Independent Data Analysis in a Modeling Curriculum

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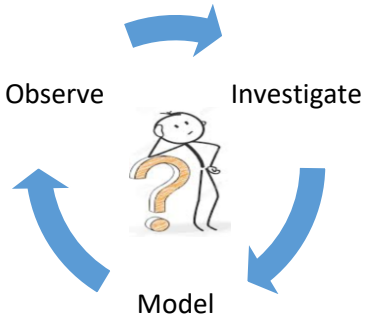
Background

This study was conducted at an independent girls' school in central New Jersey. The physics-first curriculum is largely based in modeling instruction, in which **students** ask questions, design experiments, and develop models based on the results.



Student-Centered & Inquiry-Based

Rather than performing all parts of the lab in groups, what if students spend time analyzing and interpreting their data **independently**?

Treatment & Data Collection

Students in the experimental group spent a period of time, following a lab exercise, independently analyzing their data. A combination of pre- and post-tests, observations, and student feedback were used to measure differences in **achievement** and **engagement**.

	Measurement Instruments		
Achievement	Test of Understanding Graphis in Kinematics for High School (TUG-K2)	Force Concept Inventory (FCI)	In-class observations
Engagement	In-class observations	Engagement self-evaluations	Student surveys & interviews

Results & Analysis

Achievement

Normalized gains were calculated using pre- and post-tests. Quotients for accuracy of data interpretation were computed from in-class observation data.

Engagement

Quotients for audience interaction and student presentation contribution were computed from in-class observation data. Average student-reported engagement scores were calculated and compared. Themes in student responses to surveys and interviews were ascertained.

Interpretation & Value

Results do not show any significant difference in achievement gains between control and experimental groups. Observations and student feedback do not reveal significant differences in levels of engagement between the groups. Mixed responses from students indicate having a variety of data analysis procedures may be beneficial. It was found that instruments such as pre- and post-tests and forms for observations improve quality of teacher-provided student feedback.