Variety of Strategies Used to Teach

Data Analysis and Conclusion Writing

In Freshmen Physics

By, Lori Shaaban

MONTANA STATE UNIVERSITY

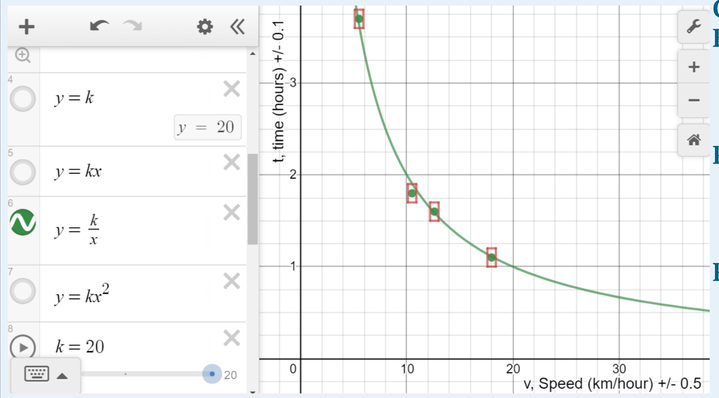
Background

This research was conducted at Liberty High School in Hillsboro, Oregon. Our society is driven by data. Our youth need to be taught to read and analyze this data for multiple uses. All of the cross-cutting concepts science practices in the Next Generation Science Standards (NGSS) are practiced when conducting and using lab experiment data. This research studied how various activities affected their ability to write conclusions and how student perceptions affected their abilities.

Methodology

The study was conducted over the entire year. Unit One taught the basics in writing a conclusion. Then throughout the year, students did various activities to improve their ability to state a claim, provide evidence and reasoning for the claim, then extend their learning outside the classroom (Figure 2). Assessments for this research were from tests in order to minimize the typical collaboration of ideas for their conclusions.

Desmos



List of Conclusion Components

- **Claim**
- **Evidence of the claim**
  - Shape
  - Data table
  - Equation
- **Reasoning**
  - What's the physics?
  - Prediction
  - Confidence in the prediction
- **Reflection**
  - Another lab that would be interesting

Data

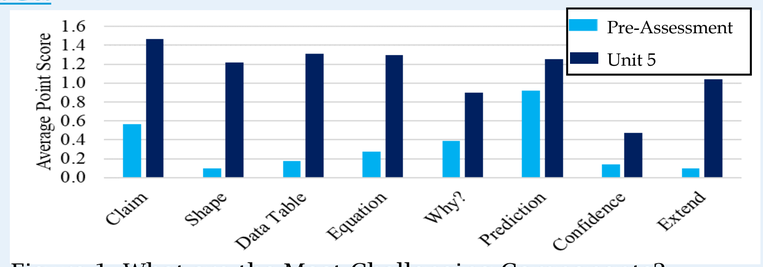


Figure 1: What are the Most Challenging Components?

Focus Question
What are effective strategies to teach Data Analysis?
Sub Questions
What are the most challenging components?
How have students improved their ability/ confidence to provide… A scientific claim Scientific evidence Scientific reasoning Lab extension or application
Which activities best helped students learn to analyze data?

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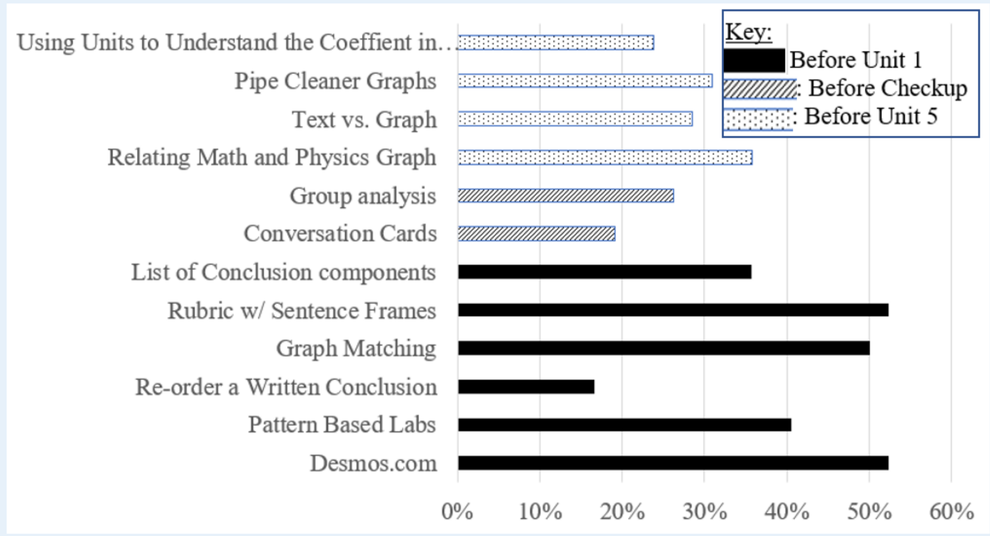

Figure 2: Survey: Activities that Helped Students Learn Data Analysis the Most

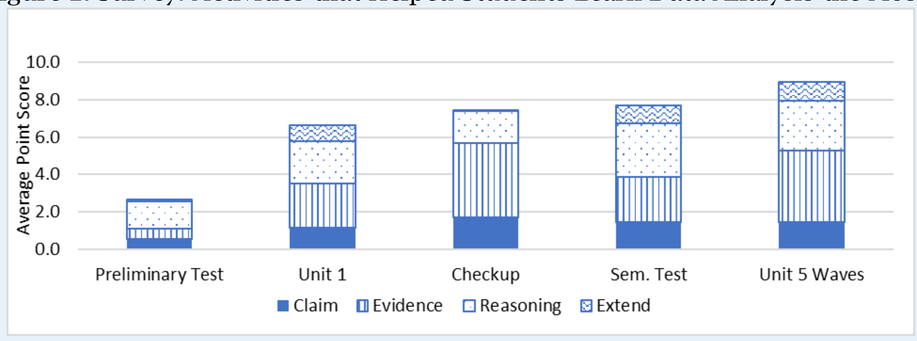

Figure 3: Students Ability to Analyze Data Throughout the Year

Analysis

Some students enter freshmen physics are able to determine the type of function and make a prediction if they have an equation or graph (Figure 1). By the end of the year, they still struggled to think of why phenomena occur and explain their confidence scientifically. The most useful activities to teach data analysis occurred in Unit one; however, growth in providing evidence was prominent after the group analysis as seen on the Checkup (figure 2). Forty eight percent of students still increased their reasoning score on the semester test (Figure 3). Twenty nine percent of students still increased their ability to share evidence on the Unit 5 Test.

Conclusion

Students should be taught to support your claim with evidence and think of reasonings for a variety of situations, not just formal labs. Scaffolds and rubrics help with conclusion writing, but having students share their groups results to the class in a game increased students understanding of expectations at they practiced. Next year flow charts will be used at the beginning of the year for the initial writing to practice writing logical statements in a fun manner.

References: Hill, B. (March 2013). Patterns Based Physics. *The Science Teacher*.