



Guided Inquiry Labs in AP Physics

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Background

This project was conducted at Blair Academy in Blairstown, NJ. Blair is a rigorous college preparatory boarding school with a diverse student population of 465.

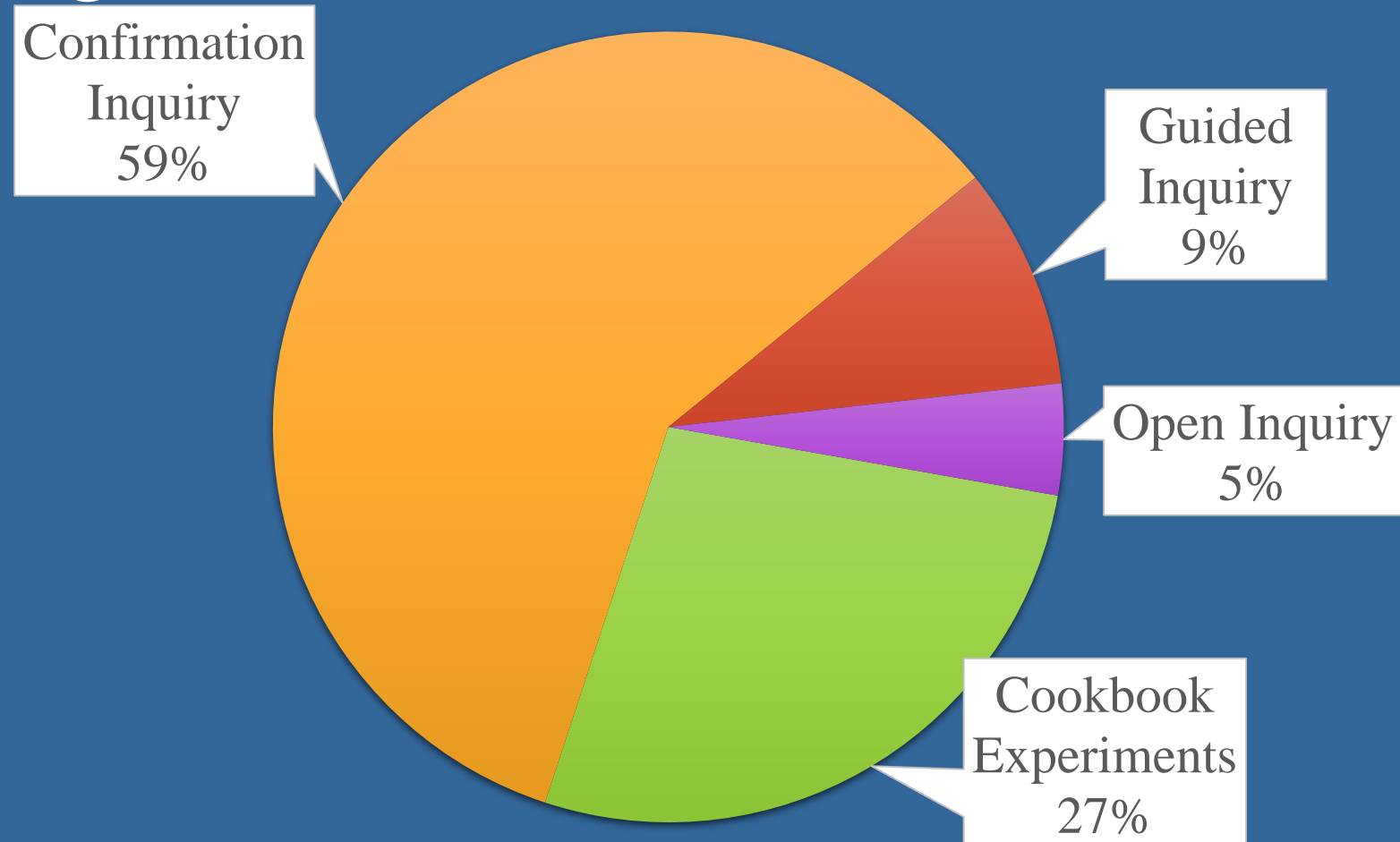


Figure 1. Ryerson Pre-Treatment Survey (Round 1) question: "What best describes your previous lab experiences?" (N=22).

Despite the diverse backgrounds of students, preliminary surveys show that less than 15% of students have experienced Guided or Open Inquiry learning in a lab setting

Blair @ A Glance

COUNTRIES REPRESENTED

23

STUDENTS AWARDED FINANCIAL AID

40%

SCHOLARSHIP GRANTS TOTAL

\$6.7M

U.S. STATES REPRESENTED

24

Images: <https://www.blair.edu/admission/blair-at-a-glance>

Data Triangulation Matrix

Focus Questions	Data Source 1	Data Source 2	Data Source 3
Primary Question: 1. What are the effects of introducing guided inquiry experiments on student engagement and enjoyment of physics?	Pre- Mid- and Post-Treatment Survey Responses	Pre- Mid- and Post-Treatment Interviews	Instructor observations and journaling
Sub-Questions: 2. Does conducting guided inquiry experiments improve student retention of course material for summative assessments?	Compare scores on unit tests between treatment and non-treatment groups	Compare scores on quizzes between treatment and non-treatment groups	Instructor observations and journaling
3. Does conducting guided inquiry experiments improve students' ability to write about science?	Compare lab report grades between treatment and non-treatment group	Pre- Mid- and Post-Treatment Survey Responses	Instructor observations and journaling

Methodology

Treatment Group

Performed 3 Guided Inquiry Experiments in which they were given only a question to answer. Experimental design, data gathering techniques, and data analysis was up to the students.

Non-Treatment Group

Performed 3 Traditional Experiments in which they were given printed instructions and a prescribed apparatus. Data gathering and analysis were predetermined by the instructor.

Data Collection

Both groups were given Pre- Mid- and Post-Treatment surveys. Each survey was accompanied by interviews. Secondly, grades on summative assessments and lab reports were compared between groups.

Results

Pre-Treatment Survey

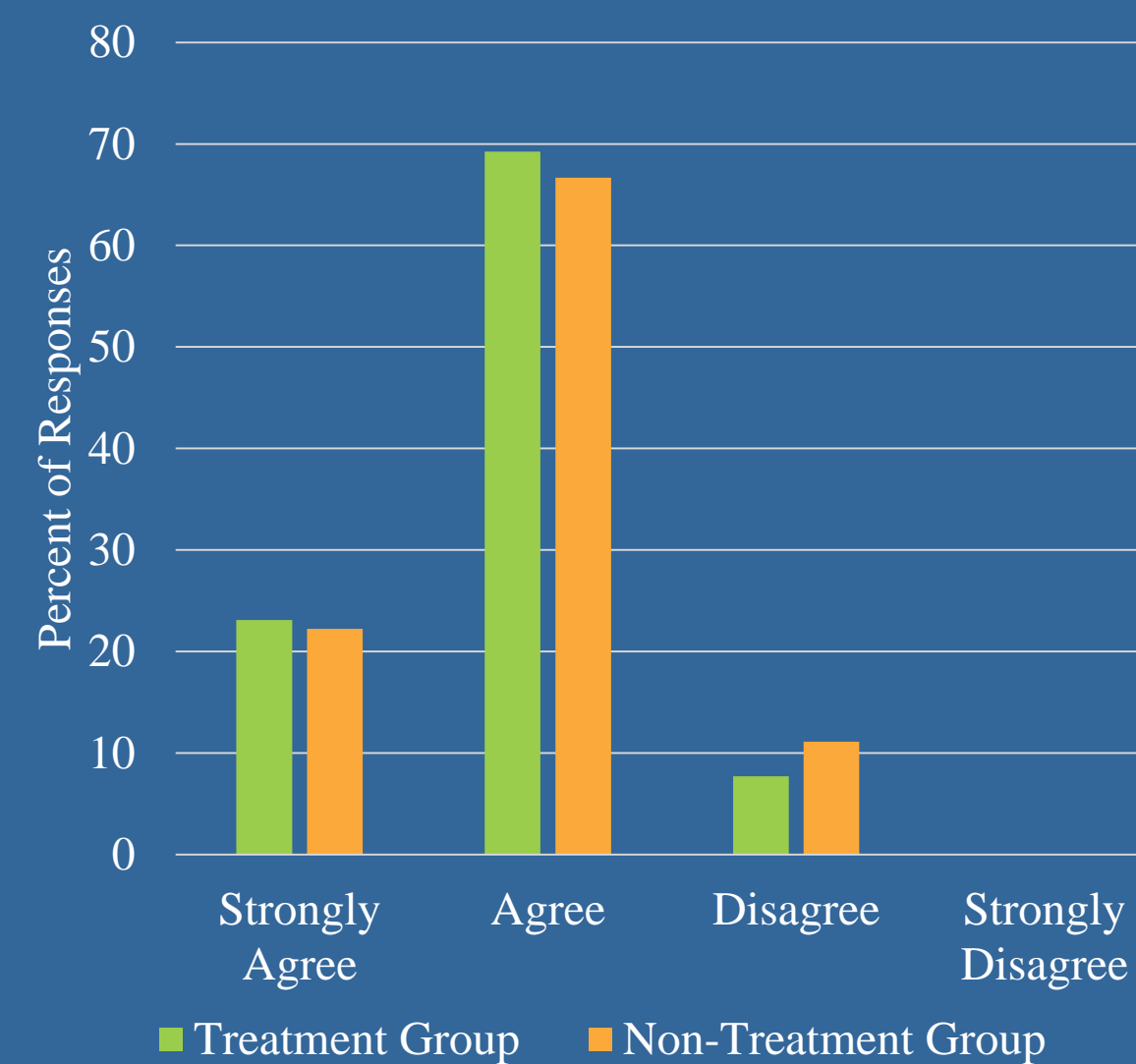


Figure 2. Ryerson Pre-Treatment Survey (Round 1) question: "I am uncomfortable when I do not know what to do next in experiments," (N=22).

Mid-Treatment Survey

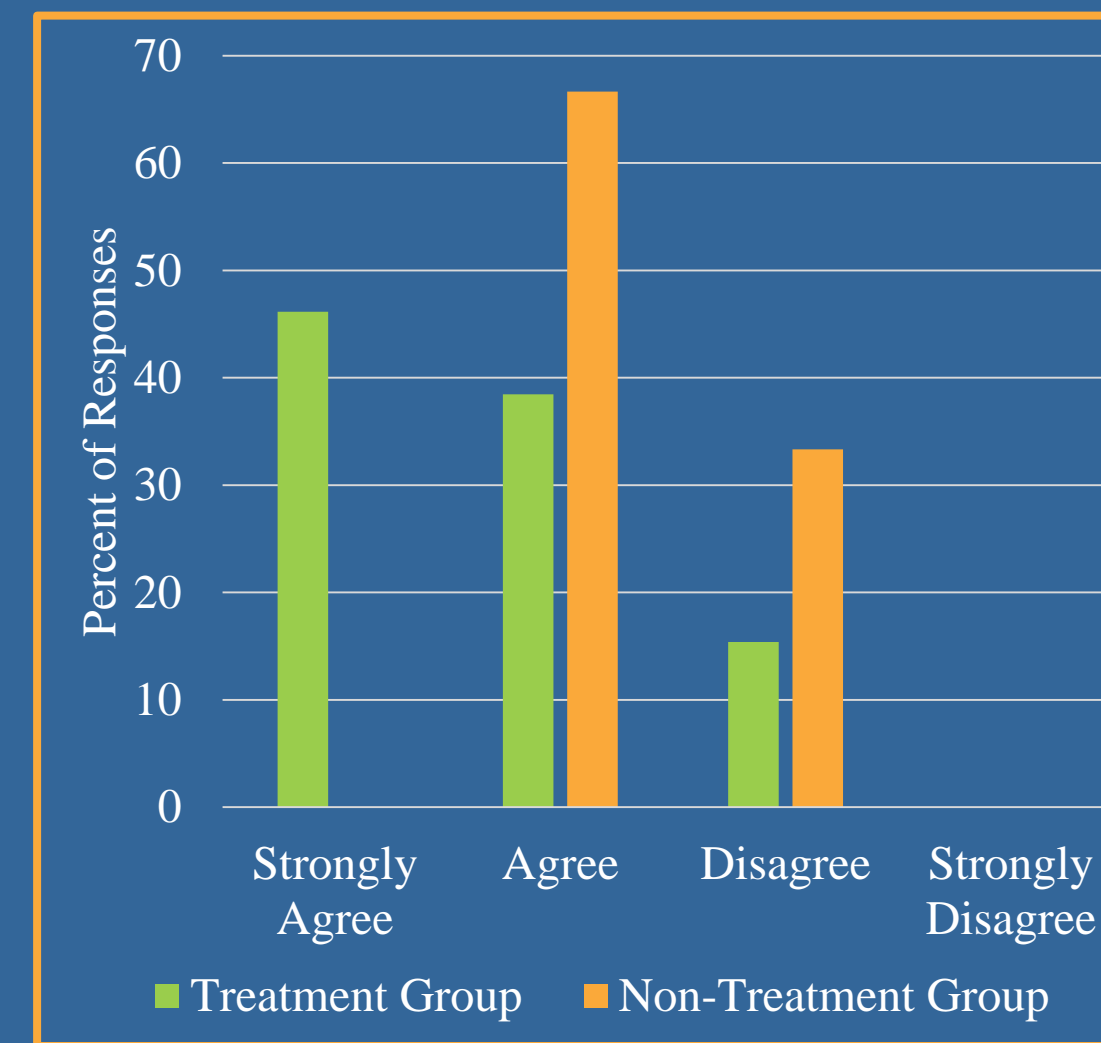


Figure 3. Ryerson Mid-Treatment Survey (Round 1) question: "I feel more comfortable than I used to be when I don't have instructions," (N=22).

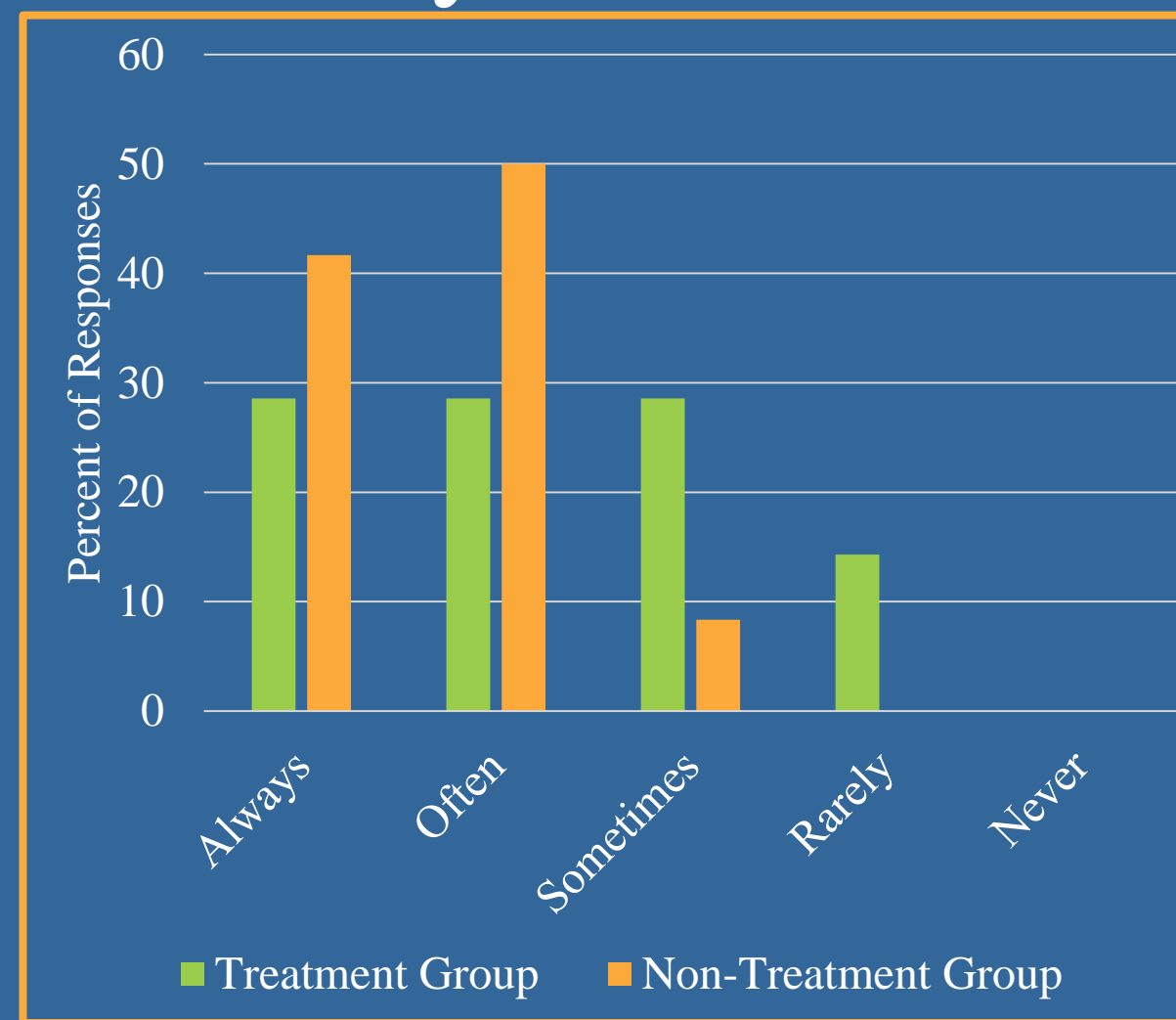


Figure 4. Ryerson Mid-Treatment Survey (Round 1) question: "When I complete these experiments I feel I have accomplished something," (N=22).

Value

- The results of this study support that Guided Inquiry labs are an effective teaching method for AP Physics, however no detectable advantage was detected when compared to "cookbook" labs.
- The first group to receive treatment responded more positively to Guided Inquiry than the second group. This is perhaps because the experimental habits formed early in the school year had a lingering effect for students later on.
- Some students benefited from the opportunity to exercise creativity as an alternative method of expressing their understanding of content and experimental design.