Goal 2.2

Morgan Karnes

Demonstrate proficiency in mathematical reasoning, including an understanding of quantitative analysis and modeling

While science is my strong suit when it comes to education subjects, my next favorite subject is math. I have always been very good at both science and math, this has come in very handy in my biology classes since many of my research projects have required me to perform quantitative analysis on my data. Some of the projects that I remember that involved mathematical analysis and modeling were in my ecology 251 class and my conservation 330 class. In these projects I learned how to use mathematical reasoning to understand, analyze, and make conclusions about data.

In my introduction in to ecology and evolutionary class, we performed a class experiment with individual analyses and conclusions. For this project, we went to a local cemetery to gather gender and age data. With this data we were given, we individually created our own statistical analyses. We used excel to create survivorship curves in which we calculated standard deviations, p-values, survival rates, and life expectancies. Using the survivorship curves, I created and the statistical data I was able to make conclusions about survivorship over the years and compared the life expectancies and p-values to make conclusions about different years. This project was the first scientific study I performed using this kind of data to make conclusions. This project really helped create a foundation for bridging math and science within scientific experiments.

While I performed some other experiments throughout the years that required using statistical and mathematical reasoning to come to conclusion and used programs like JMP programming. The next experiment that really helped me grow in mathematical use was my project in conservation biology. For this experiment I was trying to quantify the risk factors on endangered sharks around the world. In this study, I used IUCN Red List data to create a list of all critically endangered, endangered, and threatened shark species that had a location specific habitat range. I then researched each location for the risk factors which the sharks face. From that I made a qualification scale in order to quantify different risk factors. Using the mathematical quantity scale I designed I was able to quantify different risk factors and rank the locations. In this experiment I used the previous knowledge on mathematical modeling I had acquired, and I applied it to this study. Through this study I learned how to create my own way of analysis ad I learned how to make null mathematical model for scaling that could be universal in quantifying things for my study.

The skills I learned really helped to show the bridge between educational subjects. It helped me learned how to properly use multiple fields of study and gave me very good hands-on experience. I was able to grow in my ways and techniques of analyzing data and was able to broaden my thought process on how to approach a study. I learned how to properly apply mathematics to scientific research and how to create my own models for mathematical analyses.