

# The Effect of Supplemental Online Tutorials on Chemistry Comprehension in Students Diagnosed with ADHD

## BACKGROUND

- Students diagnosed with Attention Deficit Hyperactive Disorder (ADHD) have difficulty concentrating for extended periods. This population is predisposed to a host of comorbidities with other academically debilitating disorders such as anxiety and daytime drowsiness.
- High school chemistry is a challenging and rigorous subject that requires intense focus and repetition. Students with ADHD have a particularly difficult time absorbing chemistry topics in a traditional classroom setting. This focusing deficit causes students to miss key details during lectures and laboratories and to fare poorly on assessments.
- Studies show that blended learning — a combination of traditional and online learning — is successful. In an effort to assist ADHD students in their pursuit of chemistry, a project was implemented in which online supplemental tutorials were given to students to give them the opportunity to learn when they were most focused.

## RESEARCH QUESTIONS

**Focus Question:** What is the impact of supplemental online tutorials on the comprehension level of chemistry concepts on students diagnosed with ADHD?

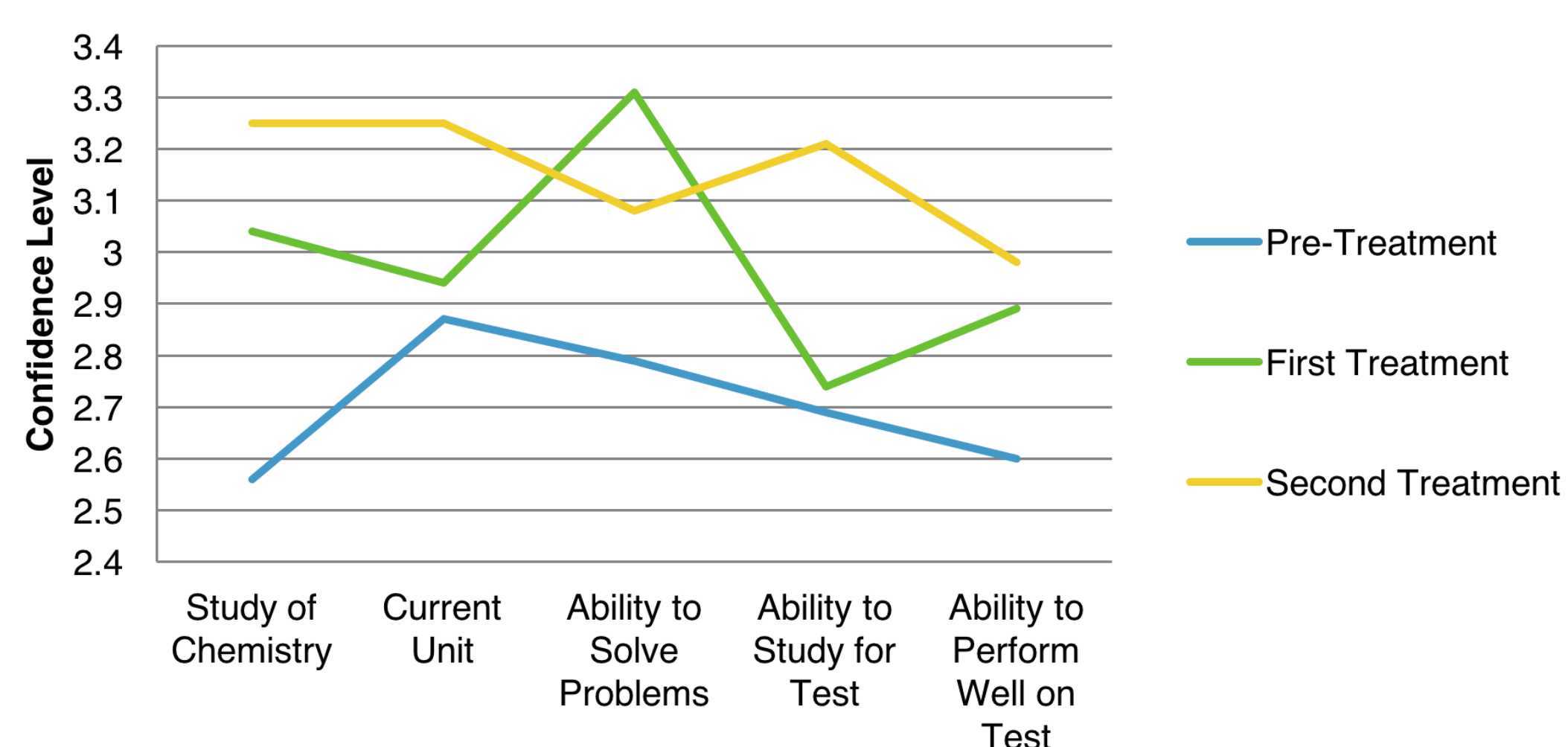
### Sub-Questions:

1. Does the use of online tutorials increase student comprehension?
2. Does the addition of mid-memory assessments into the online tutorials further increase student comprehension?
3. Does the use of online tutorials decrease anxiety levels and improve confidence levels regarding chemical concepts?
4. How are supplemental videos effective in increasing overall achievement in chemistry?

## DATA COLLECTION

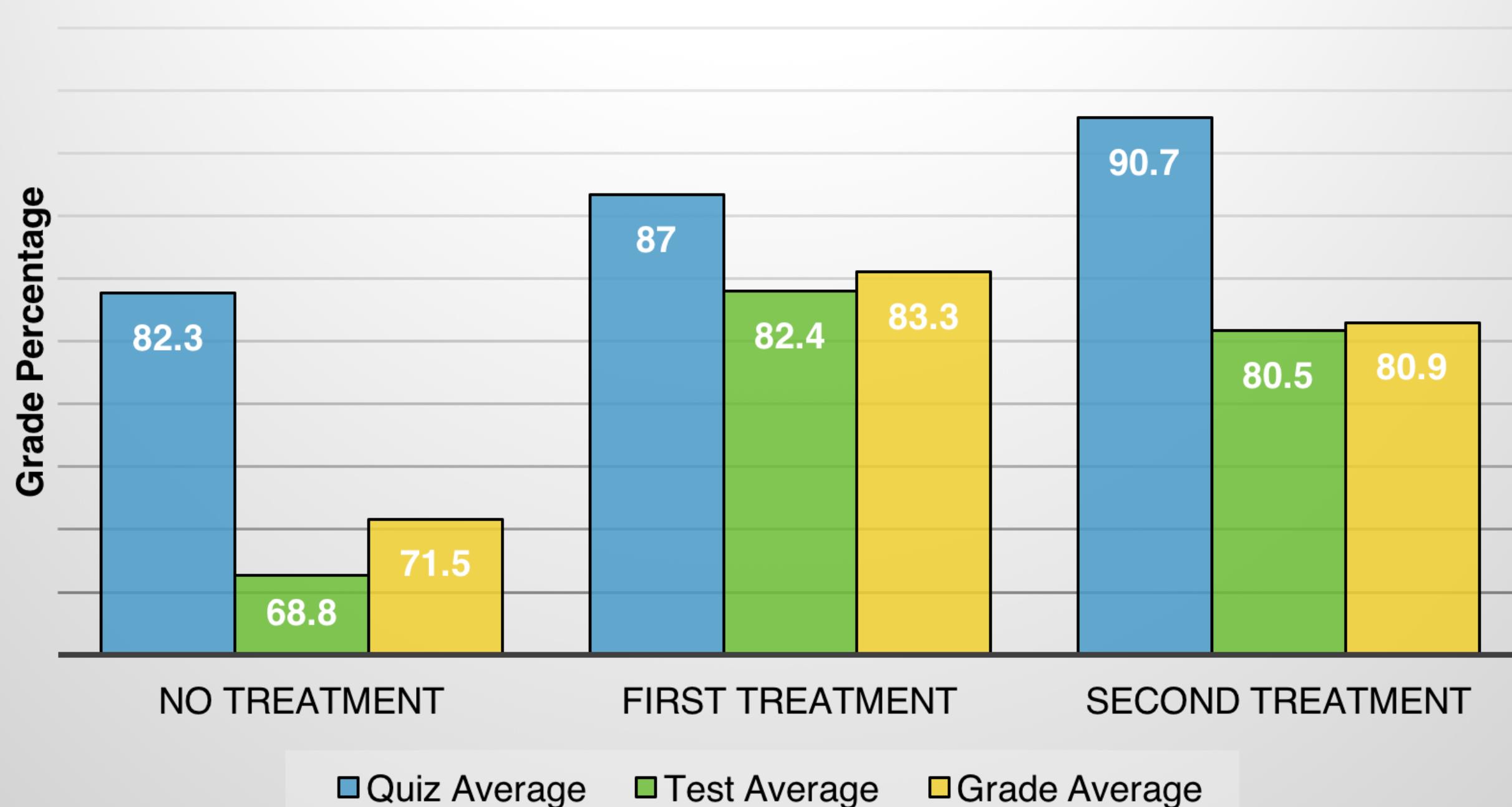
Focus Research Questions	Data Source 1	Data Source 2	Data Source 3
Sub-Question 1	Formative Assessments: Assessments and Quizzes	Rubric Scores	Likert Agreement Survey
Sub-Question 2	Formative Assessments: Assessments and Quizzes	Rubric Scores	Likert Agreement Survey
Sub-Question 3	Confidence Survey	Likert Agreement Survey	Focus Group Interviews
Sub-Question 4	Focus Group Interviews	Focus Group Discussion	Observations

## Average Confidence Levels



Average Confidence Levels of Pre-Treatment, First Treatment and Second Treatment (5 = Extremely Confident, 1 = Not Confident at all) (N=15)

## Average Student Scores



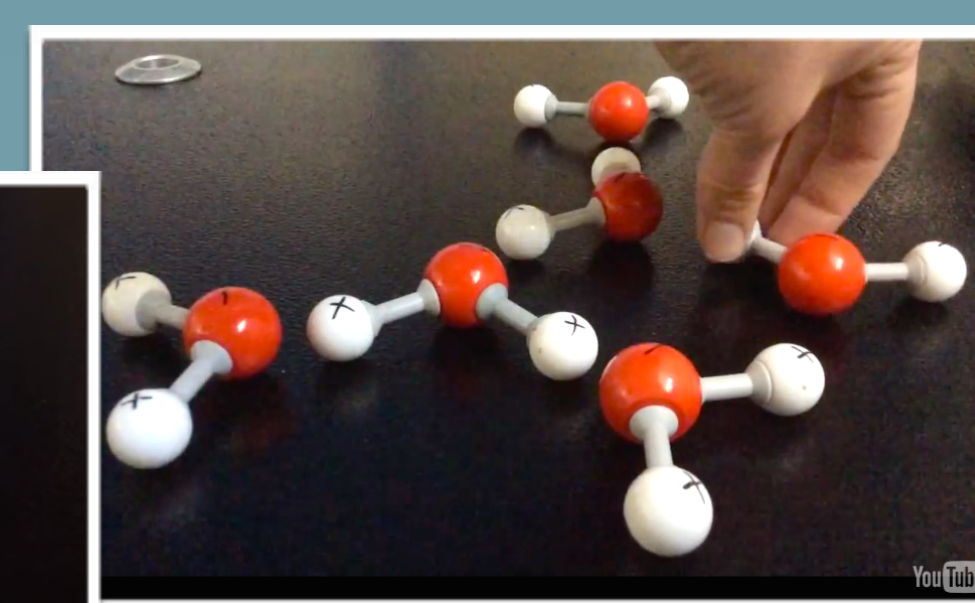
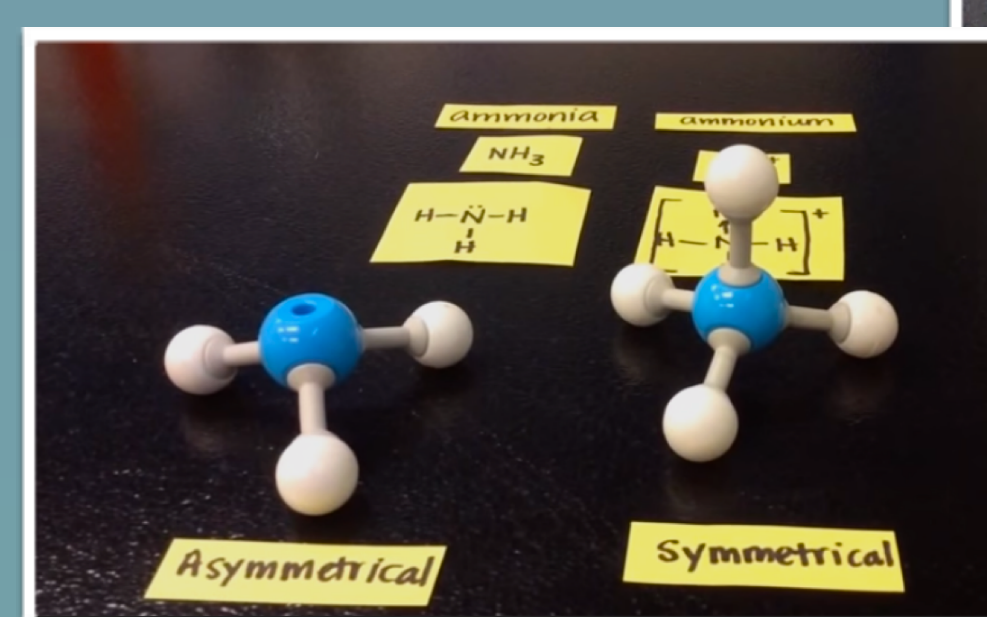
Average Student Scores of Pre-Treatment, First Treatment and Second Treatment (N=15)

## RESULTS AND VALUE

Data concluded that the tutorials were extremely successful. The population of ADHD students performed better on formative assessments in addition to increasing their confidence levels and decreasing anxiety levels surrounding the study of chemistry.

The addition of mid-memory quizzes in the second treatment illustrated mixed results compared to the first treatment; however, both treatments demonstrated a large positive impact compared to pre-treatment.

Students with ADHD can become better learners with supplemental online technology since they are able to access key information and learn when they are most focused.



Tutorial Screenshot Examples

## TREATMENT

Two treatments were implemented over the course of three units with the same students. For the comparison unit involving ionic compounds, students were given access to daily live lectures, only. For the first treatment unit involving covalent compounds, the students had access to both the daily live lectures and the addition of daily and concise (5 – 15 minutes) supplemental online tutorials with accompanying worksheets. For the second treatment unit involving molecular polarity, the students had access to the live lectures, and the supplemental online tutorials with the addition of mid-tutorial quizzes in place of the worksheets. All groups had the same in-class experience, throughout, with typical quizzes and a formal assessment given at the end of the unit.



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