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.

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

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.

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.

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QuIVERS Stands For
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

Ursuline Academy

| Figure 8: This figure shows the average test scores for the past 3 units 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). |

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.