



The Impact of Art on Students' Attitudes and Learning Gains in Science

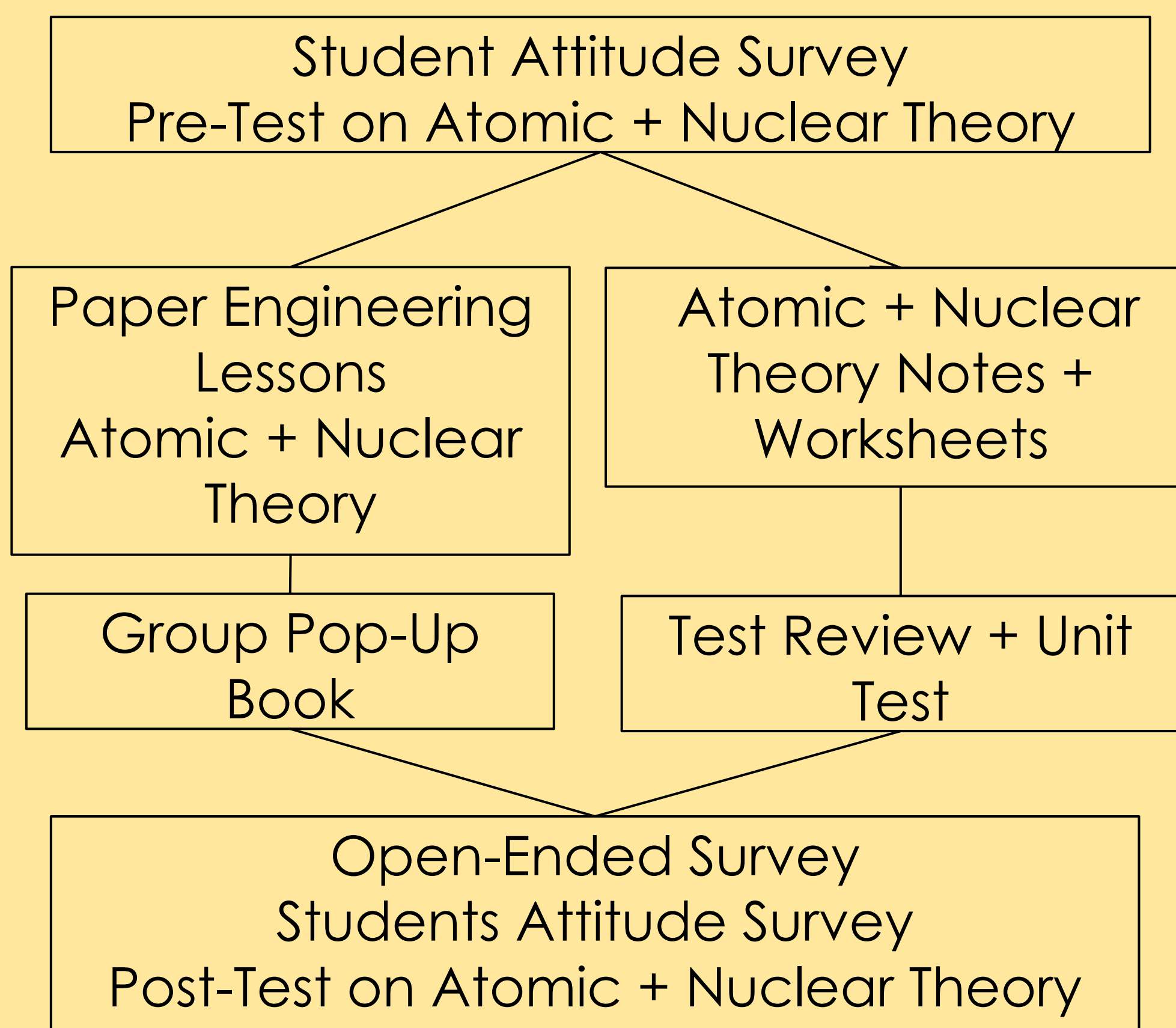
Beth Tsuha | M. C. Perry High School | Iwakuni, Japan | July 2022



Background

- The goal of this action research is to identify the impact that art has on students' attitudes and learning gains in science.
- Combined passions of art and science education
- Paper engineering challenges students to create pop-up scenes that physicalize science content
- M.C. Perry is a small DoDEA school that serves 220 diverse students

Experimental Plan



Research Questions

How does an art integrated science unit impact students' attitudes towards science?

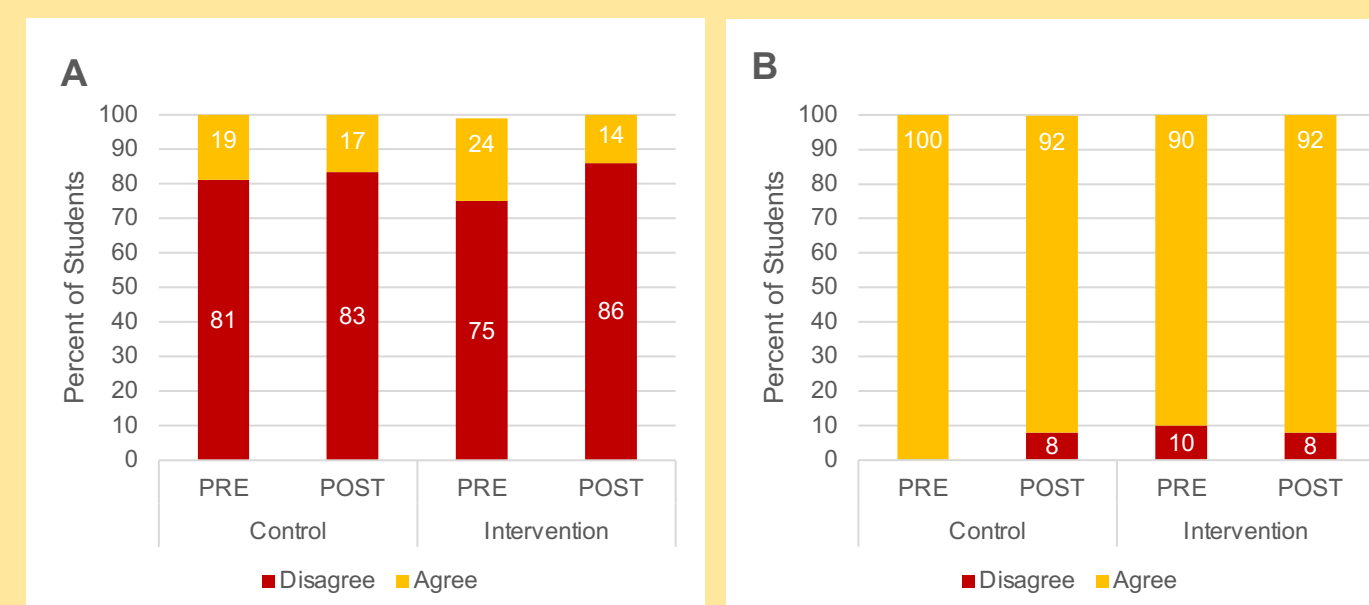


Figure 1: Change in students' response to SAS statements.

- (A) Change in students' response to the statement "Science is boring" for both control (n=16) and intervention (n=36)
- (B) Change in students' response to that statement "I find science interesting" for both groups.

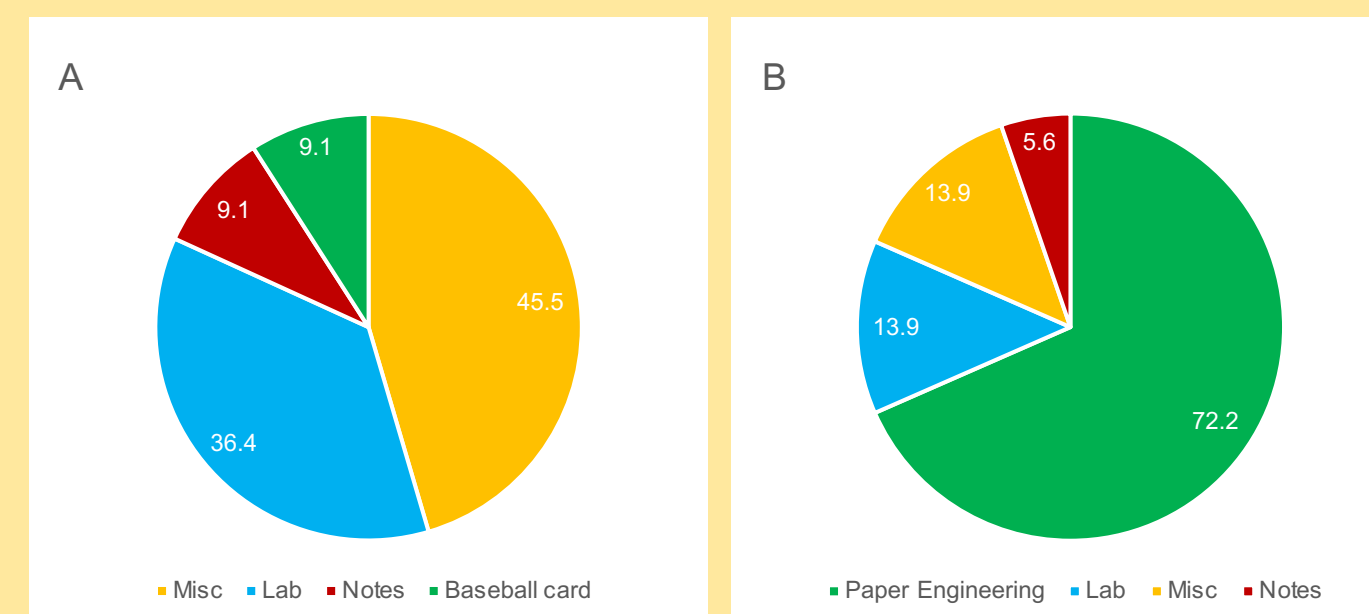


Figure 2: Percent of students who responded to the Open-Ended Survey results for question two

- (A) Percent of control group that identified their favorite activity was
- (B) Percent of the intervention group their favorite activity was paper engineering, lab, coded as miscellaneous, and notes.

Note: Question two stated "What was your favorite activity or part of the unit? Please explain."

Will students report an increase in their perceived learning and have a larger learning gain after an arts integrated science unit?

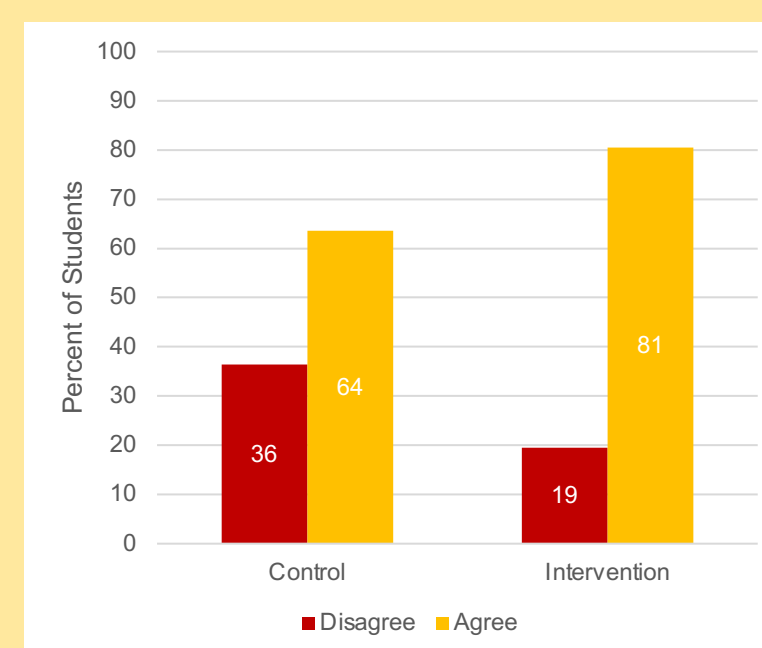


Figure 3: Percent of students who chose Disagree and Agree overall for the intervention group (n=36).

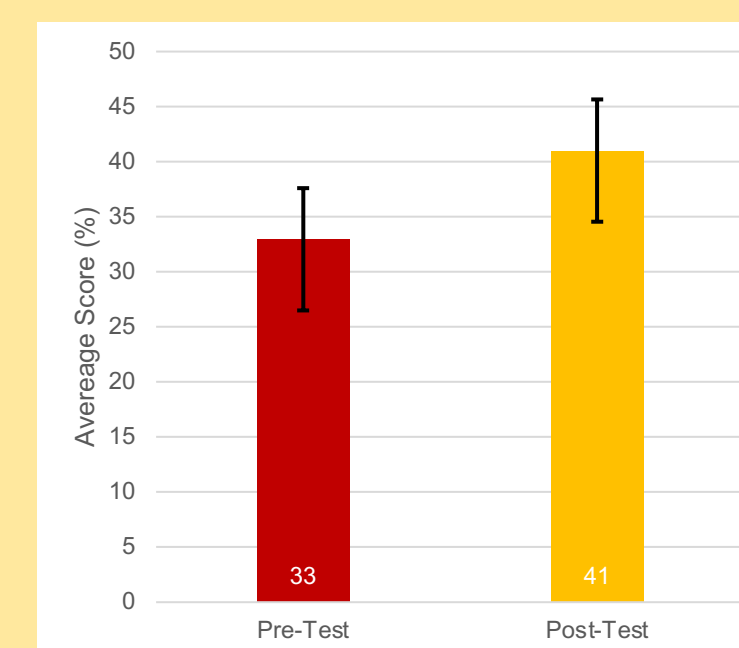


Figure 4: Average score of the intervention groups pre- and post-assessment scores (p=0.03).

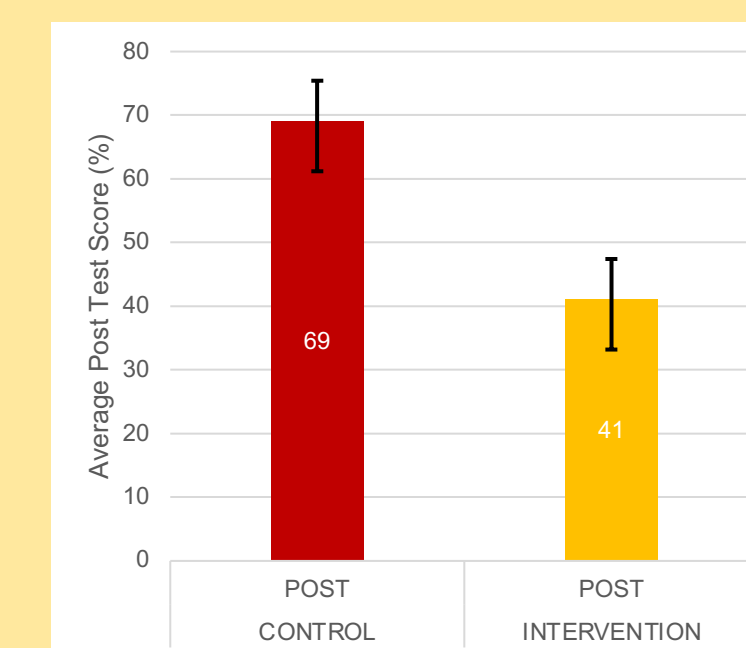


Figure 5: Average Post-Content Assessment scores for control and intervention groups (p=6x10⁻⁷).

"I enjoyed learning folds, such as the triangle fold, because it allowed me to be creative which is unique for a science class."

Data Analysis

- Control group normalized gain score of $g=0.54$.
- Intervention group normalized gain score of $g=0.13$.
- Control group t-test $p=1.5 \times 10^{-6}$
- Intervention group t-test $p=0.03$.
- The t-test between the two groups post-assessment scores: $p=6 \times 10^{-7}$.

Conclusions

- Students enjoy paper engineering
- Paper engineering is an effective STEAM strategy
- Paper engineering should be used strategically in the future

Future Research

- What impact would paper engineering have on other branches of science?
- Would the results be similar if the study had a larger research pool?
- Would the results be similar if the study had an extended implementation time?