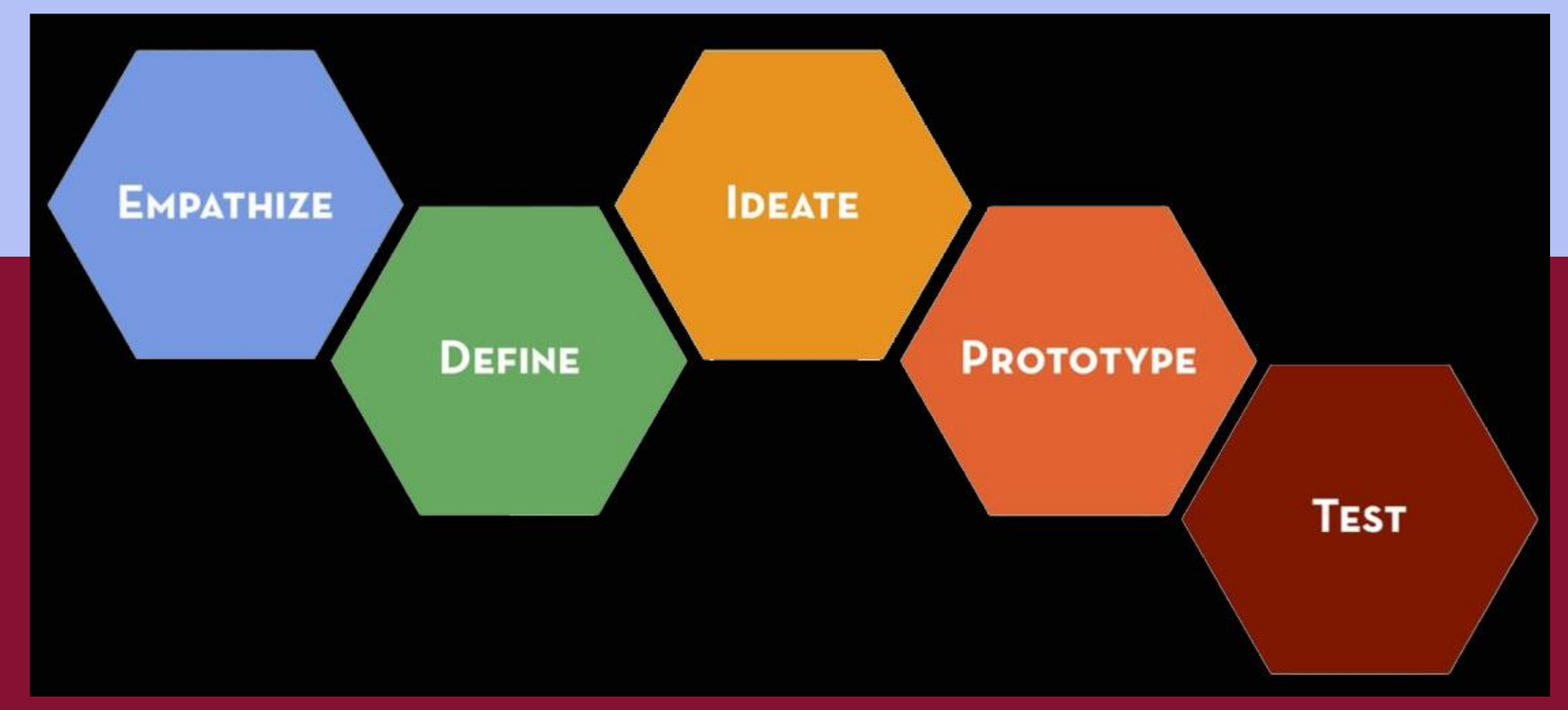
Will using Innovative technology to flip Your Classroom combined with Inductive teaching strategies (PBL) increase student engagement and performance ?



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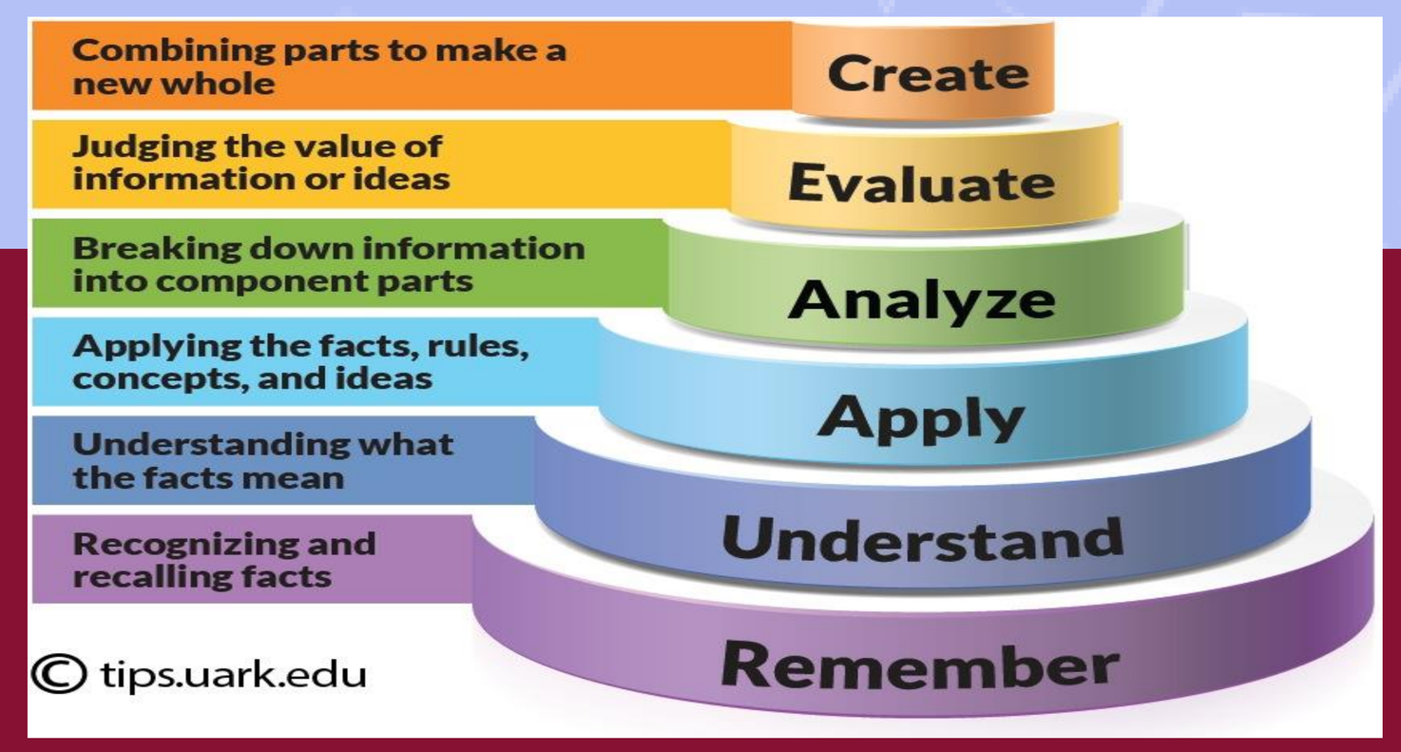
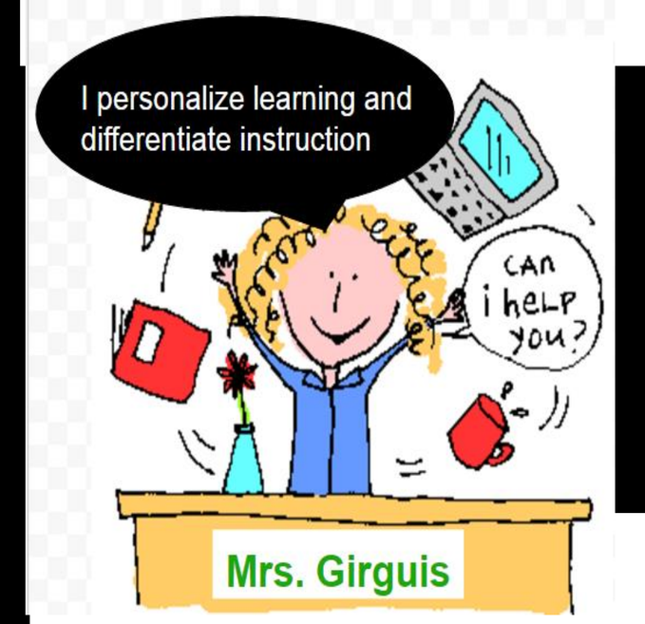


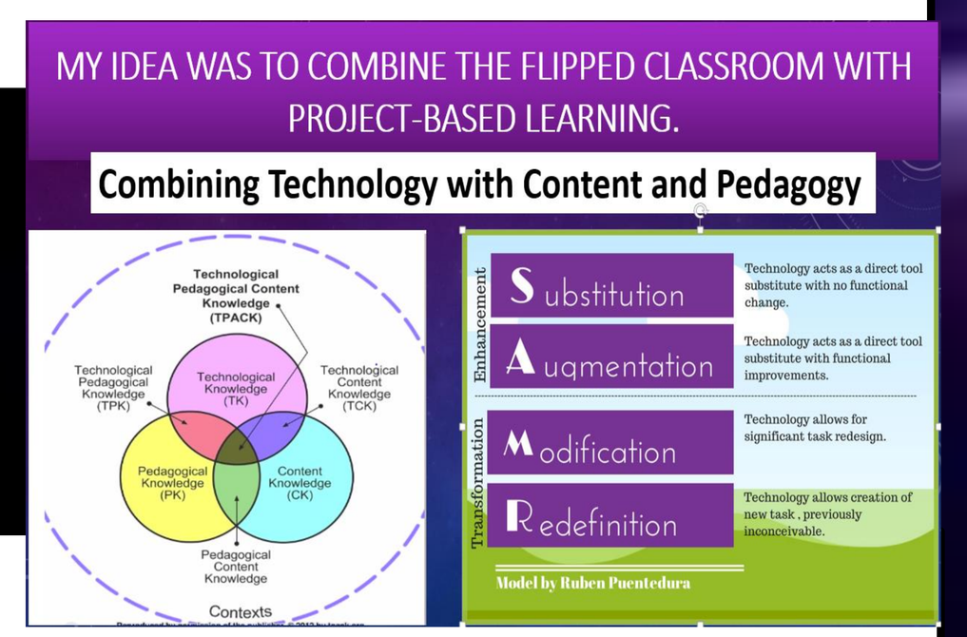
Introduction

American students are lagging behind their international counterparts, despite two decades of reforms such as the No Child Left Behind Act and now the Every Student Succeeds Act. There are concerns from policy makers, educators, businesses, and the public. The implementation of the Common Core Standards, new standardized assessments, and accountability measures show that U.S. students' performance on mathematics assessments ranges from simply mediocre to extremely poor, depending on the type of test and grade-level (Schmidt, 2012, p.133).

Purpose of the Study

As technology has grown more available to students, with iPads, Chromebooks, and hand-held devices available in classrooms for student use, it is now easier for teachers to incorporate the flipped model. Many institutions have become technology schools or bring-your-own-device (BYOD) schools, and are investing monies to provide a 1:1 ratio of computers to students. This development has led to an increase of project-based learning and challenge-based learning. Chen (2010) acknowledges that 21st century children are being raised with technology, and its use must be incorporated into modern classrooms. The purpose of this study was to find a researched based method of blending Technology, Content and Pedagogy.



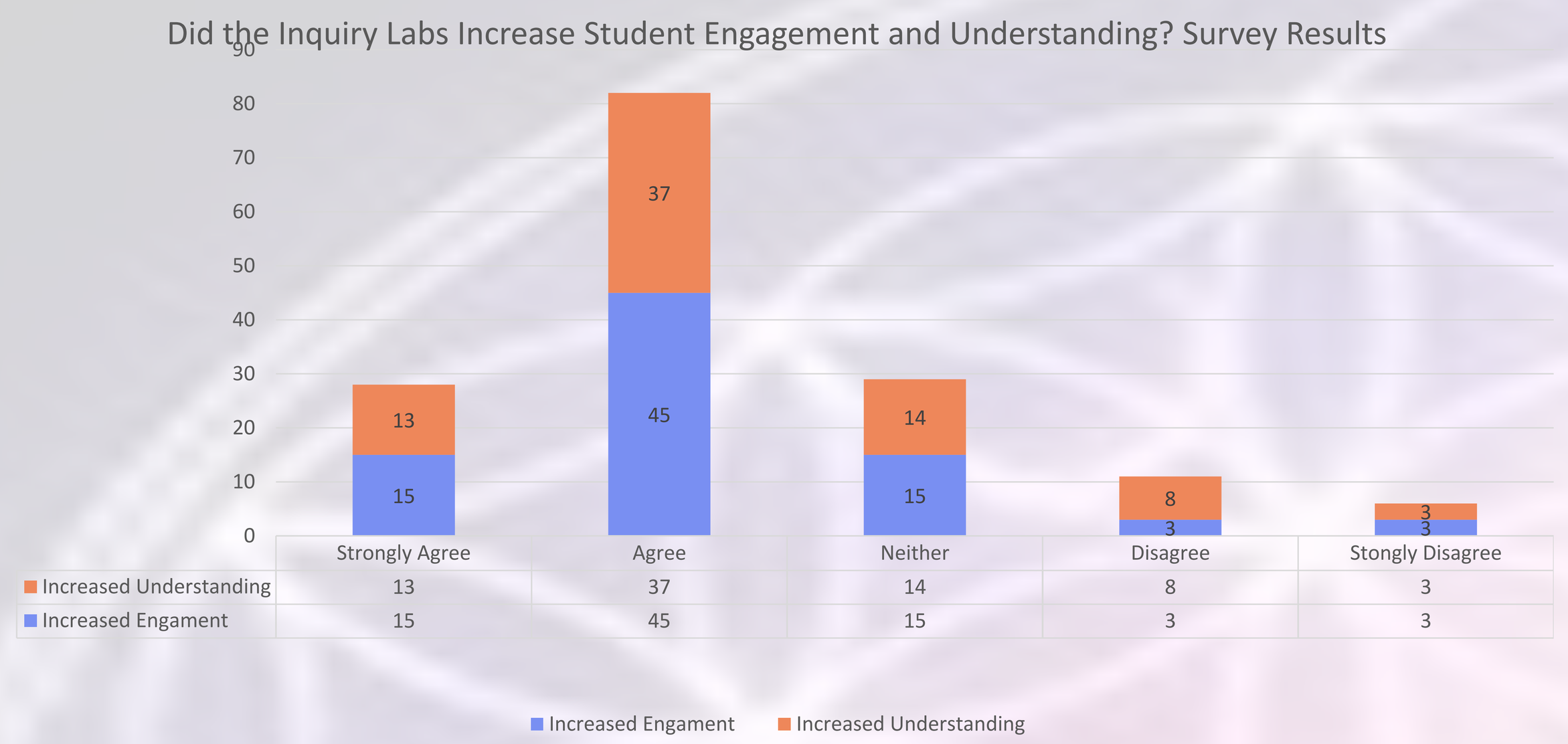


Materials and methods

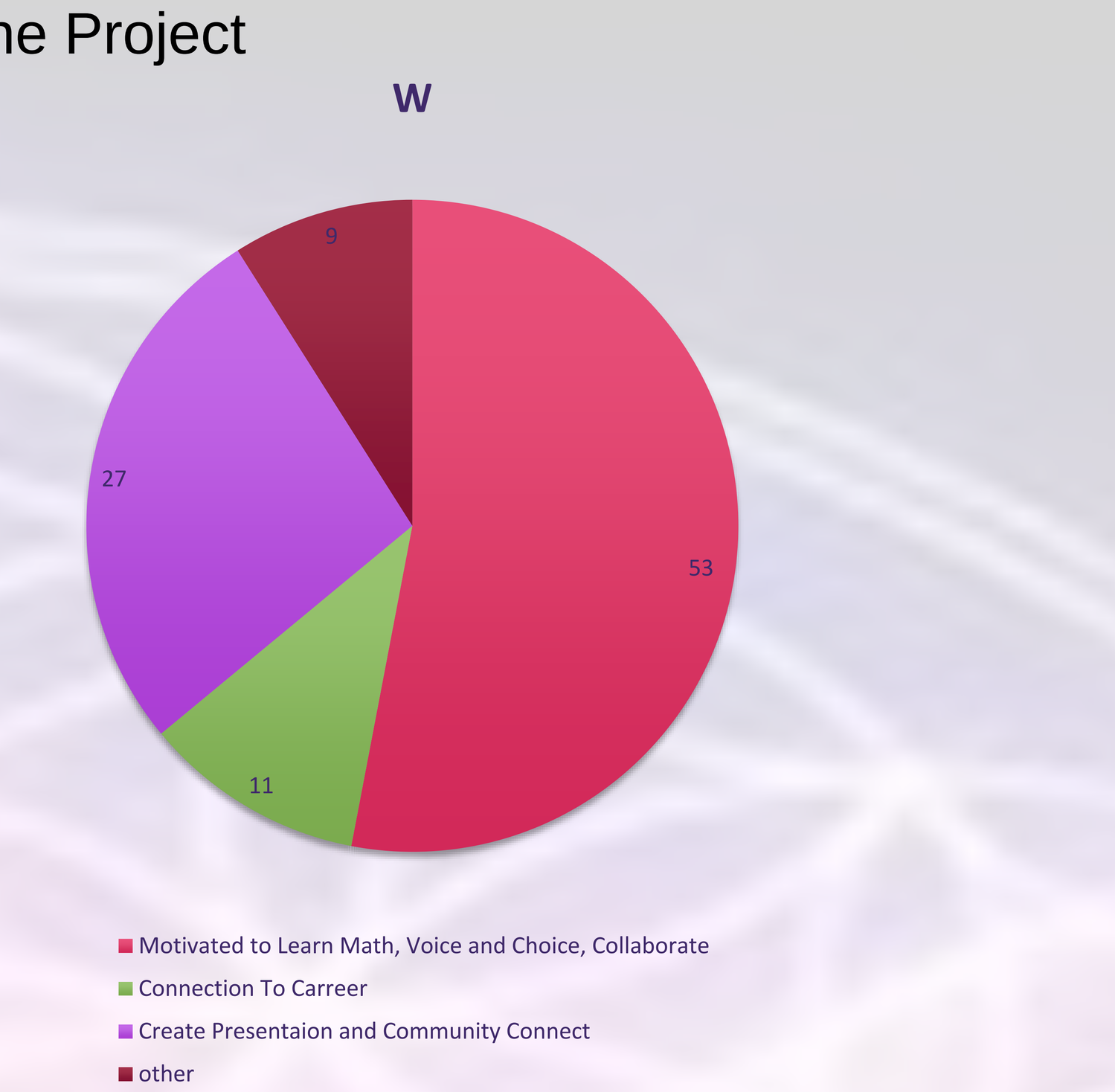
This was a quasi-experimental, mixed method, phenomenological study, using a one group pre-test/post-test design to explore the effects of using the flipped classroom model, combined with the effect that inductive teaching strategies would have on student engagement and performance. Scaled questions and open-answer questions provided qualitative and quantitative data, combined with the constant comparative method of student survey open-ended response questions. Students were given a pre- and post-chapter test, and measures of central tendency and inferential statistics, including a T Test, determined the quantitative significance of the data.

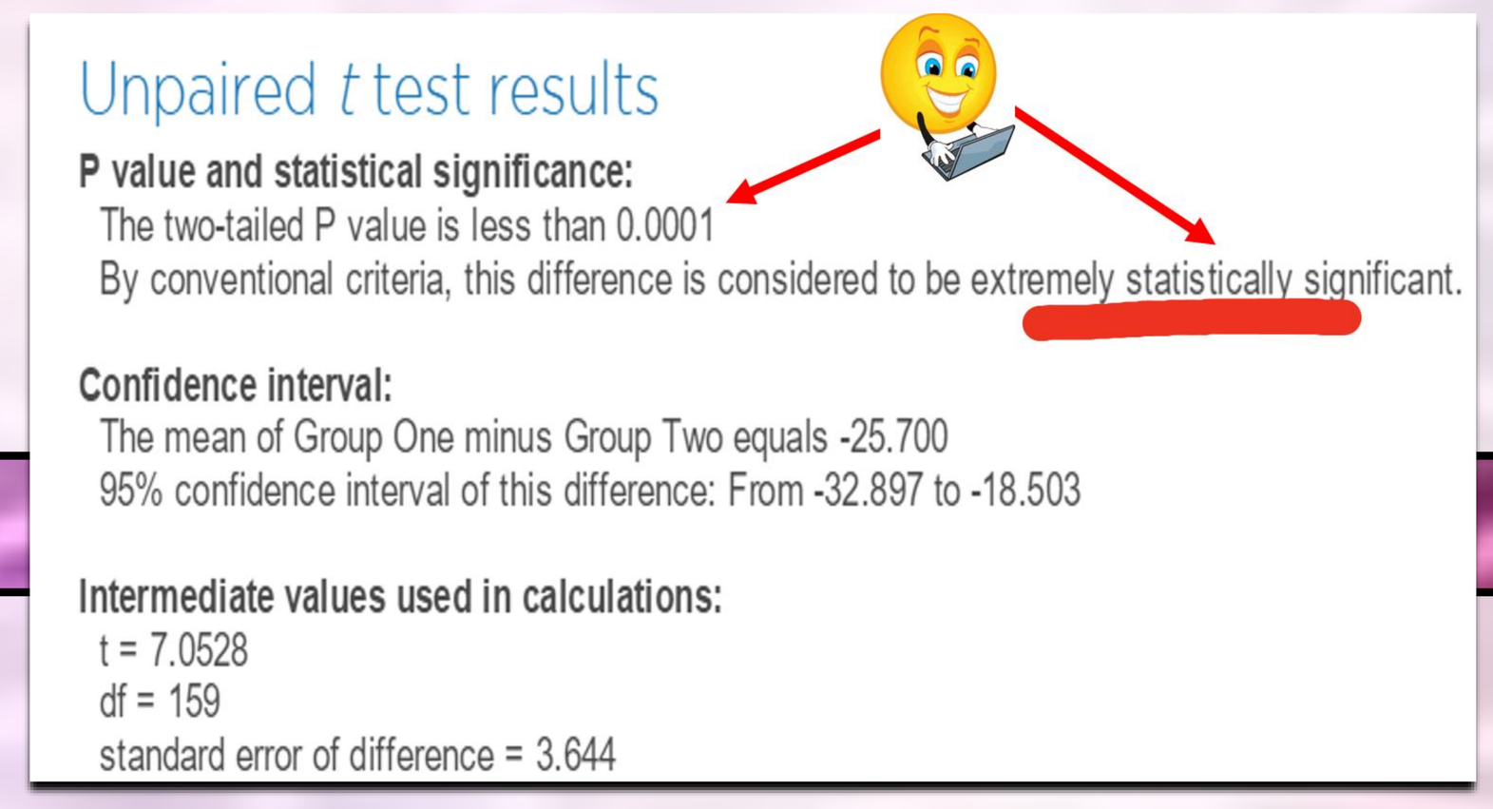
Results

Students were given a survey The first question asked which technology based lesson format helped them increase performance and engagement. There was a strong split between the Nearpod lessons and the textbook videos, which can be seen in the following graph.



Students were given a survey regarding their motivation to complete the Project





Unpaired *t* test results

P value and statistical significance:
The two-tailed P value is less than 0.0001
By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:
The mean of Group One minus Group Two equals -25.700
95% confidence interval of this difference: From -32.897 to -18.503

Intermediate values used in calculations:
t = 7.0528
df = 159
standard error of difference = 3.644

Literature Review

Scholars consider project-based learning to be an excellent form of instruction to encourage the self-learning of students (Chang and Lee, 2010; Gerber, Cavallo, Marsck, 2001; Glover, 1993; Green, 1998; Moursend, 1999; Scott, 1994).

Furthermore, the advancement of computer technologies provides a real-world constructivist, cooperative learning environment that has many advantages (Bottino & Robbitti, 2007) over the traditional environment, yet the challenge of promoting student motivation and concentration remains (Huang, Chung-Ming, Therefore, the development of an effective instructional strategy for conducting project-based learning activities has become an important and challenging issue (Woods, 2010).

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Conclusions

The driving question of this study asks whether incorporating innovative technology to use the flipped classroom model, combined with inductive teaching strategies, will increase student engagement and performance. Based on the results from both the quantitative and qualitative data, there is a statistically significant increase in student engagement and performance. One sub-question to this is study was the following: Can available technologies be used to flip the classroom and create an active-learning environment? The student survey data shows the students preferred the Nearpod lessons and the textbook videos to flip the classroom, and this did free class time to provide an active learning environment utilizing inquiry-based and problem-based tasks, as well as a project. The second sub-question asked which activities improved student engagement in the classroom. The majority agreed that problem-based activities increased their engagement and their performance. The third sub-question examined whether assessment scores would demonstrate higher performance using the flip model. The results from the t-test established statistically significant increased performance.

Our government has enacted many policy reforms and new standards to ensure American students can compete in the global economy. Technology is lending itself to the flipped model, which has led to the need to research which digital epistemologies and pedagogies provide the highest increases in achievement and engagement in the mathematics classroom. Problem-based learning and inquiry-based learning in this study allowed students to be engaged and increase performance more than the project alone. However, the project made a real-world connection to their community, with college and career connections that inspired the students to want to learn the math.

For Further information

Please contact rose_girguis@nvusd.org

More information on this and related projects can be obtained at www.learninginnovationlab.com