The Effects of Science Mentoring on Mentee Confidence

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Objective

To determine if science mentoring has a positive effect on the confidence of 5th grade mentees.

Our Project

SMART stands for Science Mentoring to Achieve a Richer Tomorrow. The project, under the broad umbrella of the Bonner Leaders within the Honors College, consists of weekly mentoring sessions at Shearn Elementary, a local HISD elementary school. Mentors travel in groups to the school to aid their assigned mentees through hands-on science experiments for one hour weekly. While at Shearn, the mentors not only guide mentees through experiments but also serve as role models and tutors for the students at this underfunded elementary school. We focus on confidence because it is essential to future success and self-fulfillment. Through science mentoring, we hope to instill a love for learning and teach critical thinking skills via the scientific process. Stanford scientists have found that if students are regularly coming to data-based conclusions on their own, it yields increased critical thinking skills.[1]

Figure 1. A look into one of our mentoring sessions. This week's lesson was landforms, so the mentees created their own landforms to demonstrate their understanding of the subject.

Mission Statement

SMART aims to alleviate educational disparities caused by poverty and cultivate personal confidence in 5th grade students at Shearn Elementary. We foster academic success, increase interest in learning, and encourage students to dream big through hands-on science experiments and mentorship.

This mission statement builds on the mission statement of Bonner Leaders, which is to fight poverty.

Methods

Measuring confidence is obviously not as simple as measuring something quantitative like STAAR scores or grades. To overcome this hurdle, we created survey questions in order to quantify a value like confidence. The students at Shearn completed a survey at the first mentoring session of the school year last fall (BOY), and then again during the first mentoring session of this semester (MOY). They will complete it once more during our last mentoring session for a final collection of data. For each of these questions, we either had students rank science from 1-4 or answer the question with a number within a 1-5 scale. The survey consisted of 6 questions total, but these 3 were the only ones relevant to the research question:

1) How much do you like science?
2) Put these subjects in a list: history, math, science, English
3) How prepared do you feel for the science STAAR test?

These questions were picked specifically to measure how confident students were in their science abilities. Confidence in their science abilities was chosen over holistic personal confidence because the nature of our program is better suited to increase confidence in science. A single study or research question is not enough to cover all external factors that contribute to overall personal confidence. While the SMART mission statement does state that we strive to cultivate personal confidence, this type of confidence and confidence in one's scientific abilities are not completely separate.

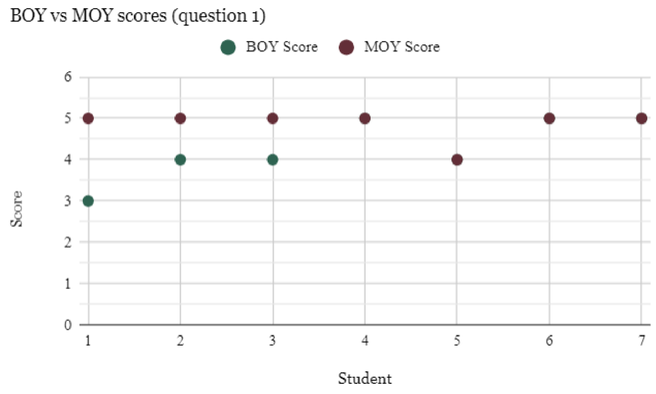

Figure 2. A scatterplot portraying both the BOY and MOY scores for question 1 for the mentees.

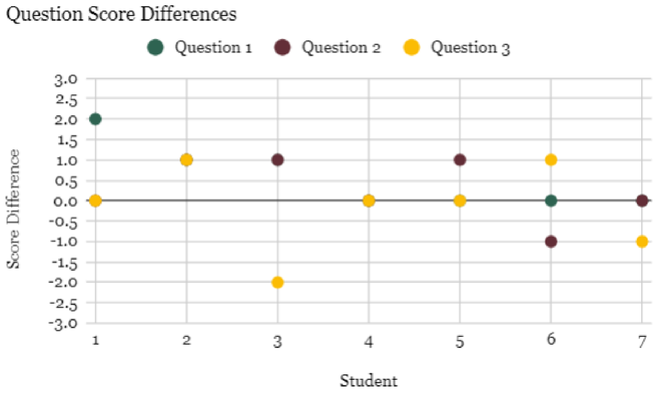

Figure 3. Another scatterplot showing the differences in BOY and MOY scores for each question and student.

Mathematical Analysis

The analysis of the survey questions was relatively simple and included basic arithmetic. Each of the 7 students' scores were inputted into a spreadsheet and the beginning of year answers were subtracted from that of the middle of year survey for each question. These 3 resulting numbers were then averaged for each student, and the average of the students came out to 0.238, or a 6.25% percent increase in confidence. The three questions each had an average difference of 0.5714, 0.2857, and -0.1429, respectively. A two–tailed p value test using a t variable yielded a p value of .3404, signifying that the results are not statistically significant.

Conclusion

While the results were not statistically significant, there was a slight percentage increase in quantified confidence scores, as well as a noticeable observed difference in mentee participation during SMART sessions. This school year, SMART has 16 total mentees, but only 7 surveys were acceptable to be used and analyzed. The adverse statistical results could be accredited to the small sample size, unserious mentee results, or a variety of other factors. Needless to say, this result will not deter us from continuing to mentor these students. Rather, it will pressure us to do better and also push future executives of the SMART project to carry out more scientific and focused investigations.

Future Applications

Bonner Leaders is a data-driven organization. Knowing that our work has tangible positive results gives us the motivation to keep working hard and bettering lives. We may also have mentees practice STAAR questions without mentor help at the beginning and middle of year – currently, they are completing practice problems with the help of their mentor, rendering results counterproductive for data analysis. This will provide another benchmark for us to analyze their progress throughout the mentoring year.

Acknowledgements

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References

[1] Carey, Bjorn, "Stanford research shows how to improve students' critical thinking about scientific evidence", Stanford News. 17 August 2015

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