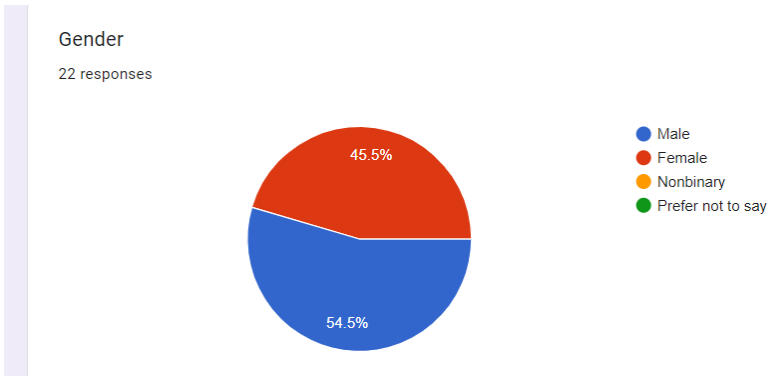
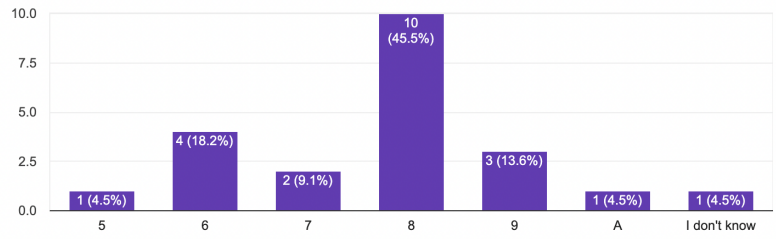
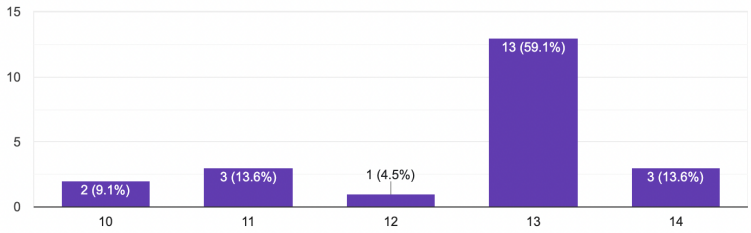
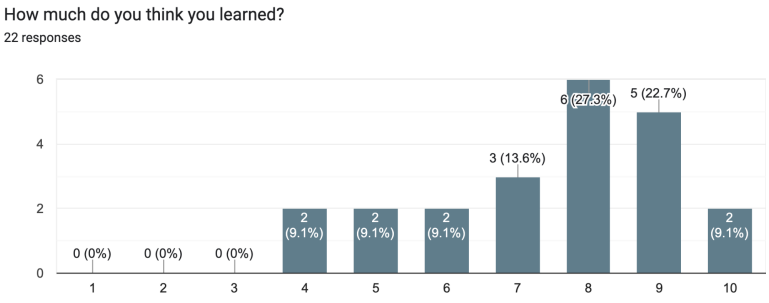
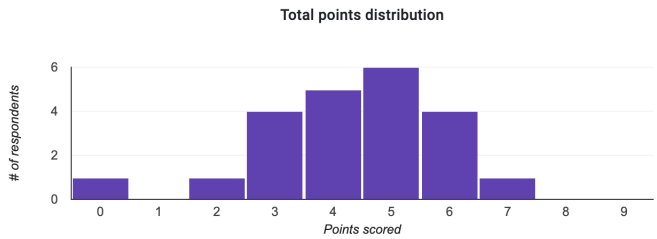
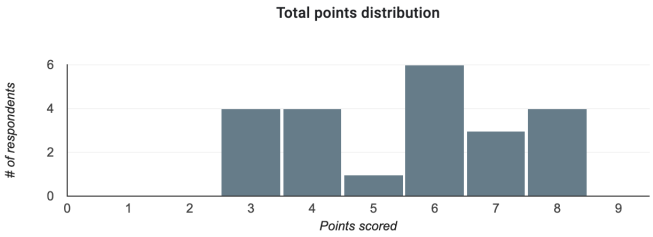
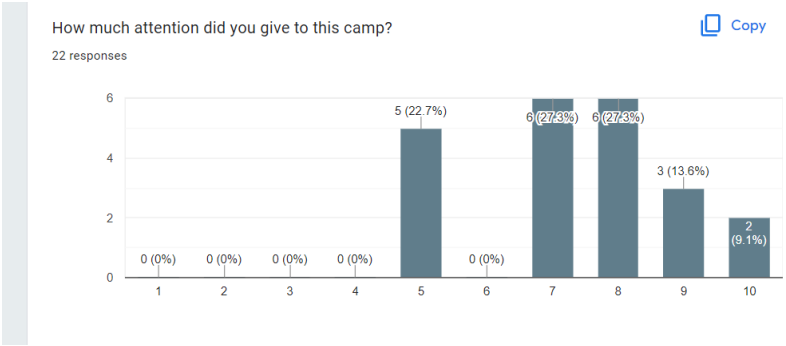
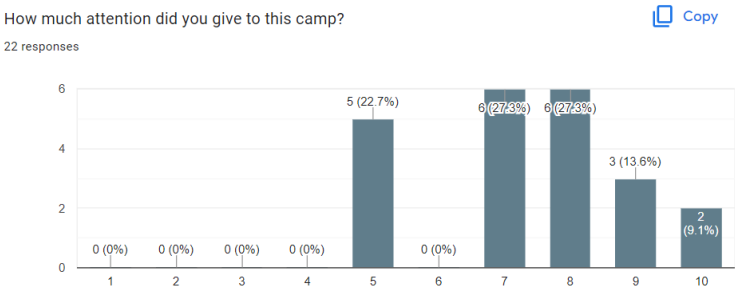
[Pre camp survey]
[Post camp survey]
[Last year's]

One Variable Analysis

Data	Analysis
Gender 	The camp was advertised to all genders relatively equally in an attempt to have a balanced ratio. Having roughly the same amount of boys and girls leads to more variety and diversity. Out of the 22 participants, 10 were female and 12 were male.
Age and grade  	Our camp was targeted towards 10-14 year olds, although older and younger students were welcome to join. The curriculum taught at the camp was created for those who did not have a deep understanding of biology, but were old enough to understand more advanced topics such as DNA structure and gel electrolysis, as well as participate in the hands-on labs. More than 50% of the participants were 13 years old, with 27.2% between 10-12, and 13.6% at 14 years old. All participants were between the age the curriculum was created for. Our purpose for targeting this age group is to prepare them, as they are going into higher grade levels, for the biology curriculum they will be taught in school. Additionally, we are hoping to introduce more of them to the more complex side of science, possibly sparking an interest for a career in STEM later on in life.

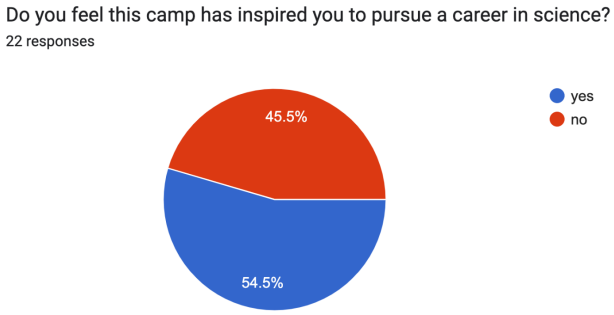
Location	The camp took place in the school's QUEST classroom, a popular STEM Research elective at Canyon Crest Academy. We had access to chemistry and biology materials including various chemicals, necessary glassware, and hot plates. The classroom had a large whiteboard that could be used as a projector, and camp participants were able to more easily see and understand class material through slideshows and videos. As we had access to most of the science materials inside the school, we were able to demonstrate and allow participation in high school level labs.
How much the participants felt they learned 	A key component of our camp was to ensure that the students felt like they learned many things that they can take away and use in the future. The camp participants gave us an aggregate score of 7.5 out of 10 in terms of how much they feel they've learned. Our graph was skewed heavily to the left due to a couple of people who attended camp the year before, but overall the general feedback we received points towards the direction of general success in this point.
Pre-Camp Quiz 	We administered our knowledge quiz twice, once before camp and once after. The nine questions given were based on the material covered in our camp curriculum, with the form intended to gauge our students' prior knowledge and to evaluate the efficacy of camp instruction. Students were not expected to score very high on the quiz, as our camp was catered to middle school students with little to no background in science and research skills. Camp participants scored a mean of 4.32 out of

	9, with the lowest scoring respondent receiving a 0 whilst the highest scoring received a 7. The majority of our students scored within the 4-6/9 range, suggesting that our students somewhat had prior knowledge in contrast to expectations. Question-format may have also manipulated the results, as certain questions may have been trivial. Participants were also required to select 1 of 4 answer choices, lacking the ability to state that they did not know, and may have had their scores inflated by guesses as a result.
Post-Camp Quiz 	In the second administration of our quiz after the completion of all camp material, we observed a mean score of 5.55 out of 9. The results show a far higher frequency in scores above 5 earned as compared to the pre-camp survey, which indicates the positive effect that our instruction had in expanding the scientific knowledge of our students. However, 8 individuals (accounting for 36.4% of our participants) scored below 5, which is certainly lower than in the pre-camp survey but demonstrates that some students were not able to grasp the material in our camp very well.
Interactiveness 	The campers were more interactive this year and this was due to the slides that were taught as well as other activities during the camp. Campers participated in various experiments and answered questions to try and win a prize at the end. Based on the data, most campers were relatively active in this camp.
Attention Given	Instructors utilized a combination of teaching slides as well as hands-on experiments to get the campers involved. They also used activities like kahoots for campers to participate in to earn points and receive a prize at the end. For attention given, the mean was 7.36/10 with zero



outliers, which indicates a good level of participation.

Did our camp inspire participants?

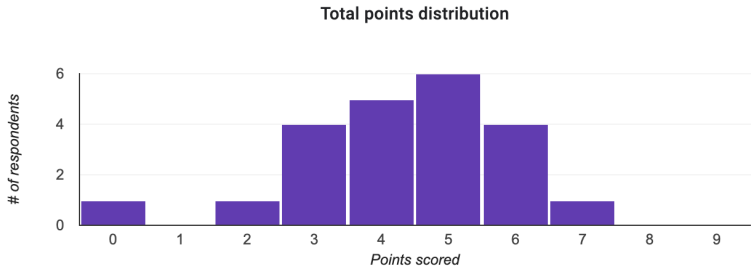


Serving as one of the final question of our post-camp survey, we asked camp participants whether our camp instruction and curriculum had inspired them to pursue a career science.

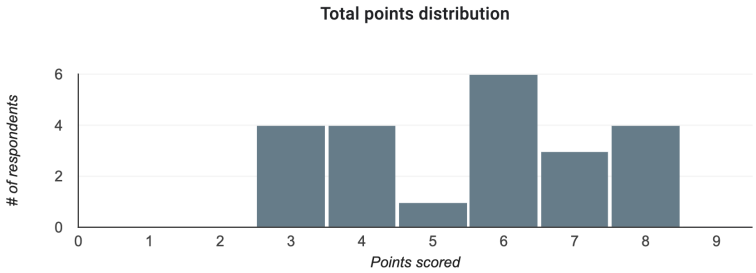
54.5% of camp participants felt inspired by our camp to pursue a future career in science, indicating a general degree of success in our objective of helping younger students develop a passion for science.

Students' Knowledge Before and After Camp

Pre-Camp Scores



Post Camp Scores

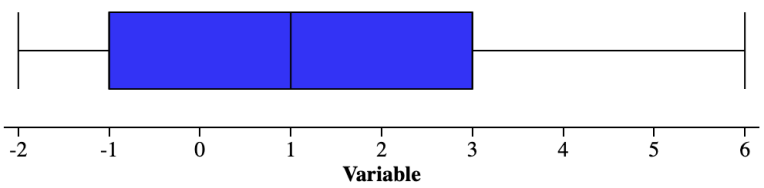


Comparison Box and Whisker Plot

Our quiz was administered twice, once before and once after the camp. Since the questions are based on material taught in class, students were not expected to score high on the quiz at the beginning of the camp.

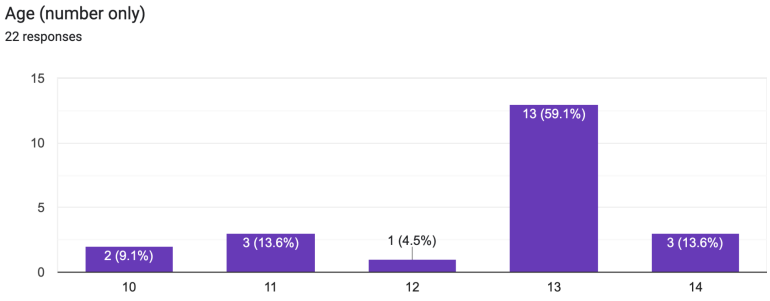
However, the participants still scored a mean of 4.318 questions right out of 10, as a lot of the students are already actively learning biology.

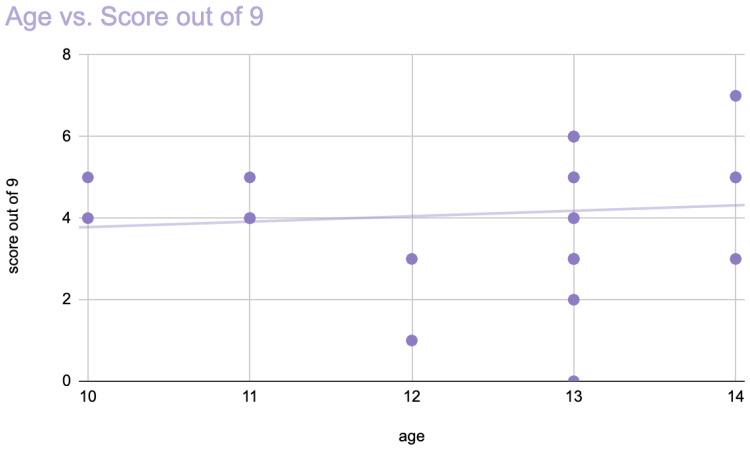
In the second administration of our quiz following the camp, the participants scored an average of 5.6 points, proving a mean increase of 1.22. Conducting a **t test** for difference of means, we found a p value of 0.01. Thus, with a 0.05 significance level, we found significant improvement in the material covered during the camp, as demonstrated by the results shown in the graph.



Correlation between Student's Ages and their Pre-Camp Scores

Age vs Pre-Camp Score





In the initial survey before camp started, students filled out their age, as well as answered a 9-question quiz. The quiz was related to each of the topics that we would cover in our camp.

We expected our target demographic, which was around 7th to 9th grade, to have a surface level of biology and chemistry understanding already. However, the content we covered in camp was more advanced, so we expected most of our students to not know most of the questions in the quiz.

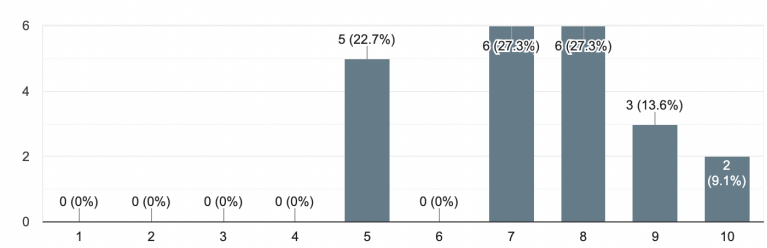
The age range for the camp was 10 to 14 years old, with the median and far majority of students being 13.

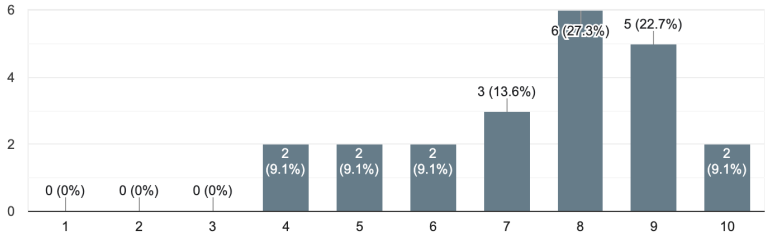
As we expected, the students did not score very well initially, with an average score of 4.32/9 and a median of 4/9. The highest-scoring student received a 7/9, while the lowest-scoring student received a 0/9.

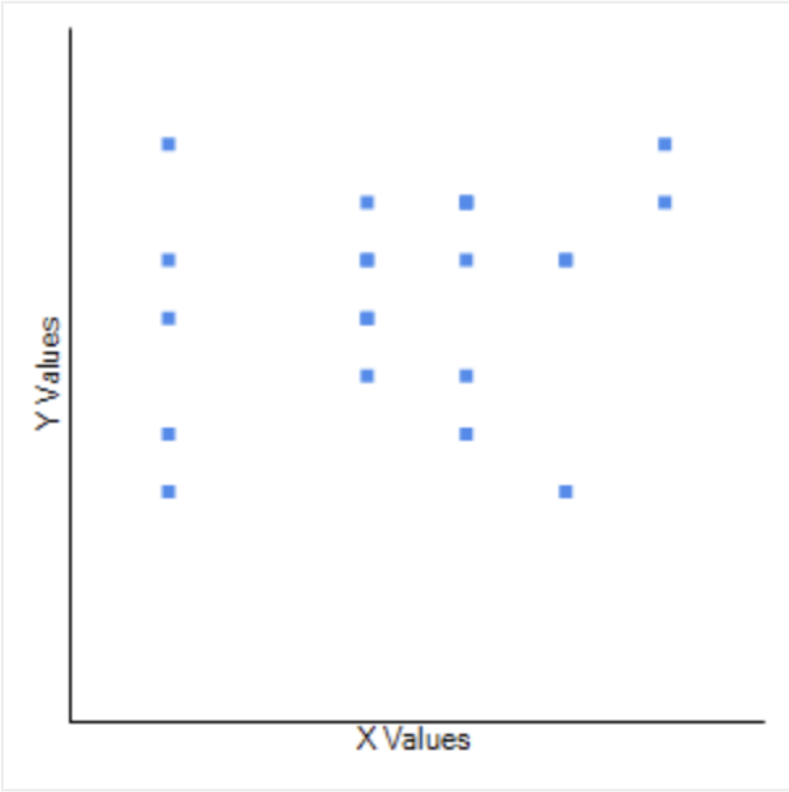
Unlike what we expected, there was not much of a correlation between the students' age and their score out of 9. Many of the older students scored relatively low, especially those who were 13 years old. This lack of correlation implies that the content we taught at our camp was not yet taught to them in middle school. If the older students had learned it before, they would have scored higher.

Correlation between the effort/attention students gave to the camp and the

amount they learned during the camp







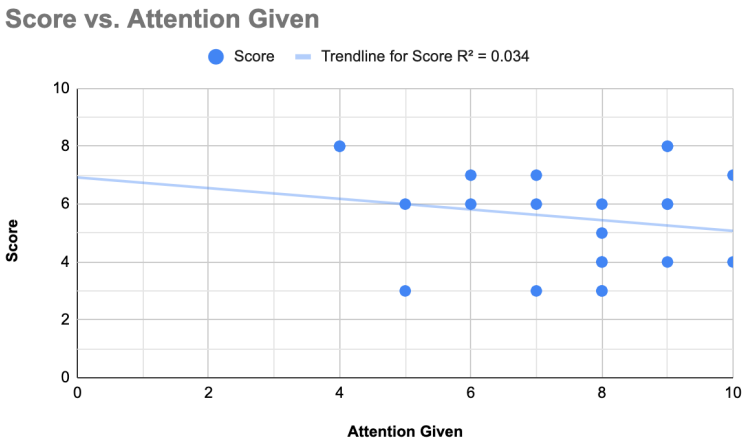
Often, the amount of effort and attention a student gives in a class directly correlates to their success in the course or grasp of the knowledge. To test whether this was true in our camp, a survey was given after camp which asked the students to rate how much attention they paid, and how much they learned, both out of ten.

50% of the students said they gave a rating of 5-7 of the amount of attention they gave the camp, while the remaining 50% rated 8-10. The rating of the amount the students thought they learned ranged from 4-10, with more than 50% giving a number between 8-10. The rest gave a rating between 4-7.

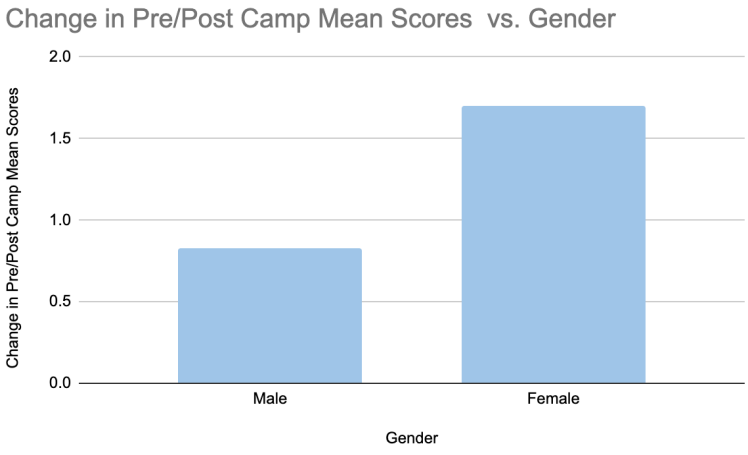
After comparing the two with a correlation coefficient calculator, a slight positive correlation was found, with a correlation coefficient of .2567. In the graph shown to the left, the rating for attention is plotted on the x-axis, while the rating for learning is plotted on the y-axis.

Thus, our data does not support the theory that the amount of attention given to the camp directly affects the amount of content learned. The correlation coefficient is too close to 0, meaning that the correlation between these two variables is too weak to state a definitive relationship.

Correlation between the amount of attention the students gave to the camp and their post-camp test scores



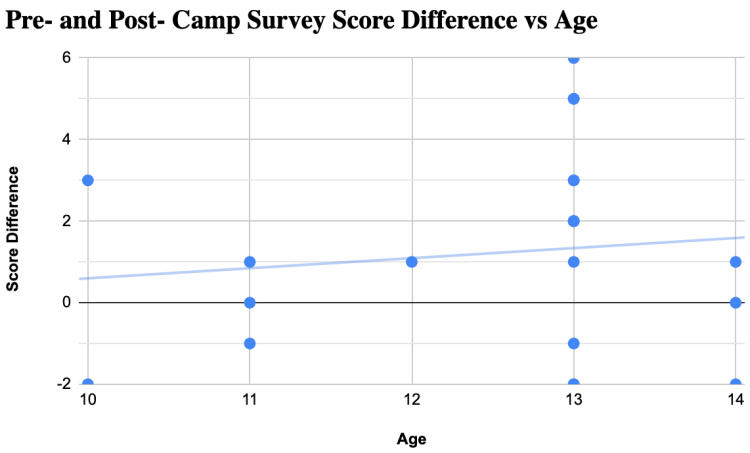
Correlation between Gender and improvement in Quiz Scores



It can be assumed that gender played a minimal role in score improvement (individual survey scores and gender distribution). Male camp attendees had an average improvement in score of 0.83, while female attendees had an average improvement slightly higher at 1.7. However, the average scores of male participants of the pre-camp survey was slightly higher than the female participants, so these results are understandable. Although female participants started at a lower average during the pre-camp survey, they had a larger margin of improvement. This shows that our camp was considerably balanced and unbiased in terms of gender.

This conclusion can be challenged due to the unequal ratio between male and female students (5:6 ratio), small data pool, and other factors that could possibly affect the data. Despite these possible errors, our data shows that our camp was balanced and adjusted to be accessible and fair for all genders. Our camp was advertised to be available to all genders and did not show any bias whatsoever. Instructors for the camp were considerably well balanced in terms of gender as well.

Impact of Age on Improvements in Quiz Scores



Based upon the comparison between the change in quiz scores (post- and pre-) and age, it can be assumed that age played a role in the magnitude of quiz score improvement, although to a mild extent.

All ages represented by participants in the camp demonstrated score improvements after the completion of the camp by earning the same scores on a survey also given before camp instruction. This implies that our camp generally expanded participant knowledge, and camp material was accessible to all age groups.

However, certain camp participants demonstrated a dip in scores after camp completion, suggesting that our camp instruction did not cater well to them. This gives us crucial feedback that can be utilized to better personalize our camp instruction for future students. The dip in scores can also be attributed to potential guesses which can either inflate or deflate both survey scores, thus giving unrepresentative changes. Despite this, there are no correlation between lower age and negative score difference.

Overall, the slight increase in positive score

	change in correlation with age was expected as certain camp curriculum items overlap with school curriculum. However, the mild increase in score difference as age increased suggests that our camp still had a similar impact on all ages, but must improve to oversee greater score differences for all ages.