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Kirmser Undergraduate Research Award

Reflective Essay

Bacteria are everywhere, and they can be extremely harmful. But, bacteria can also be helpful. These are facts that I know to be true, but research and scientific studies are necessary to support this information in order to be reliable. The process of utilizing library research for my microbiology lab report helped me create a project that was captivating, credible, and concise.

First, for my microbiology lab, we were assigned a lab report that would detail our identification of an unknown bacterium. One aspect of the report was the background and introduction, and this section was open for research and especially creativity. For my introduction and discussion, I decided to explore the idea that bacteria can either be helpful or harmful, and how identification of bacteria is important in determining further steps. I came across this idea when searching for the average number of bacteria that live within the human body, or human microbiome, which caused me to consider that most of those bacteria are helpful but some are not, hence my report's title: "friend or foe". The simple fact that bacteria have a great impact on our health is a primary reason bacterial identification is important, which is why I chose to pursue this idea in my research.

For most of my research projects, especially in biology, I have a process I have found to work the majority of the time. First, I search through K-State Libraries' database collection for biology. The database I use most often is PubMed, as it has a wide variety of journal articles spanning from molecular biology to ecology to psychology. By using PubMed and other databases like Scopus and MedScape, I began my search using keywords. Luckily, I was taught

how to use keywords and the conjunctions “and”, “or”, and “not” in the search engine, and used this process to find the human microbiome article. Next, I formed my list by using search terms including bacteria, symbiosis, and the unknown species’ names, which included 4-5 articles pertaining to bacterial identification and the friend vs. foe idea. I then scanned each for relevant information I could cite in my project and eventually narrowed my list down to two journal articles.

While searching, I encountered some problems in finding what I was looking for. I had attempted to find articles that discussed the two species of bacteria that I identified during my lab, but I had difficulty finding an article that specifically discussed *Proteus vulgaris*, one of my unknown bacterial species. However, I ultimately decided that researching the particular species was not as significant for my report as having information about the overall importance of identifying unknown bacteria. On the other hand, I was successful in finding an article that discussed *Enterococcus faecalis* as well as information pertaining to the potential harms of bacteria. Using keywords in the search engine, scanning the abstract of an article, and evaluating my ideas proved to be the most successful research techniques for this particular lab report.

Finally, I extrapolated the most relevant information and data from each of my journal articles as well as my microbiology lab manual. By outlining and mapping out my essay, I determined that I would include information about harmful, disease-causing bacteria and helpful probiotic bacteria as well as the fact that bacteria live with us. For my unknown bacteria, one sample was a potentially harmful strain, while the other sample was a strain commonly found in probiotics. My library research helped me validate my point that bacterial identification is important, as it proved these bacteria can in fact be helpful or harmful, and can ultimately have a great impact on our lives.

In conclusion, utilizing library research and search techniques helped me formulate a report that was captivating, credible, and concise. Knowing and understanding the process of research is important, especially for undergraduate students. Having the ability to utilize these resources through K-State Libraries is a convenience I am grateful for. Facts are important, but having the ability to support facts is even more crucial, especially in a situation where there is the uncertainty of friend or foe.