The Effect of the Flipped Classroom on Student Achievement and Attitude

Background

Premise: This action research project sought to analyze the effects of the flipped classroom on achievement and engagement in a 7th grade science classroom at an International School in Shanghai, China. Student perceptions about the flipped classroom were also analyzed along with an analysis of its implications for the classroom.

Research: Many studies indicate that when flipped learning is implemented in K-12 and university learning environments, there may be benefits to achievement and attitudes over more traditional approaches (*Info-graphic on teacher and student engagement*, 2012).

Concern: Not enough class time was spent on getting to the *why and how* – the critical thinking component – associated with science activities and investigations.

Proposed Treatment: Flipping the classroom allowed for lower-level content to be sent home as homework via video, allowing for more time to engage in critical thinking and higher-order reflection during class time.

Questions

Primary Question:

In what ways are student higher order thinking skills or achievement impacted by the flipped classroom?

Sub Questions:

1: To what extent does the flipped classroom impact student engagement, measured by attitudes?

2: What perceptions do students have about flipped classroom as compared to the traditional classroom?

Methodology

The study involved three grade seven science classes as they went through the *Science and Engineering Practices Unit*. All three classes began with the nontreatment for four weeks using the traditional model where written homework (higher level) was sent home and ended with the treatment for four weeks where homework became an introduction (low level) video assignment that introduced students to the following day's topic.

Outline of Nontreatment (Traditional) and Treatment (Flipped Classroom)

Summary of Methodology	
Nontreatment: Class A, B, C	Treatment: Class A, B, C

- Weeks 1 - 4
- Module 1: Science Investigations
- Use A tool for Storyline Coherence:
  o Question, Phenomena, Science Practices to Engage in, *Making Sense of It
  o Homework: *Making sense of it written assignment
	- Weeks 5 - 8
	- Module 2: Engineering Investigations
	- Use A tool for Storyline Coherence:
	  o Question, *Phenomena, Engineering Practices to Engage in, Making Sense of It
	  o Homework: *Phenomena Introduction via video

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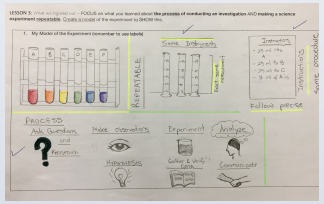
Measuring Achievement and Attitudes

To measure achievement, "Making Sense of It" assignments were assessed. During the nontreatment, the majority of these assignments were completed as homework. During the treatment, the majority of these assignments were completed during class.

Throughout the Thinking Like a Scientist Unit, students explored phenomena during class. Students conducted science experiments for four weeks during the nontreatment (left) and solved engineering design problems for four weeks during the treatment (right).



"Making Sense of It" Sample Assignment

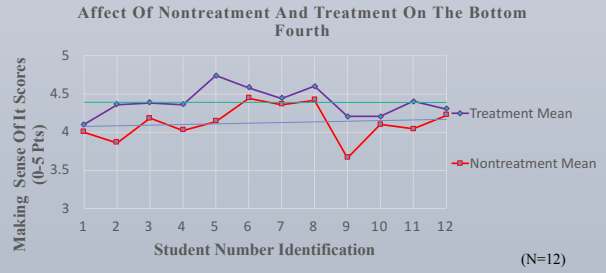
Typical Investigation

Data Collection

Instruments Used for Data Triangulation
- Student Work Samples - Focus Group Interviews - Individual Interviews - Student Adaptive Learning Engagement in Science (SALES) Survey - Student Unit Feedback Survey - Student Engagement and Thinking Survey - Teacher Observation Field Notes - Flipped Classroom Survey

Data Analysis

Achievement



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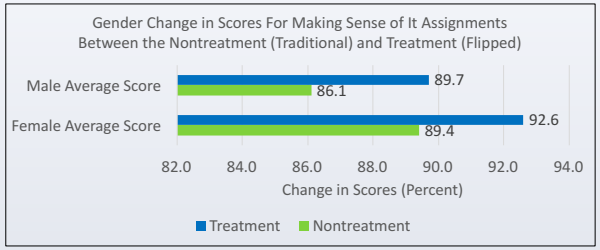
Achievement



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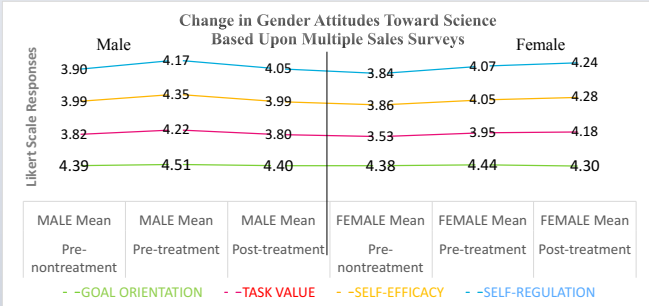
Engagement



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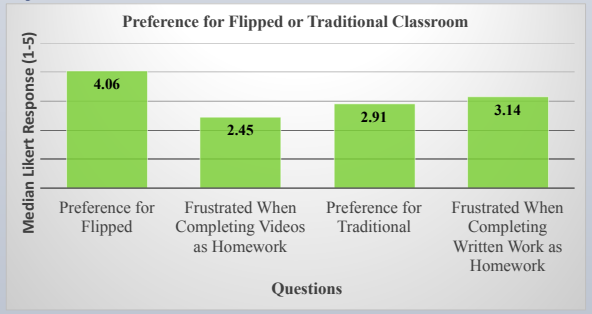
Perceptions



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Conclusion

The results revealed that the flipped classroom had a positive impact on achievement for both males and females. Additionally, all students in the bottom fourth showed improved scores. The flipped classroom had a mixed impact on engagement and attitude by gender. Females showed improved attitudes, while males remained largely unchanged. The flipped classroom was perceived as a preferable method of instruction for most students. In the future, the flipped classroom will continue to be used as a delivery method to introduce labs and activities.