



THE EFFECTS OF INCORPORATING VISUAL REPRESENTATION DAILY INTO THE HIGH SCHOOL SCIENCE CLASSROOM

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Background

The world around us is filled with scientific wonder, from the cell of a plant to the concept of gravity, we live in a highly complex and mysterious place. Science teachers aspire to teach their students the wonders of our world, socializing them to the ideas of biology, physics, chemistry, geology, and many other topics. Many of the concepts the students observe and investigate in science, whether macro or micro, are difficult to grasp, especially for students new to learning science (Eilam & Gilbert, 2014). Words often are not enough to get students to fully understand the many phenomena of science, and so teachers need to show them the macro and micro levels through visual representations. Visual representation can help build a stronger and more conceptual understanding of the science concepts that students may not get from just verbal explanations (Cook, 2011).

Methodology

- The study was conducted within 3 units of a Conceptual Chemistry Course consisting of 18 tenth grade students
- The research spanned 10 school weeks (January 24, 2022- March 8, 2022)
- There was one non treatment unit that spanned 4 weeks and two treatment units that spanned 4weeks each
- Data was collected through:
 - Pre and post test on the topics within the units
 - How do you learn best in Chemistry Interview questions
 - How do you feel you learned in chemistry Post unit interview questions
 - Students Attitudes about class and learning styles Pre and post unit survey

Data Analysis

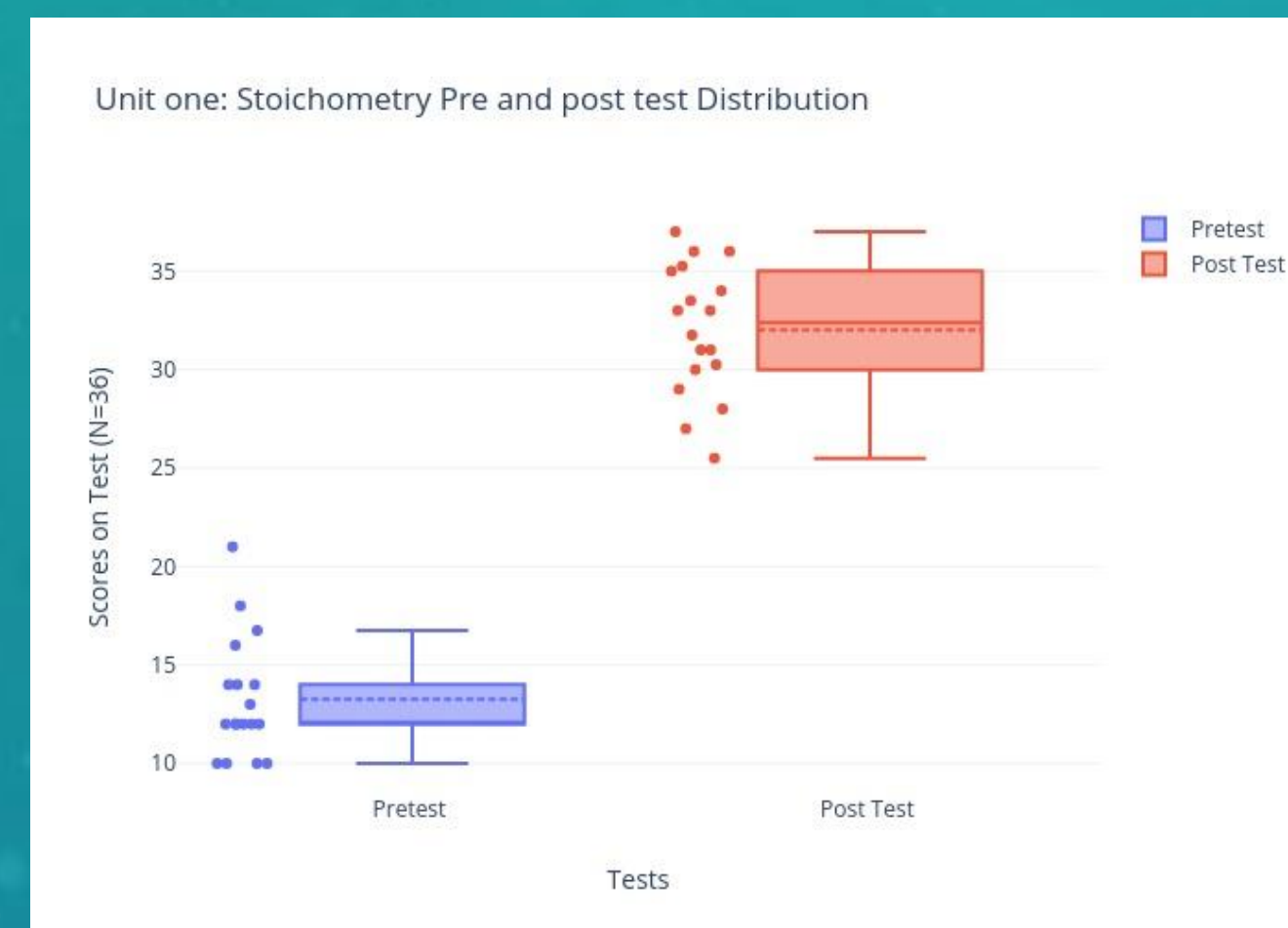


Figure 1. Pretest and post test score distribution for treatment unit one: stoichiometry with points and means shown, (n=18).

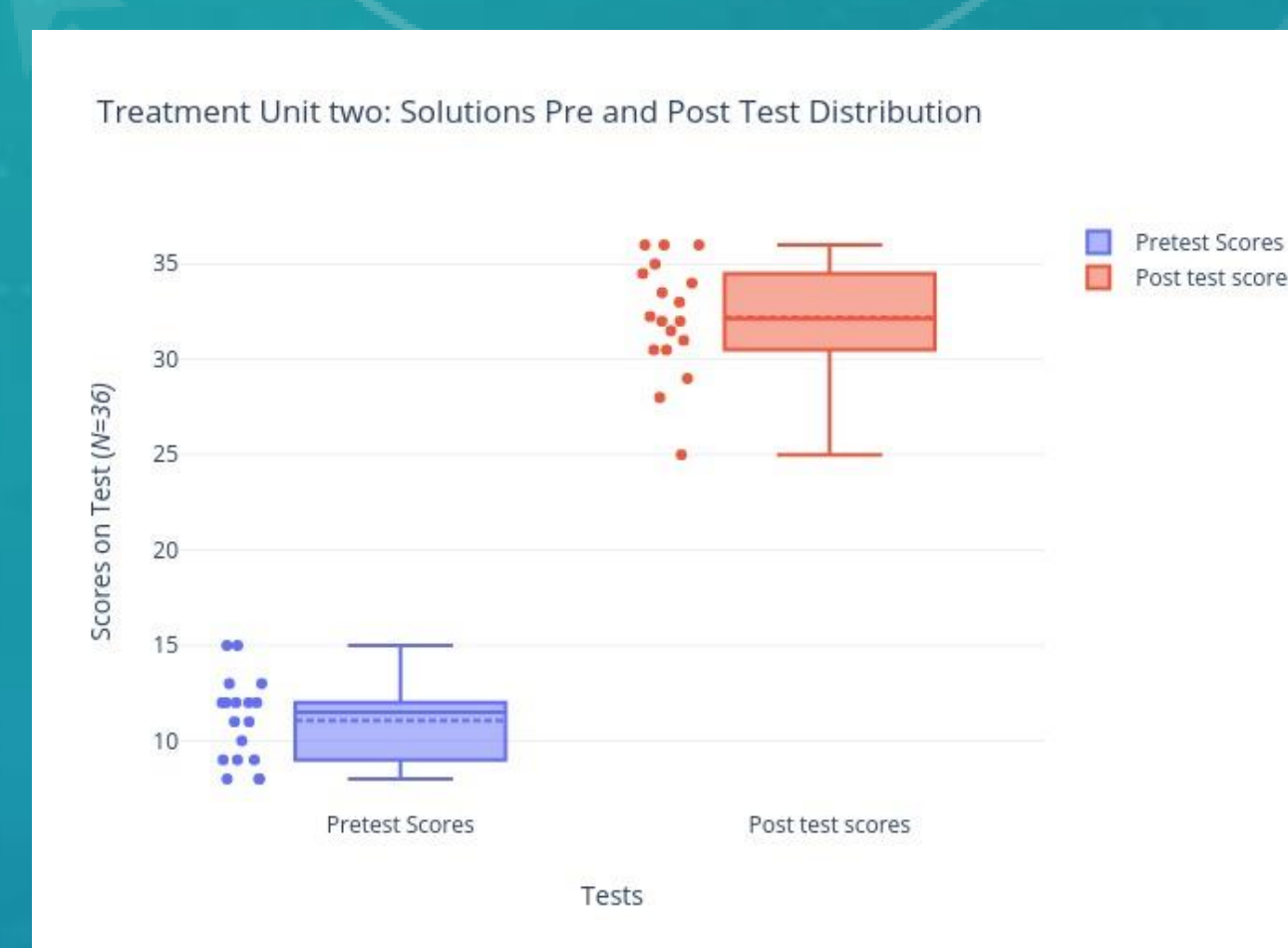


Figure 2. Pretest and post test score distribution for treatment unit two: solutions-Molarity and Acid/Base Chemistry with points and means shown, (n=18).

“The visual aids used during class help me in everything I do in the class, especially the assessments. When you add them into the start of the unit and continue to tie them in throughout, I can use them to connect back to when taking assessments or doing homework, which helps me remember and piece all the material together” - Anonymous student

Attitudes towards Chemistry Pre and Post response

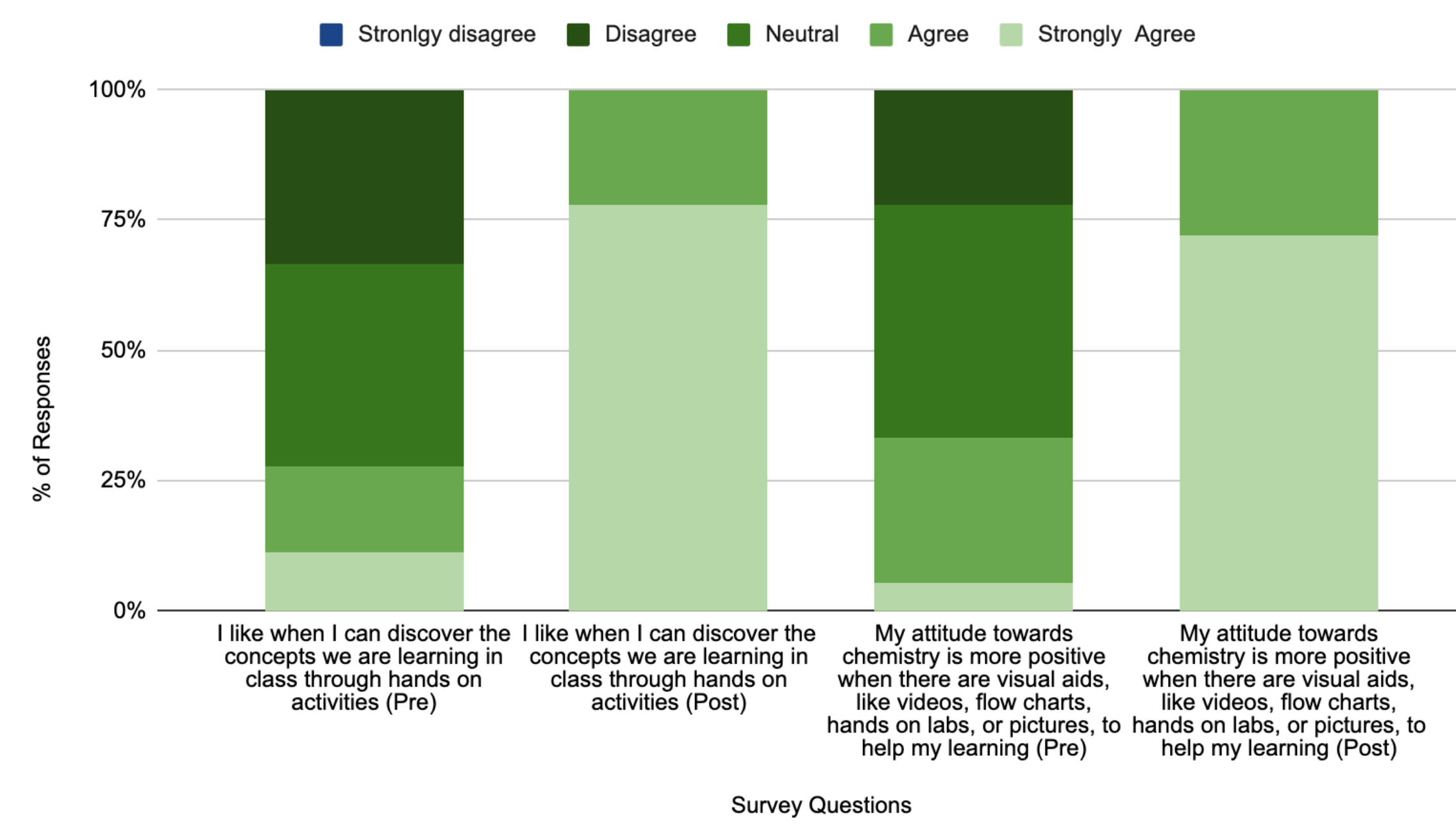


Figure 3. Pretreatment and posttreatment survey results to questions relating to attitudes towards Chemistry, (n=18).

“I am more excited about the topics because I can see it and I get to do more than just sit and take notes, I get to explore and move around, at least most of the time.” – Anonymous student

Focus Questions

1. How will the addition of visual representation, such as demonstration, diagrams, manipulatives, videos, and infographics, to help them gain a deeper understanding of the course material so they can produce stronger outputs on assessments?
2. What are the effects of incorporating visual representation, such as demonstrations, diagrams, manipulatives, videos, and infographics on students interest and attitudes in the course.

Conclusion

The results of using visual representation, such as demonstrations, diagrams, manipulatives, videos, and infographics on a daily basis in the science classroom indicated that students’ positivity gained a deeper understanding of the course material and gained better references to draw from when thinking of content. They produced stronger outputs on post treatment assessments compared a traditional science instruction with minimal visual representation present. Looking at the average of gains in treatment unit two: solutions, the class had an average of gains of 0.84. Comparing the non-treatment average of gains to both treatment units average of gains, there was a 0.11 increase from non-treatment average of gains to treatment unit one average of gains and 0.12 increase from non-treatment average of gains to treatment unit two average of gains. This indicated that students’ knowledge and understanding of the material increased from pretest to posttest more in the two treatment units compared to the non-treatment unit. Students interests and attitudes in science and specifically chemistry also increased during the treatment units where visual representation was used on a daily basis. They enjoyed the class more and were more interested when the content was infused with visual representation vs. just lectures and words.

References QR Code

