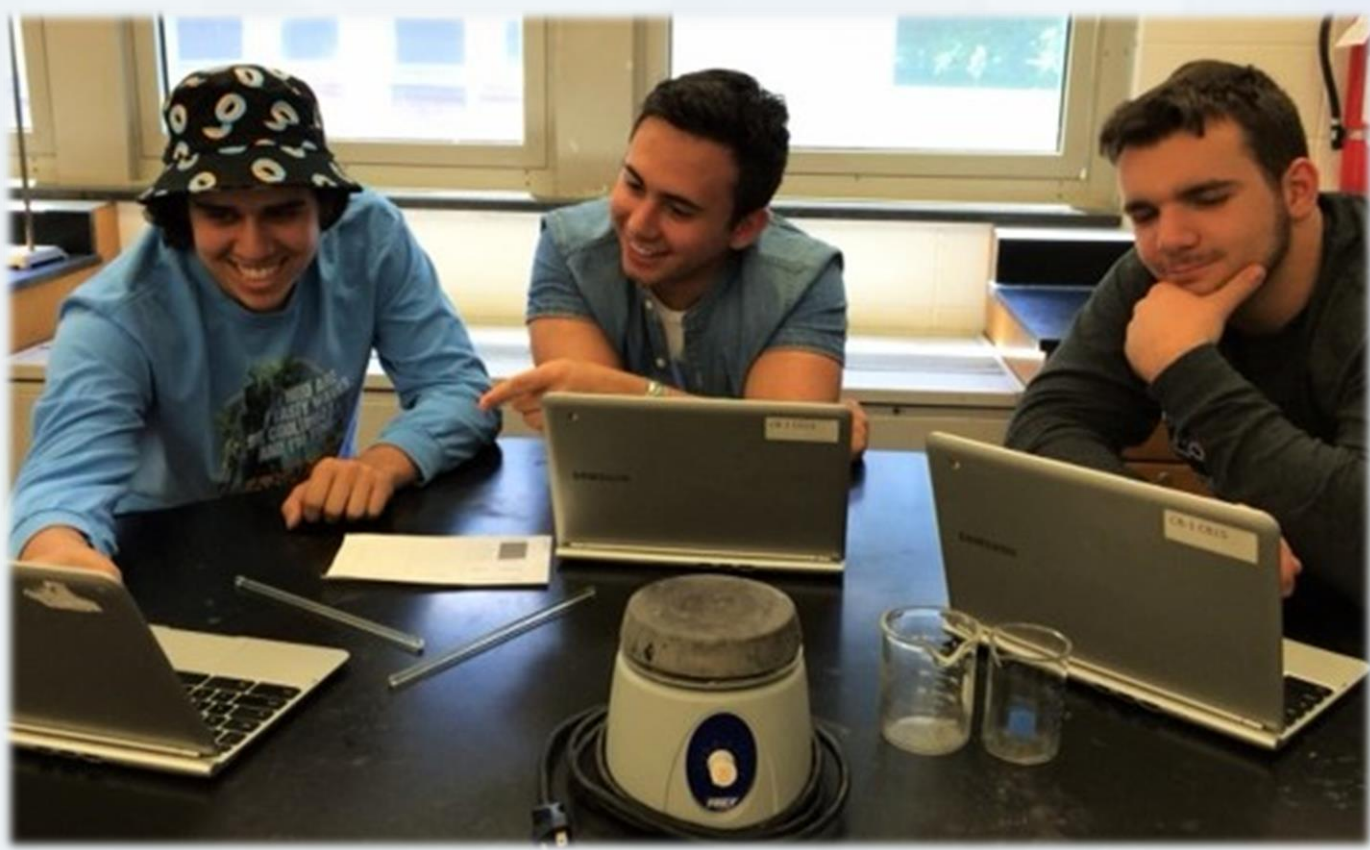


The Supported Flipped Classroom

Introduction

The vision for science education described in *A Framework for K-12 Science Education* is to have students “actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields” (NRC, 2012, p. 8). The lecture format of a traditional classroom does not support this vision. The challenge for science educators is to deliver content and assess understanding in a dynamic yet efficient manner providing opportunity for application in the classroom. The integration of technology through a flipped learning approach coupled with online formative assessments has been shown to facilitate learning, positively impact engagement, and maximize class time to apply concepts. My research will determine the effectiveness of this strategy in my classes.



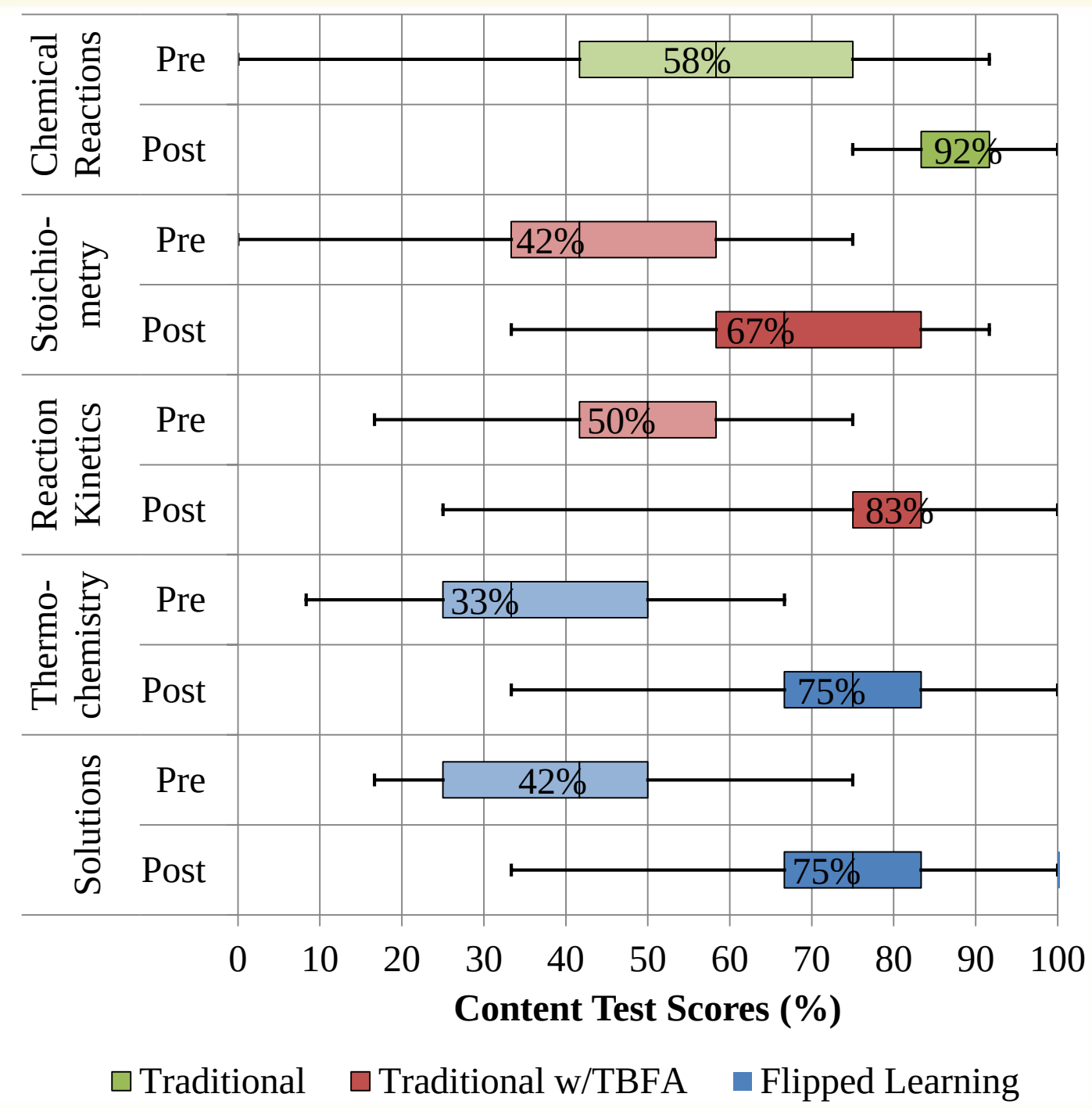
Research Question

Does a supported flipped learning approach that includes online video lectures and technology-based formative assessments facilitate student learning, engagement, and participation in a high school chemistry classroom?

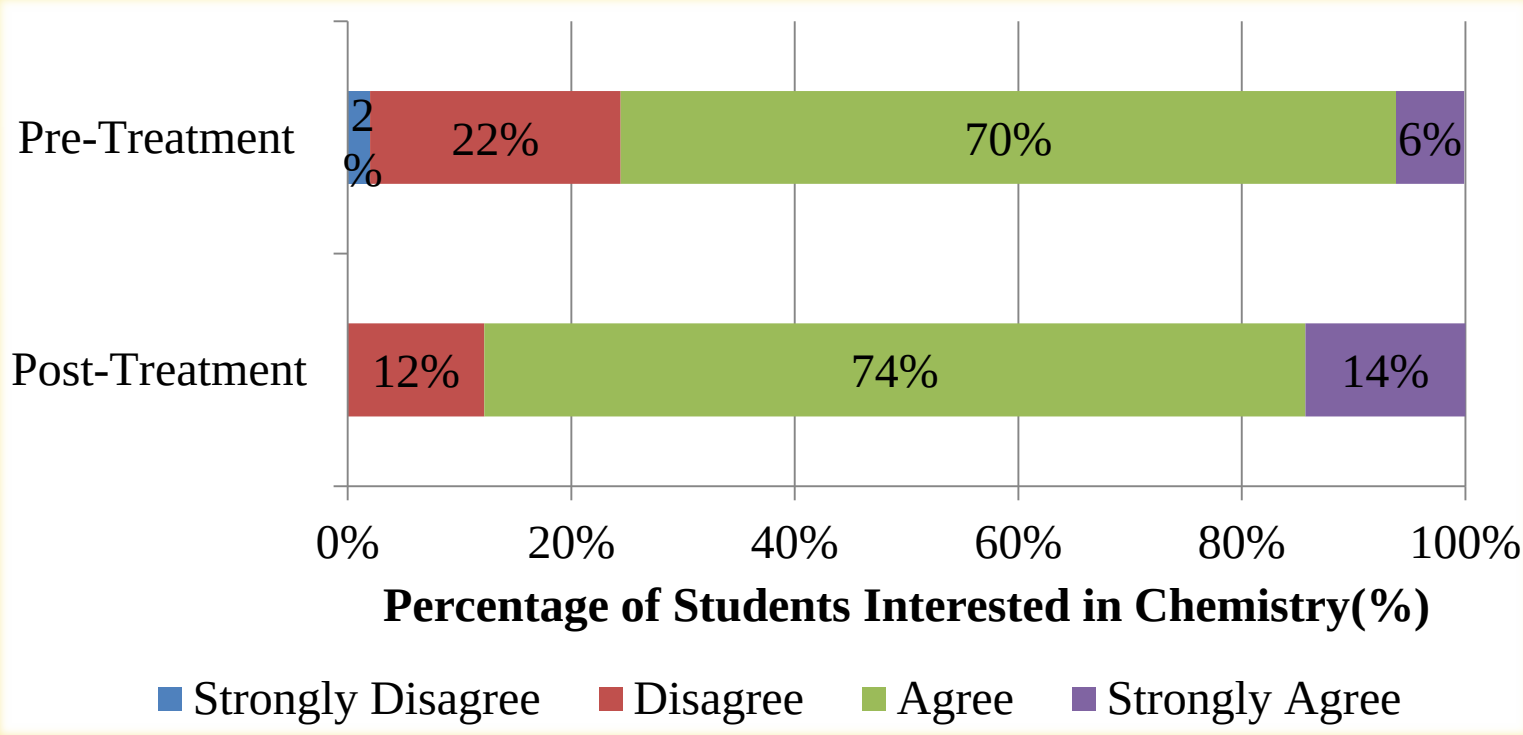


Data Analysis

Academic Achievement Data:



Student Interest Data:



Treatment

Forty-nine students participated in this study which was conducted over three content units in two sections of advanced chemistry. One non-treatment phase of traditional lecture and formative assessment techniques was followed by two treatment phases. The first phase incorporated technology-based formative assessment techniques, and the second added the use of online video lectures in a flipped learning format.

Methodology

Focus Questions	Data Source 1	Data Source 2	Data Source 3
1. How does the use of online video lectures and formative assessments affect students' academic achievement in chemistry?	Summative Assessment Scores	Pre- and Post-Content Test Scores	Formative Assessments
1. How does the use of online video lectures and formative assessments affect student engagement?	Student Pre- and Post-Treatment Survey	Post-Treatment Student Interview	Daily Teacher Journal
1. How does the use of online video lectures and formative assessments affect class participation?	Daily Teacher Journal	Participation Data for Technology-Based Formative Assessments	Post Treatment Student Interview

Participation Data:

	Traditional Pretreatment Phase	Flipped Learning Treatment Phase
# of questions asked	6	10
% of students who volunteer to answer	12%	27%
# of clarification questions asked by students	2	3
# of probing questions asked by students	>1	>1
% of active participation in class/lab activities	97%	96%

Conclusions

- Academic achievement was consistent throughout the pretreatment and treatment phases.
- Student interest in chemistry was improved after the flipped learning experience.
- Participation in labs and activities was unchanged, but participation in class discussion increased as a result of flipped learning.

References Cited: National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.