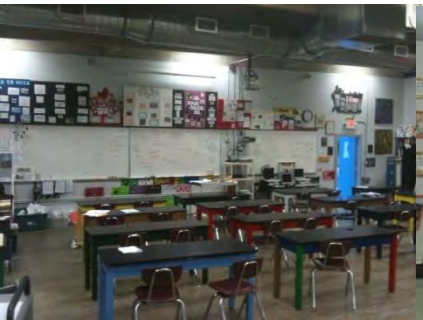
Key West High Alternative Energy Center

Josh Clearman



Resources in Perspective

- How much oil do we use?
  - 88 MB/day during the 2006-7 peak

Wolfram alpha: www.wolframalpha.com, enter “oil production”

Rationale

- Research suggests that when a student has interest in a subject, the student demonstrates greater learning gains.
- High school students are interested, and take responsibility in environmental issues (Quinn, 2009).
- Alternative Energy is not part of the ordinary physics curriculum.
- Students enter secondary school with “an equal liking for biology and physics” but when they graduate, students find physics “boring and irrelevant”
- Interestingly, Williams, et.al., found that students “decreasingly see physics as able to contribute to solutions to environmental or medical problems, and increasingly see physics as requiring mathematical ability” (Williams, 2003).
- *It seems possible that presenting a practicum lab with an alternative energy context creates situational interest, fosters personal interest, and taps into background knowledge.*

Instructional Method for AEC Students

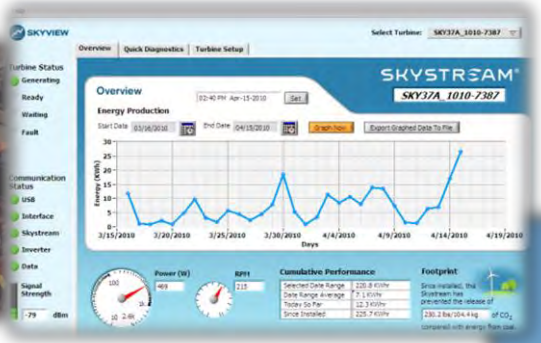
My overarching course design source comes from the goal of creating a fully sustainable laboratory. A classroom which produ

- Enough fuel to transport the students to school
- Provide electrical power for a full day of classes
- Collect rainwater for our needs
- Reduce our waste stream to zero
- Is aesthetically pleasing and informative for visitors.

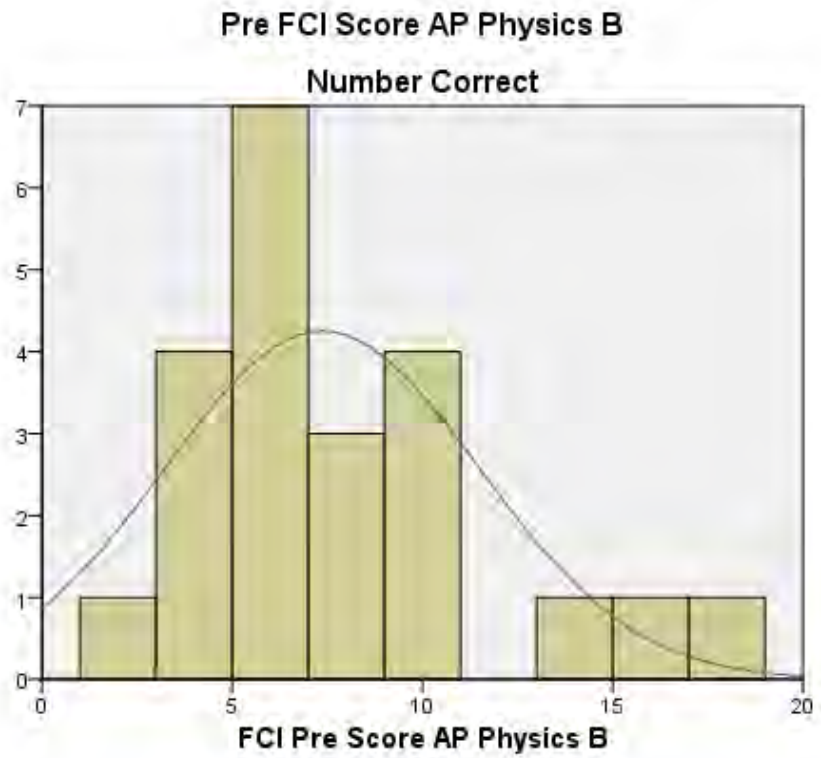
The collections of all students' Alternative Energy Practica (AEP) were small steps towards completing our overarching course design.

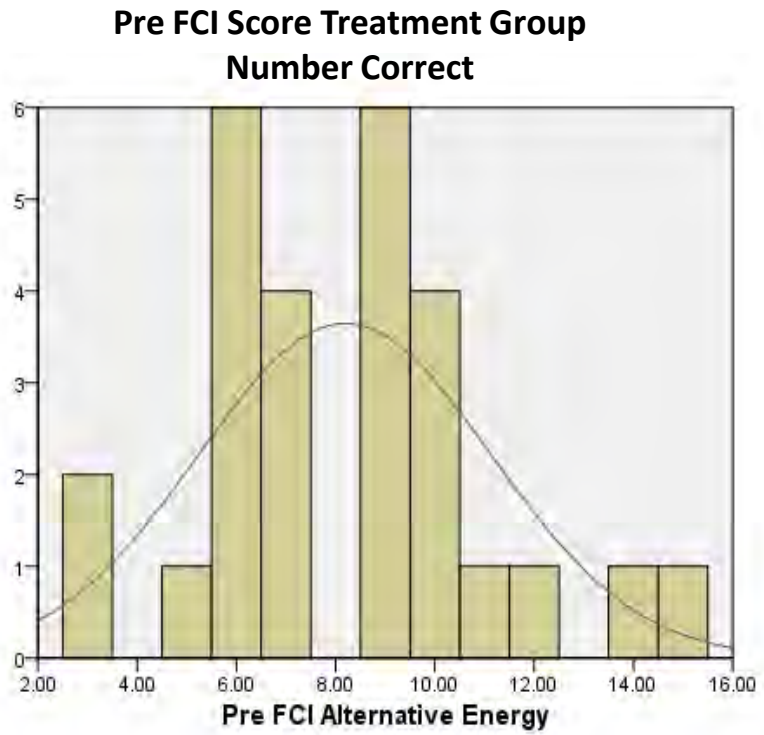
Students made biodiesel, wrote blogs, designed cisterns and installed them, fixed the 300D Mercedes, built biodiesel plants, built planter boxes, and completed other practica.

Examples of Alternative Energy Practica



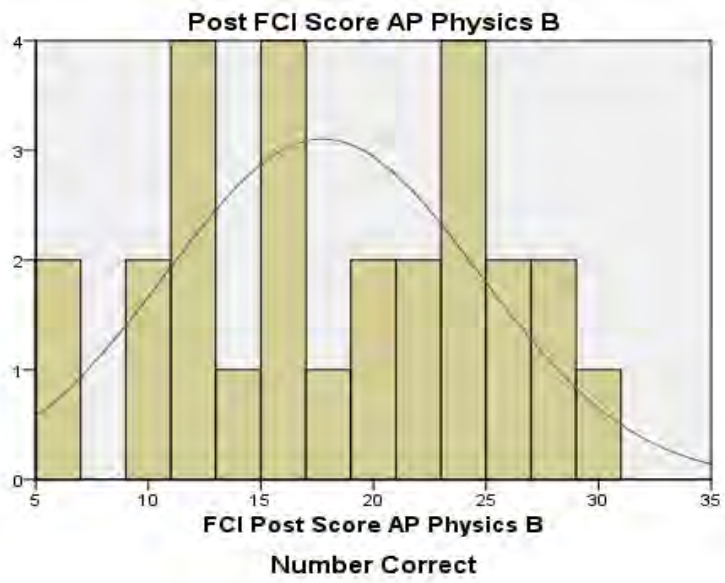
FCI Pre Test Data

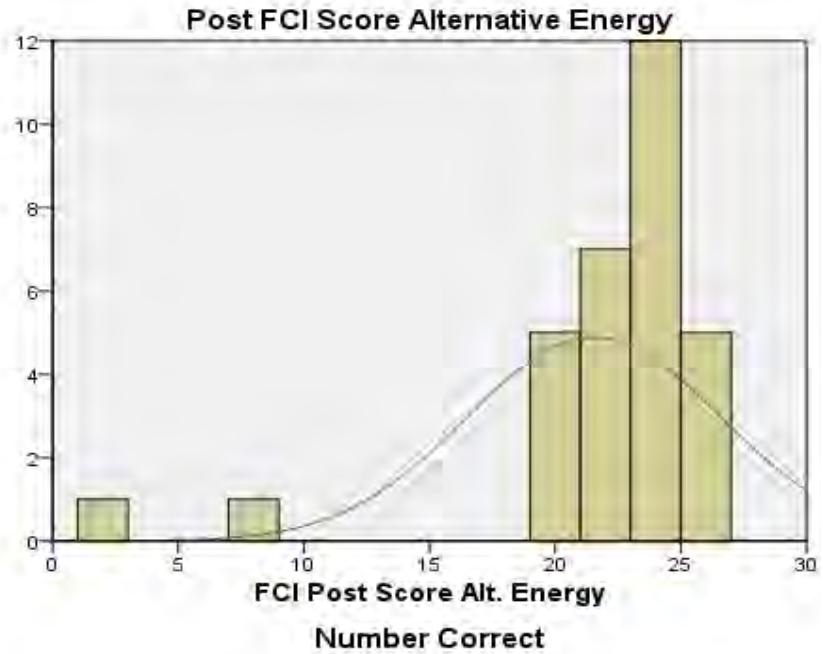




FCI Pre and Post Test Analysis for Treatment Group and Contrast Group		
	Contrast Group (AP Physics B)	Treatment Group (Alternative Energy)
Average FCI Pre Score	0.24	0.27
Standard Deviation FCI Pre Score	0.13	0.96

Data Analysis – Post FCI Scores





FCI Pre and Post Test Analysis for Treatment Group and Contrast Group		
	Contrast Group (AP Physics B)	Treatment Group (Alternative Energy)
Average FCI Pre Score	0.24	0.27
Standard Deviation FCI Pre Score	0.13	0.96
Average Post FCI Score	0.59	0.72
Standard Deviation of FCI Post Score	0.23	0.17

Hake Gain Prediction from Lawson Scores		
	Contrast Group (AP Physics B)	Treatment Group (Alternative Energy)
Predicted Hake Gain	0.36	0.29
Actual Hake Gain	0.49	0.64
Difference	**+13%**	**+35%**

More Examples of Practia








Biodiesel Plant

We have the parts, the knowledge, and the chemicals. We lack manpower and space.

Role of the SAC

- We have a under-utilized biodiesel plant. It has the theoretical capacity of 500 gallons a week, or 26,000 gallons/year
- It is highly sophisticated but needs additional work.
  - Explore a partnership where:
    - Students play an active role
    - Plant is fully utilized
    - Offer opportunities beyond high school

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