piece of ply wood using epoxy
3. Place pitching machine 18.44 m (60ft 6in) away from backstop
4. Plug extension cord into outlet and machine and adjust machine for straight accuracy
5. Set dials to 97-101 (60-63 mph) kilometers per hour as verified by radar gun
6. Set up video camera on tripod behind the pitching machine
7. Make a 1 cm slice at 0.5 centimeters away from the stitches of 2 separate baseballs
8. Place an unmarred baseball into the machine at 97-101 kilometers per hour and mark the point of impact (ball must be placed in machine same way each time)
9. Do step 8 a total of 25 times with the unmarred baseball
10. Do step 8 a total of 25 times with the cut baseball
11. Change backstop and record impact points
12. Increase speed to 153-157 kilometers per hour (95-98 mph) and repeat steps 9&10

DATA & VISUALS

YOUR DATA AND VISUALS GO IN THIS MIDDLE SECTION.
Include several photos, diagrams, charts, graphs, tables in this area, with captions and photo credits.

To add images to your poster from your computer: Go to INSERT > IMAGE > CHOOSE AN IMAGE TO UPLOAD ***DON'T*** *use the COPY-PASTE command* - it can cause problems.

****REMEMBER! EACH PHOTO/IMAGE MUST HAVE A CAPTION CREDITING ITS AUTHOR.** Use a small font size for the credits.

SCALING IMAGES: Be careful when enlarging images on your poster by grabbing and dragging the corner. Scaling an image more than three times its original size may make it look fuzzy and unappealing.

See the examples in **Figure 10** below. They look okay, right? But what happens when they're printed at poster size? Go to the Zoom command (in the View menu) and choose 100% or 200%. Now look at the images again. See all the jagged edges? That's called ***PIXELIZATION***. It doesn't look good, and it will detract from the look of your poster.

Figure 10: Original image at 100%, enlarged 200% and 400%.

To have good-looking images on your poster, use the **largest** images you can. You can tell how large the image is by looking at the file size. Also, be VERY wary of images downloaded from the Web: they'll probably be small files of less than 100kb, and they won't look good when blown up to poster size.

Importing tables, charts and graphs: To import tables and graphs from a Google spreadsheet, go to that object in the spreadsheet and click COPY CHART. This copies it to the Clipboard. Then come back to your slide and go to Edit>Paste to paste the chart onto the slide. You can resize your graphs and tables by dragging in or out one of the corners or sides.

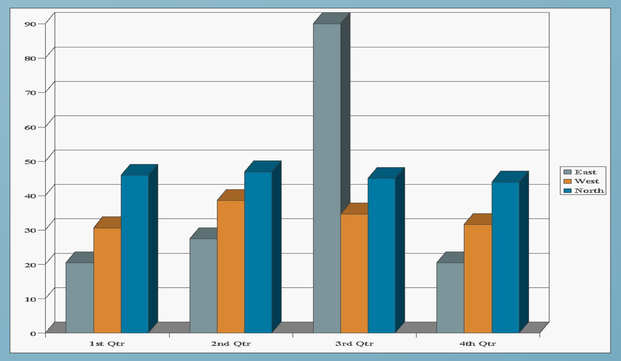

TABLE ONE		
1998	1999	2000
2001	2002	2003
2004	2005	2006

RESULTS

<u>Summarize</u> your results in a few sentences.
You should get this information mainly from paragraphs/sections 5 and 6 of your Results section in your final report. But don't copy/paste whole paragraphs! Hit the main points.

To personalize this poster further, change the background and font colors. To explore new backgrounds, go to SLIDE>Background or SLIDE>Change Theme. There, you can try different color schemes until you find the one you think works best. Remember to keep the contrast high between background color and font color, and stick with one font color throughout the poster, to make for easier reading. Also avoid neon colors that can make viewing the poster uncomfortable or unpleasant.

CONCLUSIONS

Summarize your conclusions in a few sentences.
You should get this information mostly from paragraphs 2, 3 and 5 of the Conclusions section of your final report. But don't copy/paste whole paragraphs! Hit the main points.

You can also discuss a few of the important scientific concepts you have come to understand better, now that you've reflected upon your data and your project as a whole.