

Effects of Interactive Tools in a Flipped Chemistry Classroom

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INTRODUCTION

An efficient, blended, self-paced, student-centered classroom can be a reality when lecture is moved outside of class and more practice and application of the material occurs during class (Bergmann & Sams, 2012). Technology allows teachers to personalize the learning within the flipped classroom to increase student engagement (Khan, 2012). EdPuzzle and PlayPosit are technology tools that allow teachers to weave formative assessment into the flipped classroom (Smith & Mader, 2015a). Twenty-eight high school students at Penn-Trafford High School participated in this study. **The main focus of this study was How do different instructional tools affect student achievement, engagement, and attitudes in the flipped chemistry classroom?**

METHODS

- **Interactive Tools Survey:** Establish baseline of students' attitudes and engagement with videos and Watch, Summarize, Question (WSQ) forms. Given again after each treatment and analyzed using a Wilcoxon Signed Rank test
- **Comparison:** Students watched content videos and completed the WSQ forms
- **First treatment:** Students watched videos using PlayPosit and completed WSQ forms
- **Second treatment:** Students watched videos using EdPuzzle and completed WSQ forms
- **Pre-test and Post-test:** To determine student growth. Normalized gains were calculated.
- **Daily Observation Report:** Recorded before treatment and during each treatment phase
- **Student interviews:** Additional qualitative evidence was collected.
- **Methods Summary:**

	Students Involved	Video Method	Content Covered	Length of Time
Comparison	All students	YouTube	Gases	Two weeks
Treatment 1	All students	PlayPosit	Kinetics	Three weeks
Treatment 2	All students	EdPuzzle	Equilibrium	Three weeks



RESULTS

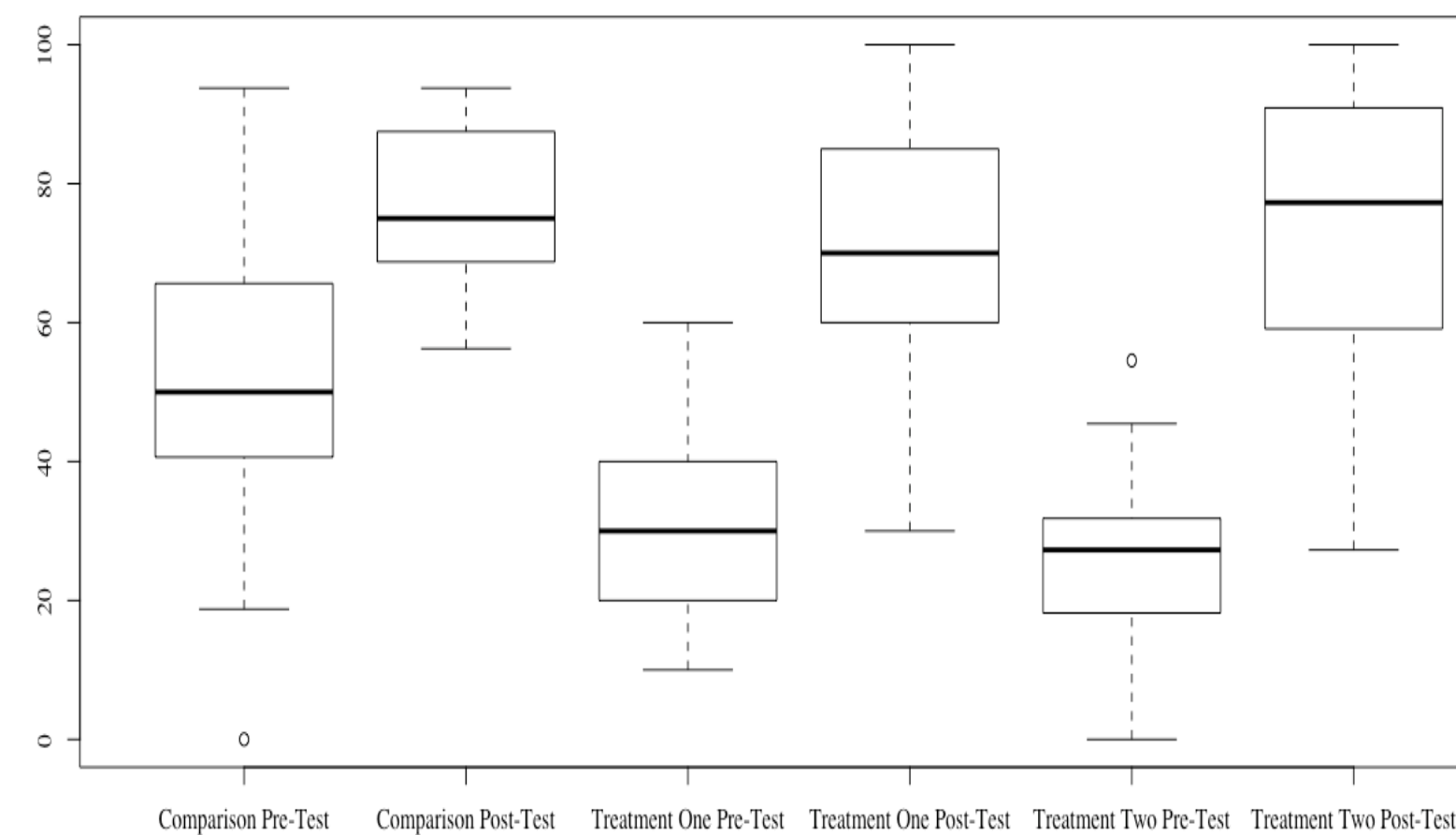


Figure 1. Box plots for the Comparison, Treatment 1, and Treatment 2 Assessments, (N=28).

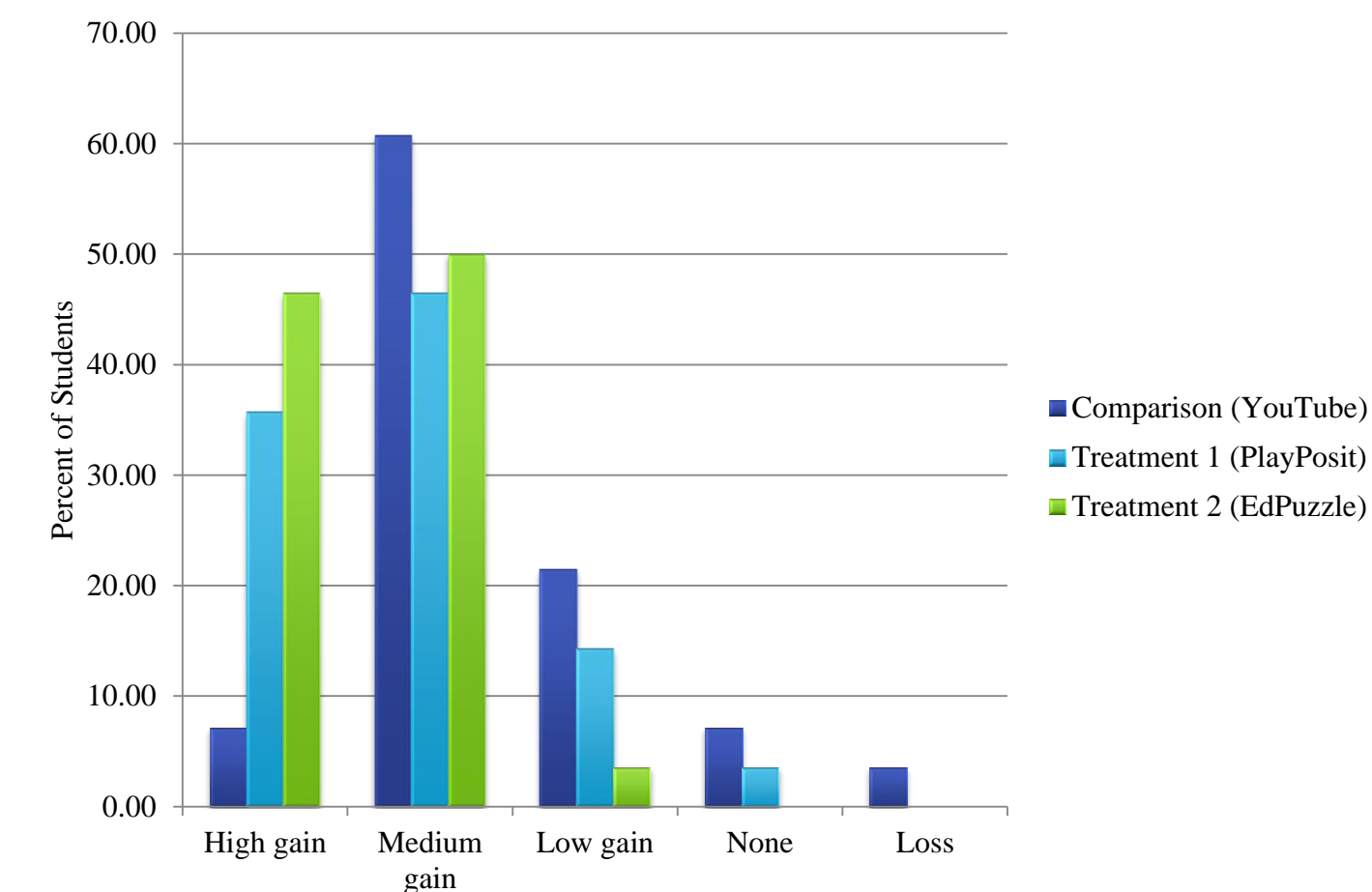


Figure 2. Normalized gains for each phase, (N=28).

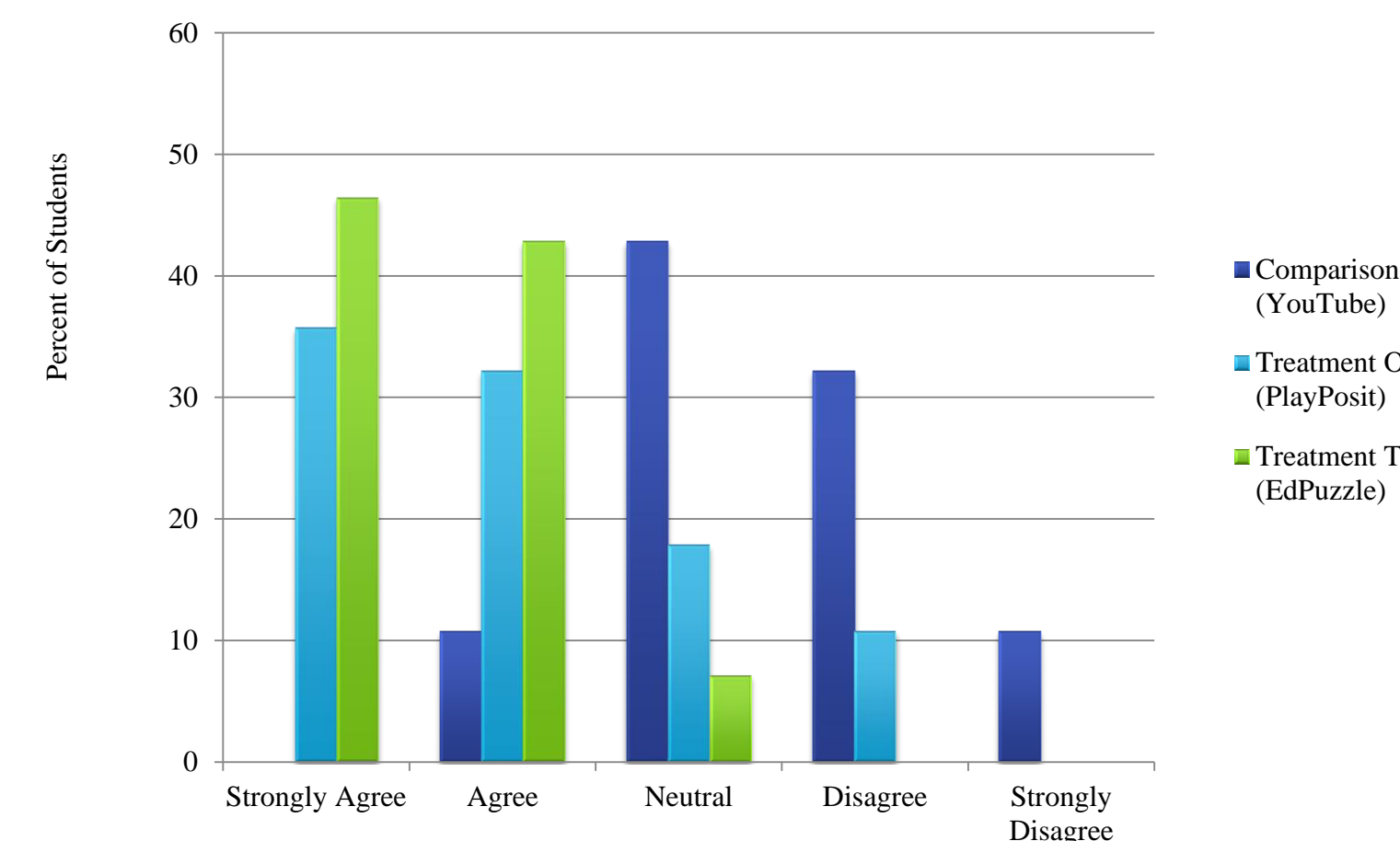


Figure 3. Interactive Video Tools Survey: "I feel more engaged during class after watching the videos," (N=28).

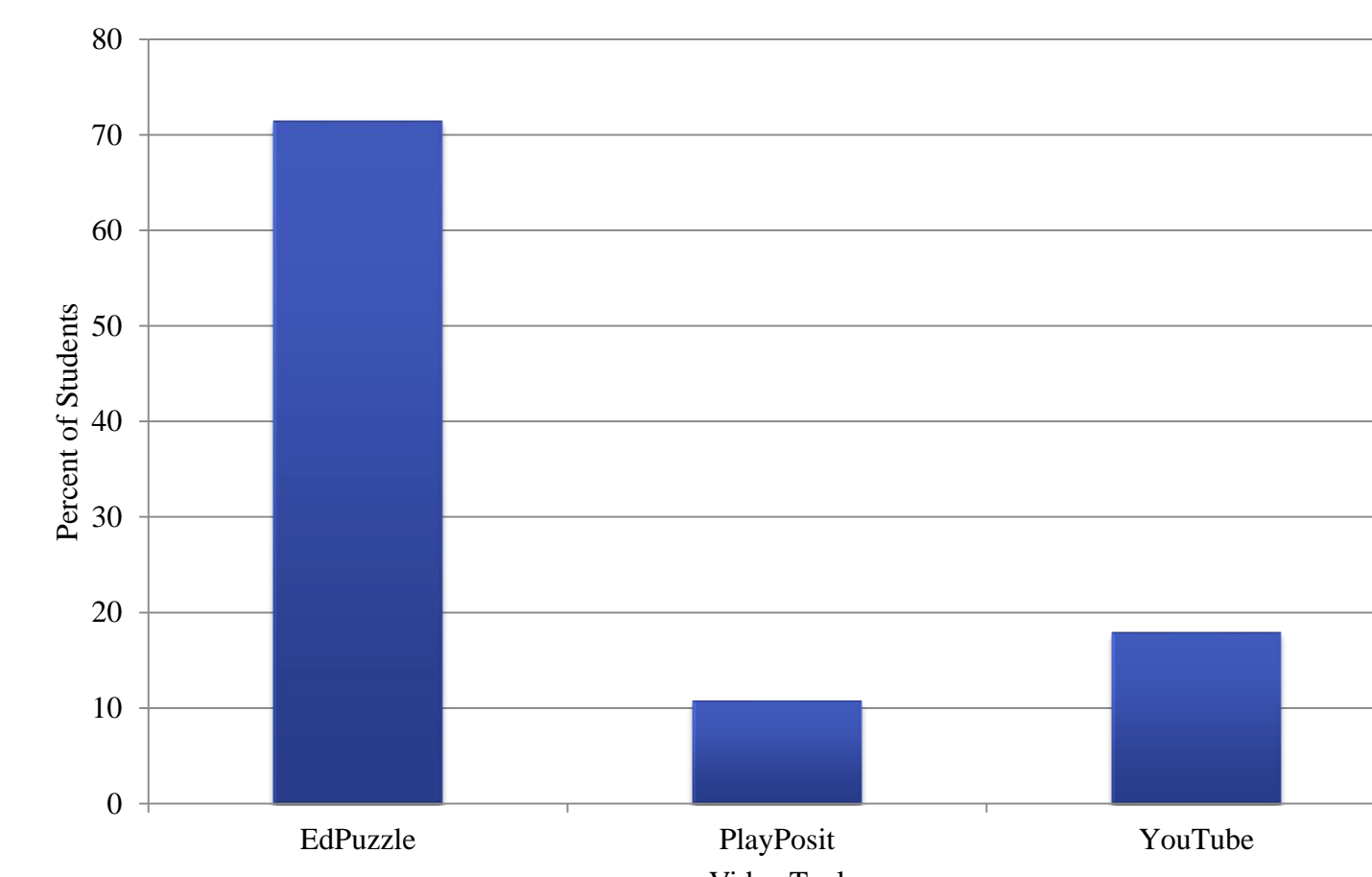


Figure 4. Student preference for video tool, (N=28).

CONCLUSIONS

Student Achievement:

Although both Treatment 1 and Treatment 2 averaged high normalized gains, the difference in median scores were not statistically significant. This was surprising because it would be expected that with more active participation in the videos, students would perform at a higher level on the exams. Therefore, different interactive tools do not significantly affect student achievement in the flipped classroom.

Student Engagement:

Both PlayPosit and EdPuzzle increased student engagement during the videos and during class. The random, embedded questions in the videos were required before the video would continue playing. Both interactive tools had a positive effect on student engagement, but EdPuzzle also helped students feel more prepared for class.

Student Attitudes:

Both PlayPosit and EdPuzzle enhanced student learning through the use of embedded questions, but students preferred EdPuzzle to both PlayPosit and YouTube. Overall, both interactive tools had a positive impact on student attitudes in the flipped classroom.

STUDENT QUOTES

- "EdPuzzle is a good site that helps me learn the material as the video pauses and questions appear."
- "The questions in PlayPosit make me pause and think about what I'm learning instead of just watching the video passively."
- "The videos give me background information I need to make the examples in class easier. I like that I can rewind to re-learn material as needed and review the questions."

REFERENCES

- Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Eugene, Oregon: ISTE.
- Khan, S. (2012). The rise of the tech-powered teacher. *Education Week*, 32(6), 28-25.
- Smith, B., & Mader, J. (2015a). Science 2.0: Flipping tools for the science classroom. *The Science Teacher*, 82(3), 8.

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