

TESTING THE EFFECTS OF PAUL ANDERSEN'S QUIVERS METHOD ON INTELLIGENCE MINDSET AND ACHIEVEMENT IN A 9TH GRADE BIOLOGY CLASSROOM

Background

My capstone project was done with ninth grade Biology at Ursuline Academy, an independent all girls Catholic middle-high school located 30 minutes south of Boston in Dedham, Massachusetts. There are 431 students enrolled in grades 7 through 12. Tuition is \$18,990 a year with 22% of students receiving need-based financial aid. Our students are 74% Caucasian, 2.6% Asian, 1.4% African American, and girls come from 55 different communities in the greater Boston area. Students must submit applications and pass an entrance exam to be admitted to Ursuline. All freshmen are enrolled in honors Biology. My students tend towards perfectionism which, combined with a fixed mindset of learning, can cause them to avoid taking risks due to fear of failure. Implementing a student-led, blended learning, teaching technique will shift student perspective to a growth mindset and give them the confidence to pursue difficult problems.



Questions	Data Source		
Focus Question: Is there an increase in growth mindset vs fixed mindset?	Student pre and post unit survey.	Student post unit interviews.	Class discussion.
Sub-question 1: Is there an increase in student understanding of content?	Student quizzes and final tests.	Pre and post 5 minute paper scores	Analysis section of lab grades
Sub-question 2: Is there an increase in student resilience when solving difficult problems?	Student pre and post unit survey.	Student post unit interviews and class discussion	Teacher observations
Sub-question 3: Is there a positive student reaction to this teaching technique?	Student post unit survey.	Student interviews and Class Discussion	Mid-point feedback

Treatment

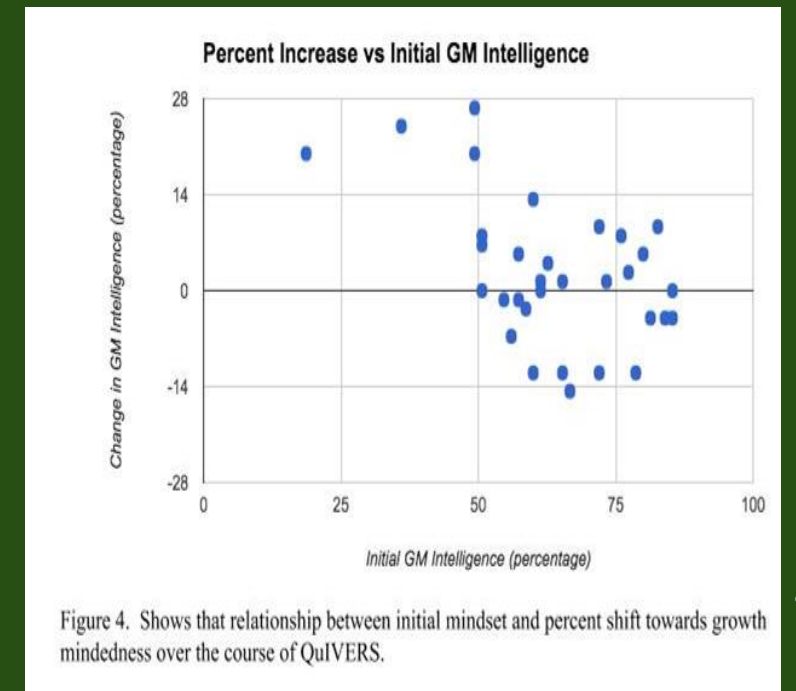
I used a student-led teaching technique called QuIVERS designed by Paul Andersen. This technique is based on the 5E learning technique and uses a blended learning approach. I used this technique in two of my 9th grade biology classes. I had a third 9th grade Biology class that was taught using traditional methods that I used as a comparison, each class had 16 students. All of the classes covered two units on DNA and Protein Synthesis. The QuIVERS classes completed the units at their own pace and had to meet with me to demonstrate mastery of the subject before they moved on to take a quiz. Students in the traditional class moved together as a class instead of at their own pace.

QuIVERS Stands For Question

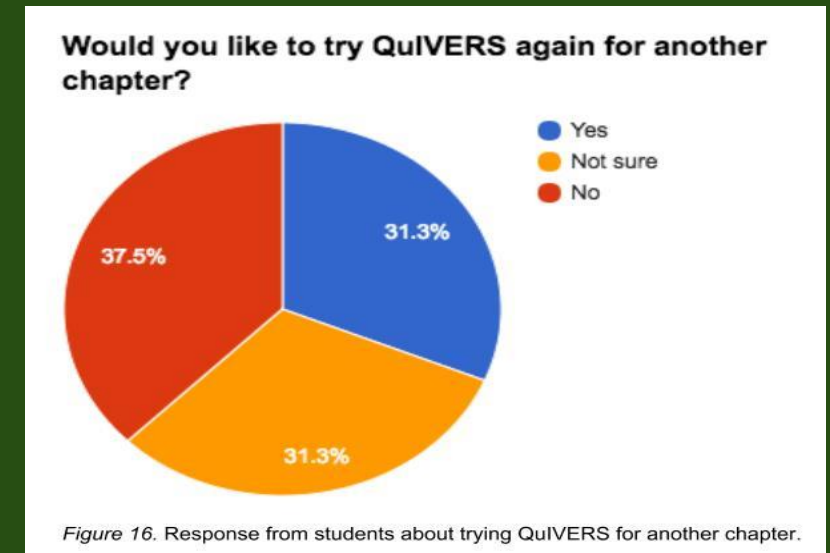
- Question**
Pose an interesting question as introduction to the lesson
- Investigation**
Students explore the concept presented
- Video Lecture**
Students watch a video Lecture
- Elaboration**
Learning is supported by reading additional material
- Review**
Students meet with me to review the material in small groups. This ensures mastery before they can move on
- Summary Quiz**
Assessment of material

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Students didn't show an increase in resilience thinking according to the survey but did exhibit it in their classwork and responses to interview questions. Some felt they had to work harder on problems because they knew that I wasn't going to tell them the answer in class. They were also better at working independently on challenging work as the unit went on.



Students were very conflicted about this new teaching method. They loved the self-pacing and reduced homework but felt the assignments were challenging and often struggled teaching themselves the material.

Results

Students with an initial fixed mindset shifted towards a growth mindset. Classes that received the treatment showed no significant improvement but struggling students had an increase on average for H Block. Two students in particular showed a 10 point increase over their previous 2 exams.

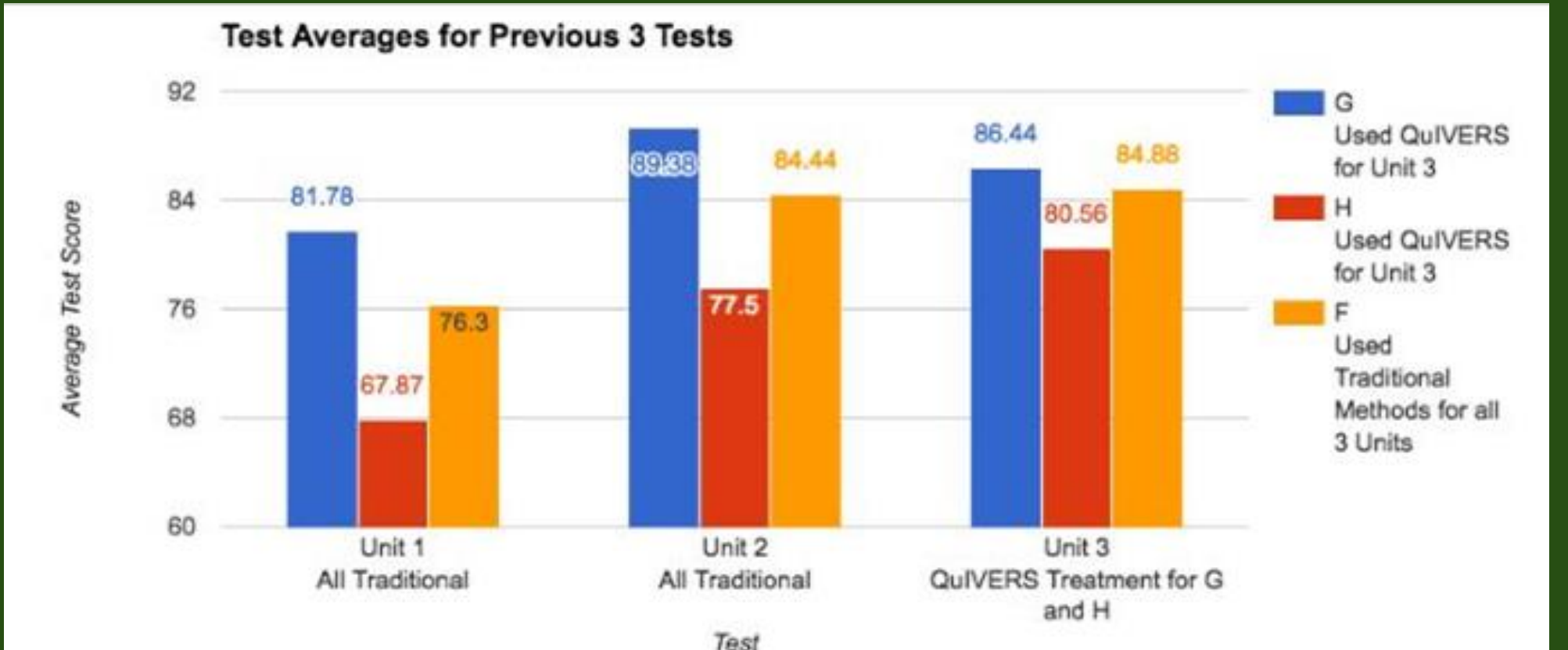


Figure 8. This figure shows the average test scores for the past 3 tests for all classes. Classes G and H were part of the treatment group for unit 3 while class F was taught using the traditional method for all 3 units. This graph shows that the QuIVERS method seemed to work best for the lowest scoring class, H block.

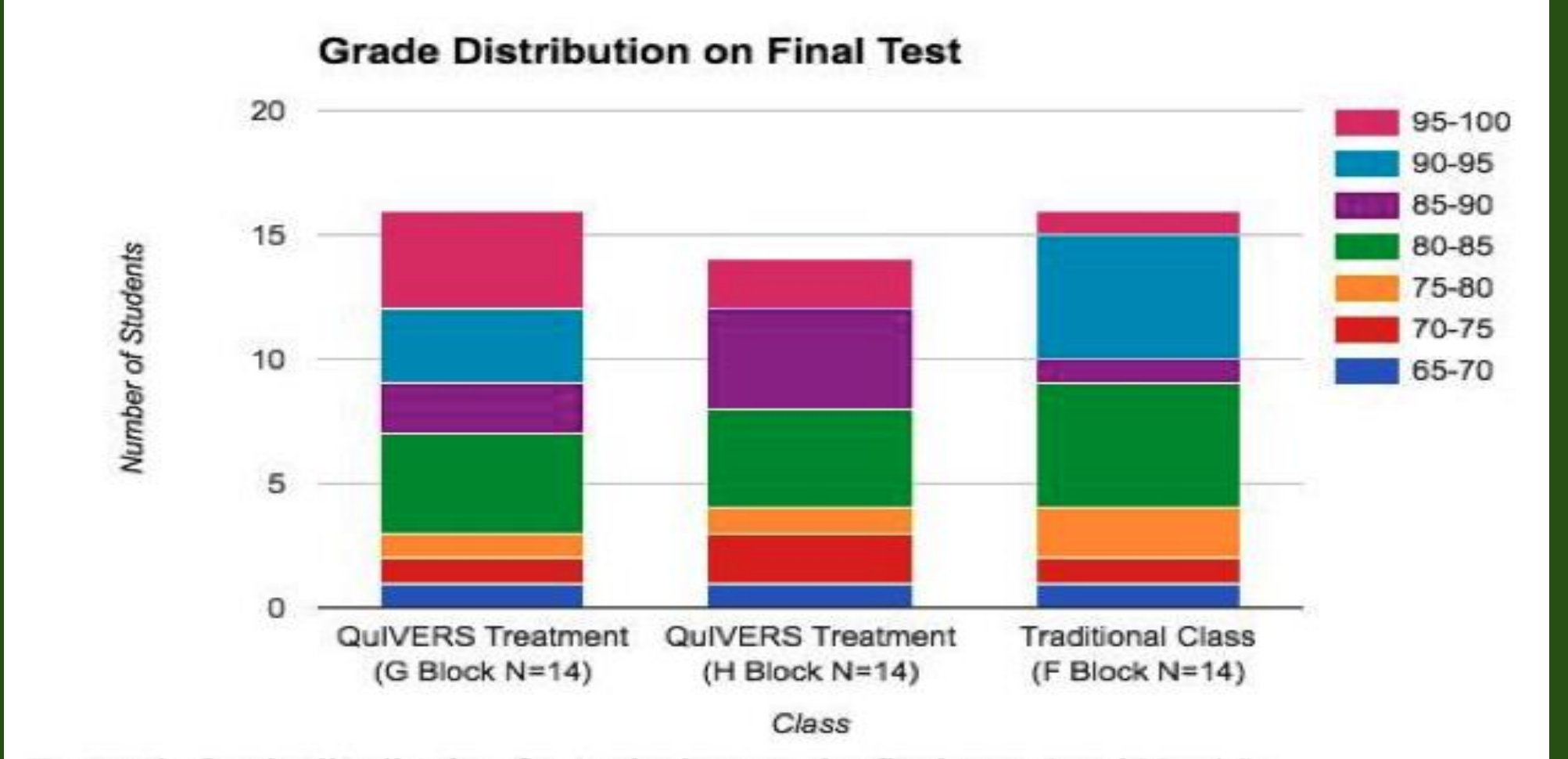


Figure 9. Grade distribution for each class on the final test. (total N= 46).

Conclusion

The QuIVERS technique resulted in an shift towards a growth mindset for some students, improved academic achievement for struggling students, increased diligence on difficult problems and positive student reaction.

