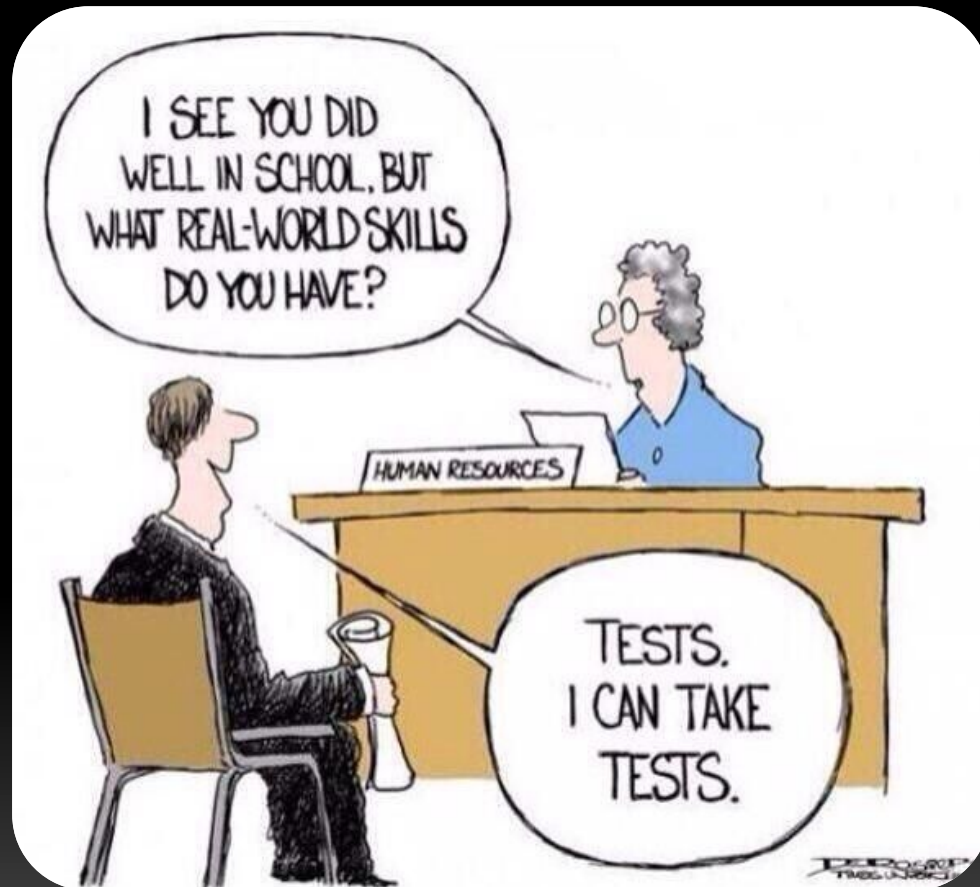


Content Post-Tests

8:30



Long-Term Experimentation

9:15



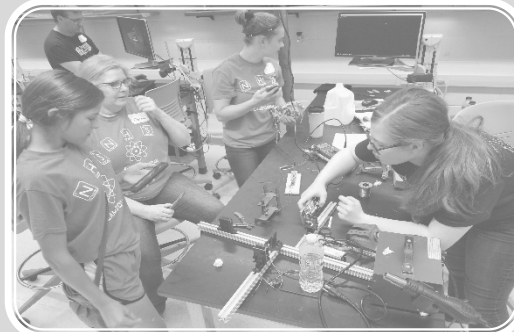
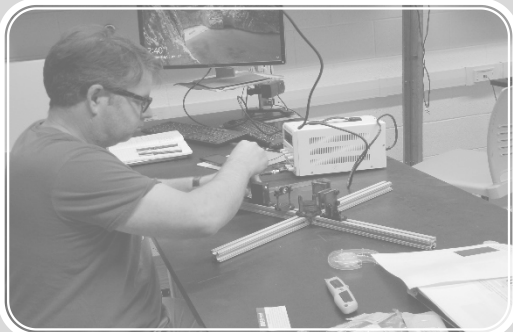
Applied Physics Workshop

Agenda

- Where do you go from here?
- What is PhysFESTT?
- Conference funding
- Science and Engineering Fairs
- PhysFESTT planning
- Traffic Intersections



Where do you go from here?



Demos

Lessons

**Long-term
Experiments**

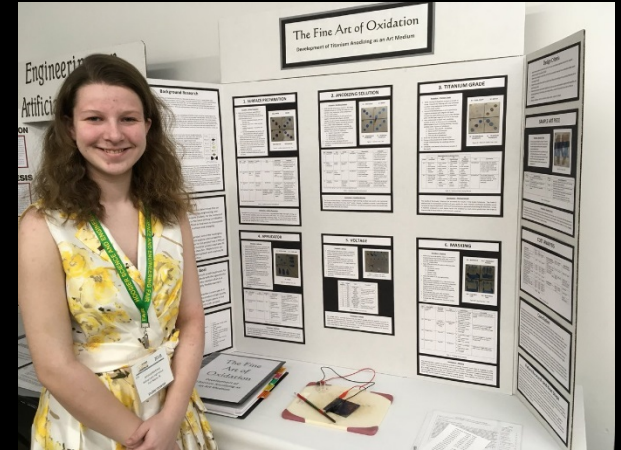
Demos: What is PhysFESTT??

- **WHEN:**

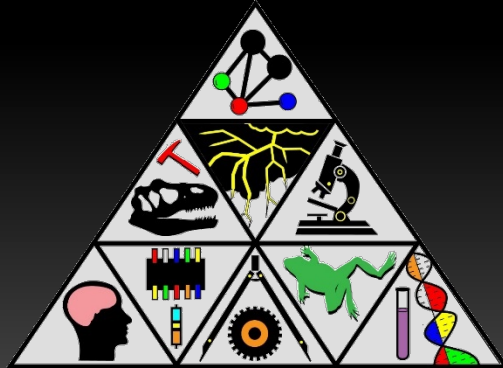
March 16, 2019

Walb Student Union

12:00 – 3:00pm

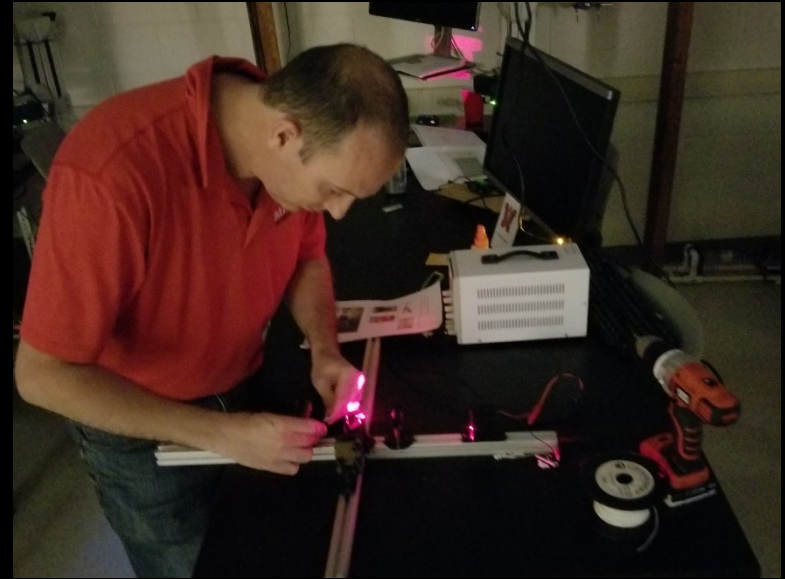
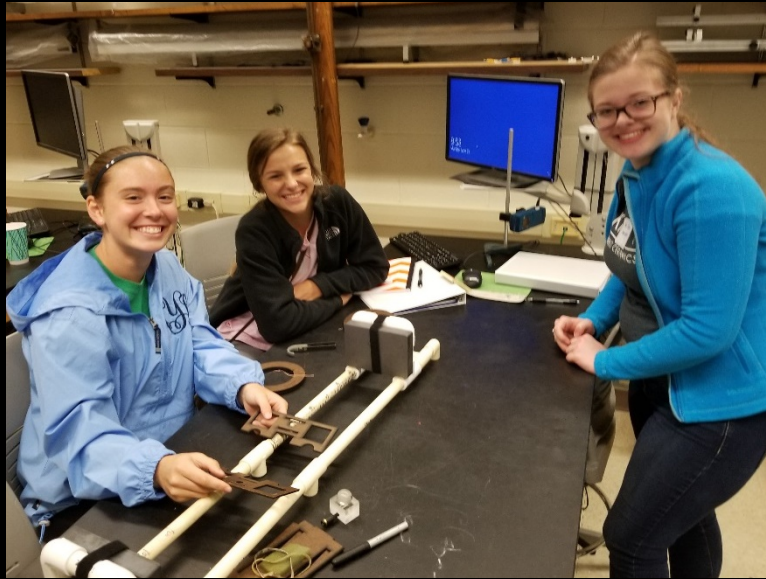


- During the afternoon of the 64th annual NEIRSEF



<http://www.neirsef.org>

PhysFESTT is YOU!!!



- Create a project board
- Demonstrate your demo!!!
- Share your research

Conference Funding

- AAPT Winter meeting
January 12-15, 2019 - Houston, TX
- Indiana STEM Education Conference
January 2019 - West Lafayette, IN
- HASTI
February 17-19, 2019 - Indianapolis, IN
- AAPT Summer meeting
July 20-24, 2019 – Provo, UT
- IN-AAPT
April 2019?
- Other meetings???

Demo, Lesson, or LTE???

How do you see these used in your HS physics classrooms?

- NMR
- AFM
- Spectroscope
- Interferometer
- Acoustic Levitation

(5 mins – WB)



Long-Term Experiments (LTE)

- Science and Engineering Fairs

<http://www.sefi.org>



- NEIRSEF

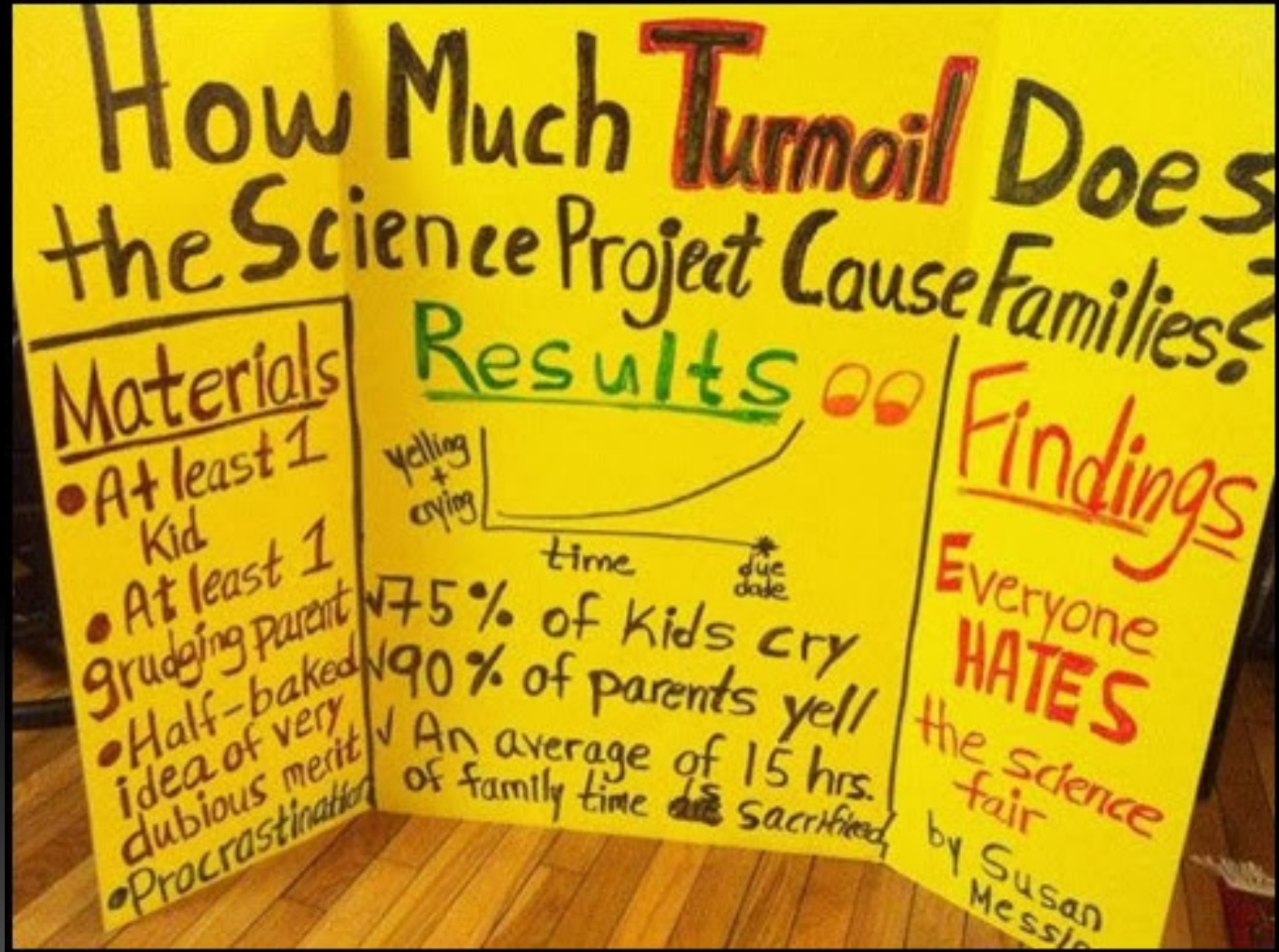
<http://www.neirsef.org>

- Intel ISEF

<https://student.societyforscience.org/intel-isef>



Science Fair?



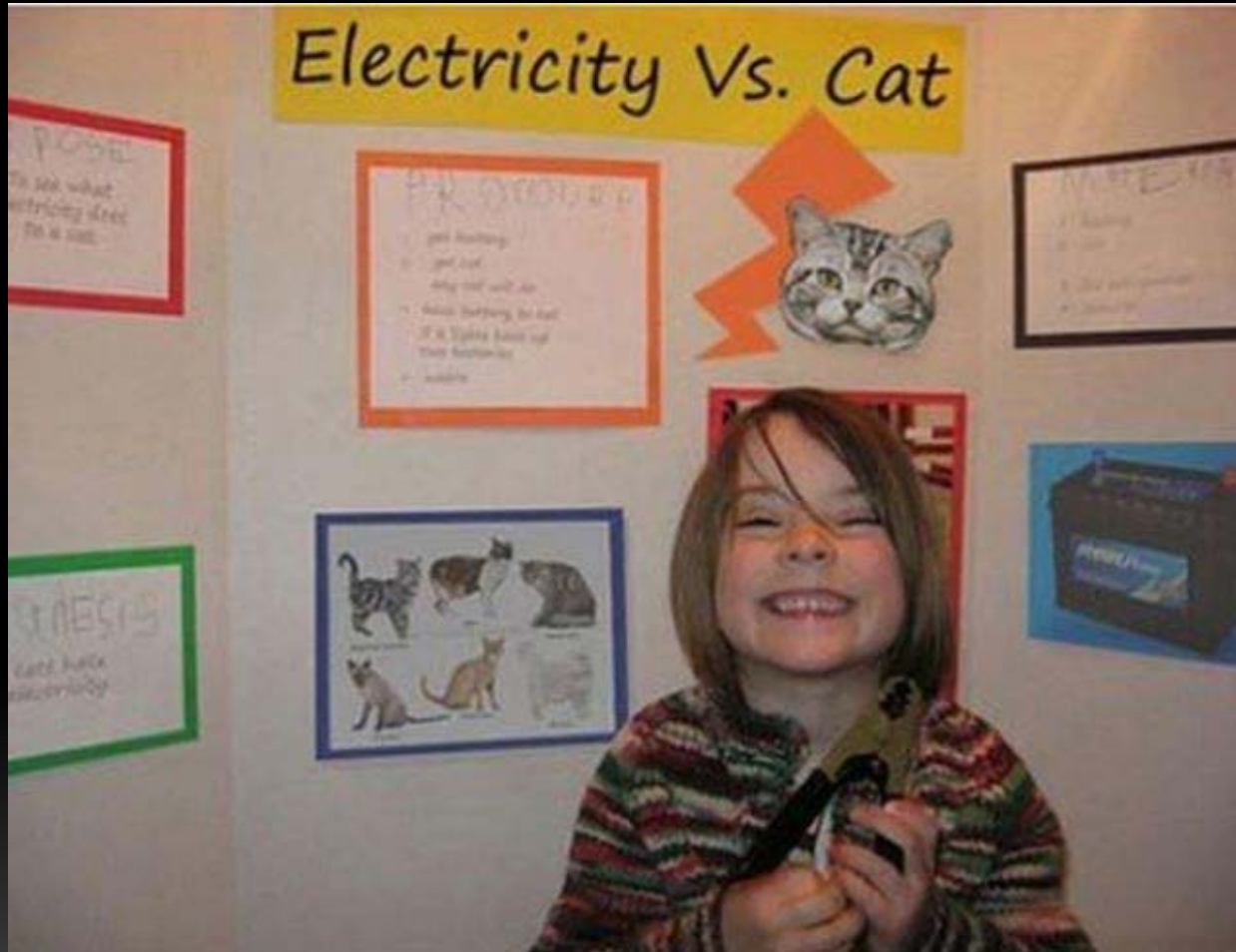
NSTA Position Statement

Science Competitions

[http://static.nsta.org/pdfs/PositionStatement Competitions.pdf](http://static.nsta.org/pdfs/PositionStatement%20Competitions.pdf)

- Student and staff participation in science competitions should be **voluntary** and **open to all** students.
- **Emphasis** should be placed on the **learning experience** rather than on the competition.
- Science competitions should **supplement** and enhance other educational experiences and be closely aligned or integrated with the curriculum.
- The emphasis should be on scientific process, content, and/or application.
- Projects and presentation should be **the work of the student** with proper credit to others for their contributions.
- Scientific competitions should **foster partnerships** between students, the school and the science community.

What is wrong with this project?



What is wrong with this project?



What is wrong with this project?



What is wrong with this project?



SOMETHINGAWFUL.COM

What is wrong with this project?



What is wrong with this project?



What is wrong with this project?

Paw Preference and its Influence on Dog Behavior

Background Info:
The brain in mammals is divided into different areas for different actions. Humans, for example, have a hand preference for performing daily activities, such as a dominant hand for writing. The dominant hand or leg indicates the side of brain that is more developed. The brain's connection from the cortex to the body are "crossed," meaning that left dominant mammals use their right brain more while right dominant mammals use their left brains more. The right brain controls the artistic and creative part while the left brain controls logic and reason.

Materials:

- 30 dogs of any breed and sex
- Dog treats
- A piece of furniture (couch, chair, coffee table)
- Music player with classical and pop songs (iPod, computer)
- Masking tape

Procedure:
1. The owner is given a survey/release form to fill out regarding their dog.
2. The dog's paws were shook five times and the extended paw was recorded.
3. A small section of masking tape was placed onto its nose.
4. A treat was placed underneath low furniture and the first paw used to reach was recorded.
5. Two specific songs—"Damaged" by Davy Kane, "Canon in D Major" by Johannes Pachelbel were played, any specific reactions were recorded.

Raw Data:

Hypothesis:
Dogs do have paw preferences, and more than 40% of the dogs would have a preference for their right paw. The left pawed dogs, or right brain dominant, would respond to music better than the right pawed dogs, or left brain dominant.

Does this have an effect on their response to music?

Conclusion:
The results gained from the experiment hypothesis that, yes, dogs do have a paw preference for shaking hands was 53%; for masking tape from their noses was 73%; for a treat was 40%. Since all the percentages were or above 40%, the results also support hypothesis that a majority of the dogs would prefer their right paw. However, for music, the results from classical music ("Canon in D Major") showed that a majority of the dogs would prefer their right paw. However, for pop music, the results from classical music ("Canon in D Major") showed that a majority of the dogs would prefer their right paw. However, for pop music, the results from classical music ("Canon in D Major") showed that a majority of the dogs would prefer their right paw. However, for pop music, the results from classical music ("Canon in D Major") showed that a majority of the dogs would prefer their right paw.

Data Interpretation:

Evaluation:
The experimental process was a success. However, some of the dogs had trouble with the masking tape and some of the dogs had trouble with the masking tape. Some of the dogs had trouble with the masking tape and some of the dogs had trouble with the masking tape.

starkid.com
starksilvercreek.com

What is wrong with this project?

Conclusion

I learned that the plants in the soil grow better than the plants in the water. The plants in the soil grow better than the plants in the water. The plants in the soil grow better.

Materials

Soil
Water
Seeds
Cups
Spray bottle
Sunlight

THIS IS A LIE, MY PARENTS DID THIS WHOLE THING

Data

Procedure

I gathered my materials cups, seeds, soil, and water. I planted my seeds in the soil about 1/4 inches deep. The seeds used were, Basil, Parsley, and Oregano. Then I filled my cups half full of water, and put 1/3 of seeds in the water.

Each day I checked the growth of the seeds. If they needed water I used my spray bottle to water them. I would turn each plant toward the sunlight, since I grew them in a window sill.

Graph

Soil

Plant	Soil Growth
Basil	High
Parsley	Low

How do I support students from brainstorm to the final poster?

- Establish a timeline
- Check in often
- Be flexible and firm
- Winning isn't everything
- Read the rules



Establish a timeline – 3 month option

Date	Student Task
Week 1	Introduce project, pair students up and sign a contract
Week 2	Research the topic.
Week 3	Problem and hypothesis due . Approve the project
Week 4	Back to the library. Literature review due
Week 5	Materials and Methods due
Week 6-8	Students do research. Data in your journal!
Week 9	Conference with teacher. Work on charts, graphs, analysis
Week 10	Draft conclusion due . Write a paper!
Week 11	Draft paper due!
Week 12	Project board due!

Literature Review

- Must be completed *before* doing the research
- A source of inspiration for experimental design and refinement of the question
- An indicator of how original the topic is

How do I Write a Hypothesis

If _____, then _____

- statement in response to a scientific question that provides a **tentative explanation** that **leads to an investigation** and can be used to provide more information to either strengthen a theory or develop a new one.

Hypothesis

- Results always *support* hypotheses, never *prove*.
- Hypotheses are never a *sure thing*.
- Hypotheses are never *educated guesses*
 - Hypotheses are strongly developed predictions based on **prior observation** or scientific knowledge that if something is done, an expected result will occur (**prior experiment**)
 - Hypotheses rely on past evidence
 - Hypotheses require significant planning

What makes for a good research design?

- Experimental Design for Advanced Science Projects

<https://www.sciencebuddies.org/science-fair-projects/competitions/experimental-design-for-advanced-science-projects>

Ethical Research

- **SRC** – Scientific Review Committee
Reviews all projects involving
 - Vertebrate animals
 - Hazardous Materials
 - Biological agents

- **IRB** – Institutional Review Board
Reviews all projects involving
 - Human subjects
 - *No permission forms... no admission!*

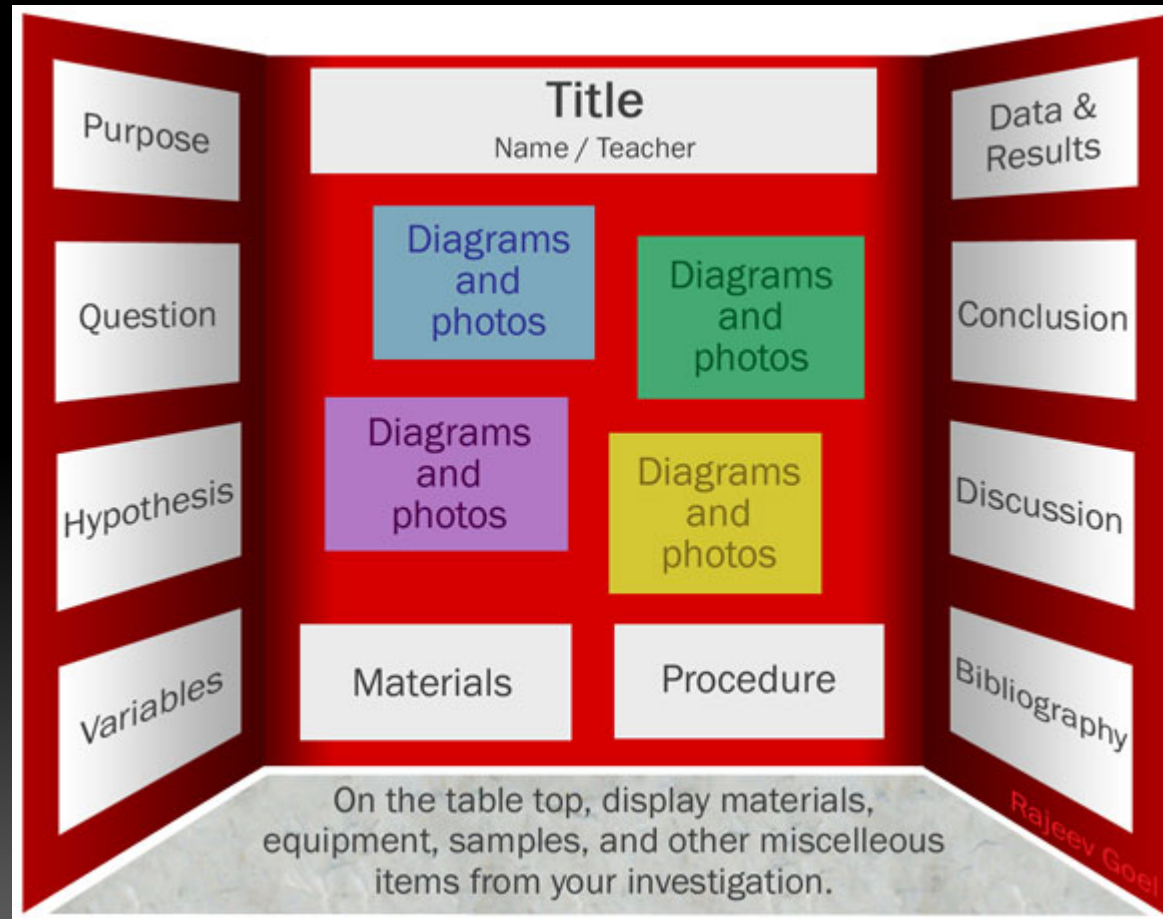
ISEF Paperwork

Required Forms

- 1 – Checklist for ADULT sponsor (teacher)
- 1A – STUDENT checklist (student)
- 1B – Approval Form (each student + parent)
- 1C - Regulated Research Institutional/Industrial Setting Form (other than home or school)

Display your work!

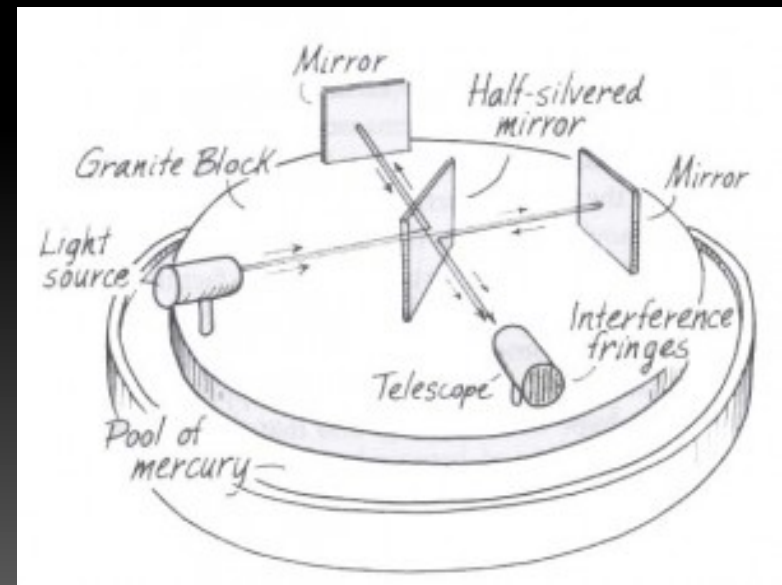
- The “easy” hard part



<https://www.sciencebuddies.org/science-fair-projects/science-fair/science-fair-project-display-boards>

What if the project bombs?

- Failure IS an option...
and sometimes a success!



Other Competitions

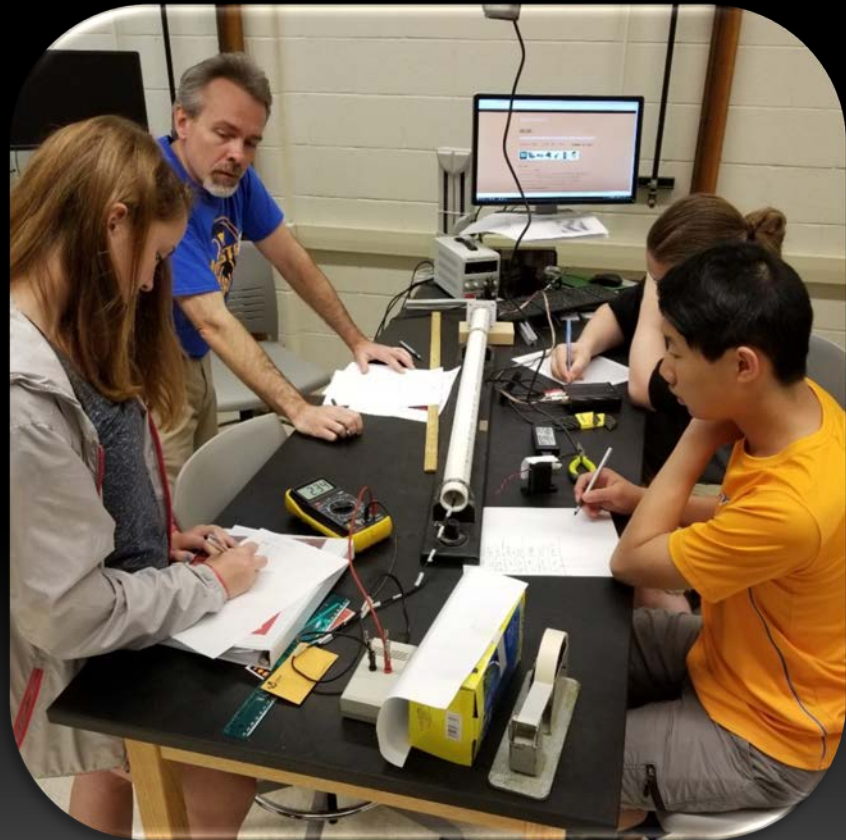
- Junior Science and Humanities Symposium
 - <https://www.jshs.org>
- US IYPT – physics competition
 - <https://jkeohane.wordpress.com/usiypt-2019-problems/>

Other Project Ideas - Citizen Science

- **Biology**
 - Cornell Ornithology <http://www.birds.cornell.edu/citsci/>
 - Project WILD <http://www.projectwild.org/>
 - Frog Watch <https://www.aza.org/frogwatch/>
 - Monarch butterflies <http://www.learner.org/jnorth/monarch/>
- **Earth and Environmental Science**
 - USGS <http://txpub.usgs.gov/myscience/>
 - GLOBE <http://www.globe.gov/>
 - EPA: MyEnvironment <http://www.epa.gov/myenvironment/>
 - Green Map <http://www.greenmap.org/>
- **Astronomy**
 - AAVSO <http://www.aavso.org/>
 - GLOBE at night <http://www.globeatnight.org/>
 - Galaxy Zoo <http://www.galaxyzoo.org/>
 - Planet Hunters <http://www.planethunters.org/>
 - The Noon Day project
<http://www.ciese.org/curriculum/noonday/>

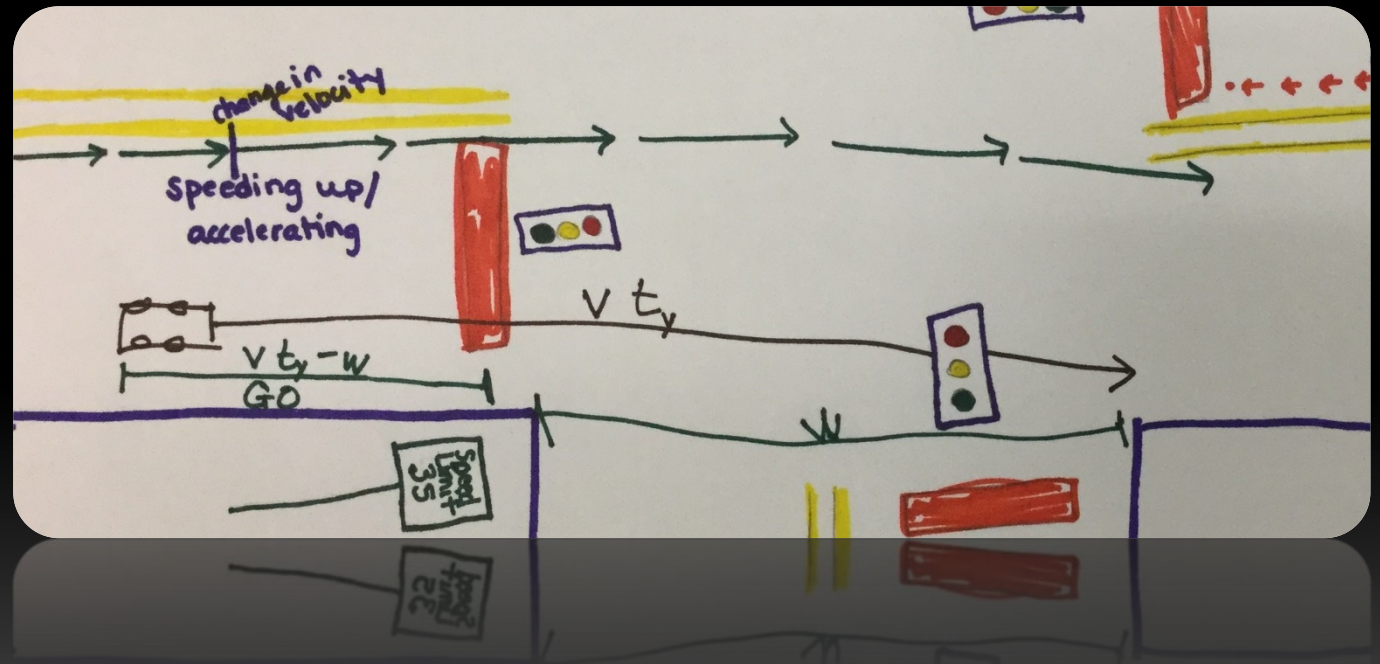
PhysFESTT Planning

9:45AM



Modeling Traffic Intersections

11:00AM



LUNCH!!!

12:00



Applied Physics Workshop

PURDUE
UNIVERSITY
FORT WAYNE

Teacher Lesson Planning

1:00PM

Student Rocketry Challenge

1:00PM

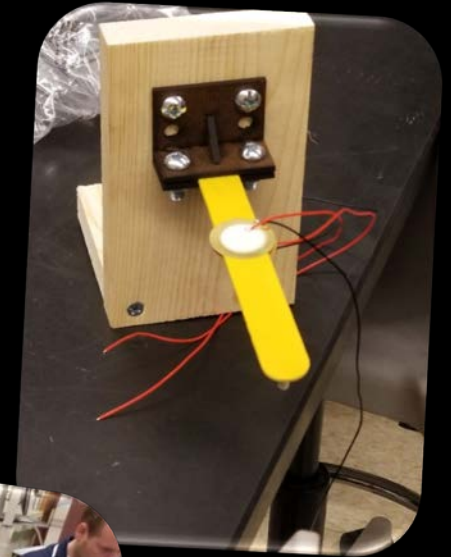
Lessons

- What **physics concepts** were involved in
 - NMR?
 - AFM?
 - Spectroscopy?
 - Interferometry?
 - Acoustic Levitation?

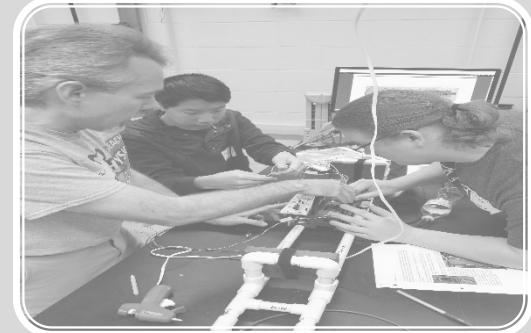
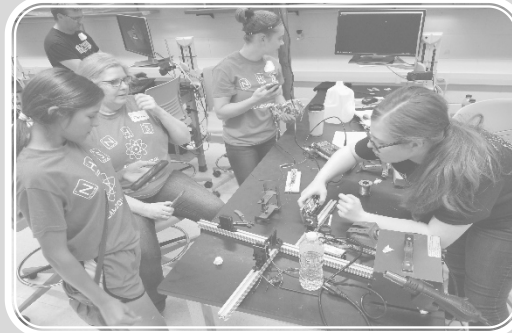
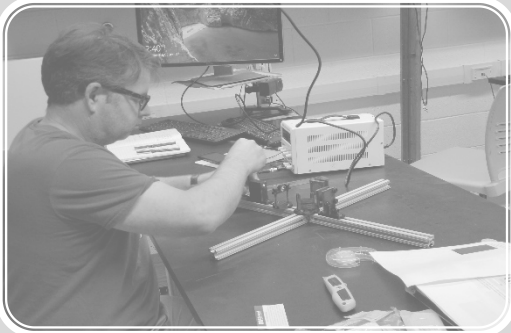
(5 mins - WB)

How do these apparatus fit into the curriculum?

- ICP
- Physics 1
- Physics 2
- AP Physics C



Where do you go from here?



Demos

- for class
- for PhysFESTT

Lessons

- for class

Long-term Experiments

- for science fairs
- for publication

Teacher Share Out

3:30PM



Applied Physics Workshop

The Physics Community

- American Association of Physics Teachers ([AAPT](#))



- [The Physics Front](#)
- [Listservs](#)
- [IN-AAPT](#)
- American Institute of Physics ([AIP](#))
 - [Career Resources](#)

Teacher Resources

- OpenStax – online textbooks
 - <https://openstax.org/subjects/science>

Thank you!!!



Applied Physics Workshop

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