Reflection on My Work-Integrated Learning (WIL) Placement

1. Introduction

During my Work-Integrated Learning (WIL) placement at SAS Laboratory in Brisbane, I had the unique opportunity to immerse myself in a hands-on environment within the microbiology department. Over several weeks, I was tasked with various responsibilities, including testing drinking water samples using Colilert and hydrophilic plate count (HPC) techniques. This placement was a crucial part of my Master's in Biotechnology at Griffith University, bridging the gap between the theoretical knowledge I had gained in the classroom and the practical application of those concepts in a real-world laboratory setting.

The experience allowed me to refine my technical skills, especially in microbiological analysis, while also developing crucial soft skills such as communication, teamwork, and problem-solving. This reflection will delve into the responsibilities I undertook, the challenges I faced, and the key lessons I learned, all of which have significantly shaped my career aspirations.

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2. Placement Environment

The SAS Laboratory, located in Darra Brisbane, is a high-tech facility specializing in water quality testing. Having being bought by urban utilities in 2012, it plays a role in providing analytical services for water, waste water and environmental testing.

The microbiology department, where I was placed, focuses on detecting waterborne pathogens and ensuring compliance with public health standards. Upon arriving at the lab, I was introduced to a team of experienced microbiologists and lab technicians who played a pivotal role in my orientation and learning.

The laboratory itself was equipped with state-of-the-art technology, including incubators, autoclaves, and specialized instruments such as Quanti-Tray sealers. Each day, a wide range of water samples from different locations within Brisbane municipality arrived for testing. These samples were analysed for bacterial contamination using Colilert ,membrane filtration and HPC techniques, among others.

The structured nature of the lab allowed me to develop a routine while providing me with a deeper understanding of lab protocols and best practices. I learned to navigate the importance of lab safety, proper documentation, and precision in handling samples. Working alongside professionals who were deeply knowledgeable in microbiology inspired me to enhance my skills and gave me insight into the broader impact of our work on public health.

When the microbiology section at SAS Laboratory wasn't busy, I took the opportunity to explore other areas of the lab to see what the rest of the team was working on. I found this extremely enriching as it allowed me to observe different techniques and understand the broader scope of work at the lab.

In the organics section, the team focused on testing for hydrocarbons using a combination of gas chromatography (GC) and mass spectrometry (MS). This method is essential for detecting organic pollutants, particularly in environmental samples, such as water and soil, where hydrocarbons might indicate contamination from oil or industrial activities. The use of GC-MS allows for the precise identification of complex organic compounds based on their mass-to-charge ratio.

Next, I explored the **metals section**, where the primary focus was on testing for heavy metals, including **mercury**. Techniques such as **atomic absorption spectroscopy (AAS)** or **inductively coupled plasma mass spectrometry (ICP-MS)** are typically employed in this

section to detect trace levels of metals, which can be harmful to both human health and the environment.

The lab also had a **nutrients section**, where scientists were testing for essential nutrients such as nitrogen and phosphorus. These nutrients are critical to monitor in water quality analysis because their excess can lead to environmental issues like eutrophication, which disrupts aquatic ecosystems.

In the **inorganics section**, the team handled a range of tests, focusing on inorganic compounds such as salts, minerals, and metals. Testing in this section helps to ensure water quality and compliance with environmental standards, particularly for drinking water or wastewater management.

Chatting with these scientists, I could relate to some of the complexities they encountered. Having a background in pharmacy, I was already familiar with **chromatographic techniques**, and the principles behind **metal testing** and **inorganics analysis** were not entirely new to me. However, there were still terms and processes that were unfamiliar due to my lack of hands-on experience in certain areas of environmental testing.

This exposure broadened my understanding of laboratory work beyond microbiology and gave me insight into the specialized testing that each section handles. It also helped me appreciate the interconnectedness of the different types of analysis that all contribute to the overall goal of ensuring environmental and public health.

Away from the busy lab schedule at SAS Laboratory, I had the opportunity to engage in meaningful conversations with my colleagues. We shared jokes, encouraged each other during stressful moments, and found ways to lighten the workload with humour. This camaraderie made the work environment more enjoyable and fostered a strong sense of

teamwork. Beyond just working together, I believe I created a lifelong network of friends and professional contacts. The shared experiences, both challenging and rewarding, built a bond that will last well beyond the placement.

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3. Key Responsibilities and Duties

Most of my mornings started with unpacking the dish washer ,I then arranged glass bottles in trays ready for use in the buffer media preparation .Preparation of buffer media involved several steps ,I had to ensure that I used deionised water , after adding monophosphate and magnesium chloride solution i used a specialised machine to pour specific volumes into bottles sealed them and autoclaved

One of the core tasks I performed daily was the testing of drinking water samples for the presence of coliforms and *E. coli* using the Colilert method. The process began with the receipt and verification of water samples, which were then transferred to 120 ml containers for testing. I carefully labelled each container with a batch number that corresponded to the original water sample to ensure traceability.

The Colilert test involved adding Colilert powder media to 100 ml of water in each container, mixing it thoroughly to ensure the media dissolved, and then pouring the mixture into Quanti-Trays. These trays were sealed using a Quanti-Tray sealer and placed in an incubator at 35°C for 18 to 22 hours.

In addition to the Colilert test, I conducted hydrophilic plate counts (HPC) on the same samples. For this process, I pipetted 1 ml of the water sample or 1microlitre for some cases onto two petri dishes. I then melted two bottles of agar that I poured on each of the sets of petri dishes separately. This was to ensure the tests have accurate results in case one bottle of agar was contaminated. The plates were then incubated for 48 hours at 37°C. Given that I

worked on Monday and Tuesday ,I was not directly involved in counting heterophilic bacteria that was done on Wednesday for samples prepared on Monday .

Alongside the test samples, I observed preparation control samples using *E. coli* and *Pseudomonas aeruginosa* to ensure that our procedures were functioning correctly. Sterile water (blank samples) was also included as a negative control. These controls were critical in verifying the accuracy of our test results.

Complex and technical procedures

Even though there were some tasks that were easy to learn and perform, some tasks were a little bit complex and required more training. Some tasks that I struggled with include:

i. Serial dilutions, I had challenged performing serial dilutions and needed several sessions of observing before I got comfortable performing this.
ii. Membrane filtration -this was performed after serial dilutions ,I only performed this procedure three times under guidance from a senior team member
iii. Coliphage testing – this was a complex test that I observed and helped performing .I was a very interesting test and I was more drawn to it by the fact that it involved use of antibiotics which was my specialty in my undergraduate degree.
iv. Test for *Clostridium perfringes* this was also an interesting test that I observed being performed .It involved subjecting the samples to high temperatures above 75 degrees for 20 minutes .This temperature is sufficient to kill most vegetative bacteria apart from *C.perfringes*

Skills Developed

During the placement, I developed a range of both technical and soft skills that will serve me well in my future career.

Technical Skills:

The Colilert and HPC tests required attention to detail. I learned to follow strict protocols for sample handling, labelling, and incubation, ensuring that each test was performed accurately. I gained technical skills in operating the autoclave and calibrating the pH meter. I also gained skills in handling the Quanti-Tray sealer and performing colony counts on agar plates. In addition to this I learned the importance of proper sterilization techniques to prevent contamination, a critical factor in microbiological testing.

Analytical Skills:

Interpreting the results from the Colilert tests and HPC plates required technical skills, I was not directly involved in this due to lack of official training. However ,due to keen observation of how the procedures were undertaken, I gained a stronger understanding of how to identify positive test results for coliforms and *E. coli*, as well as how to quantify bacterial colonies. This process required not only technical skill but also the ability to analyse data and draw conclusions about water safety based on the results.

Teamwork and Communication:

The lab was a collaborative environment, and clear communication with my colleagues was essential. I worked closely with other team members to ensure that test results were accurate and that samples were processed efficiently. Regular discussions with my supervisor and peers helped me improve my communication skills, particularly when presenting data or discussing the implications of certain test results. In one instance , most staff had called in

sick, I was tasked with preparing SPC media, given that I had only observed the procedure conducted once , I could not remember a vital step in calibrating the pH meter .I was able to call in a team member for assistance. From then on , I went through SPC media preparation smoothly. This experience taught me the importance of teamwork.

Problem-Solving:

There were instances where things did not go as planned. For example, I made a buffer media preparation using tap water instead of deionized water . When I realized this mistake, I immediately informed my supervisor, and we developed a plan to redo the media preparation. Another example, is when the senior microbiologist noted that the positive control test for Colilert test were inaccurate due to forgetting to add media. We were called in into a meeting as the microbiology team where we discussed this issue as it was a recurring occurrence. After deliberation and sharing views , we established procedures and protocols to be observed to prevent repetition of the same mistakes . This experience taught me the importance of being proactive in addressing errors and developing solutions ..

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5. Challenges Faced and How I Overcame Them

One of the most significant challenges I faced during the placement was learning how to balance multiple tasks simultaneously. On busy days, we received a high volume of samples, and it was challenging to ensure that all samples were processed within the required timeframe, especially when each test had strict incubation times. To overcome this, I developed a checklist system that allowed me to track each sample's progress from receipt to incubation, ensuring that no sample was forgotten or mishandled.

Another challenge involved the technical procedures, particularly when I was still becoming familiar with the lab equipment. The Quanti-Tray sealer, for example, required precise

handling, and I initially struggled with ensuring that the trays were sealed properly. My supervisor provided guidance, and through practice, I became more confident in my ability to use the equipment effectively.

A critical error I made was forgetting to use deionised water in making buffer on one occasion. This mistake had the potential to cause wrong test results. After discussing the issue with my supervisor, we decided to re-do the test, ensuring that proper controls were in place. This experience reinforced the importance of attention to detail and taught me to double-check my work to avoid similar errors in the future.

The process of adjusting to the high-tech lab environment was also a challenge. While I had previous lab experience from my undergraduate coursework, the equipment at SAS Laboratory was more advanced, and the expectations for precision were much higher. I spent extra time familiarizing myself with the new instruments and developed a routine to ensure I was working efficiently and accurately.

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6. Lessons Learned

Through this placement, I gained invaluable lessons that will have a lasting impact on my career.

Attention to Detail:

One of the most important lessons I learned was the critical importance of attention to detail in lab work. Even small mistakes, such as forgetting to add media to control samples, can have significant consequences for the results. I developed a routine to help me stay focused and minimize the likelihood of errors, which is something I will carry forward into my future roles.

Resilience and Adaptability:

Lab work can be unpredictable, and I learned how to adapt when things didn't go according to plan. Whether it was managing a high volume of samples or correcting an error in a test, I developed the resilience to handle challenges and find solutions quickly.

Collaboration and Teamwork:

I gained a deeper appreciation for the value of teamwork in a lab environment. The microbiology department functioned as a cohesive unit, and I learned how to communicate effectively with my colleagues to ensure that tasks were completed accurately and on time. This experience has made me a better team player, which will be invaluable as I pursue a career in research and development.

Practical Application of Theory:

Perhaps the most rewarding aspect of the placement was seeing how the theoretical knowledge I had gained in my coursework translated into real-world applications. The techniques I learned in the classroom became much more meaningful once I was able to apply them in the lab, and this experience has solidified my passion for microbiology and biotechnology.

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7. Impact on Future Career

My WIL placement at SAS Laboratory has had a profound impact on my future career aspirations. Prior to this experience, I was unsure whether I wanted to pursue a career in research, industry, or academia. However, after working in a high-tech laboratory and gaining hands-on experience with microbiological testing, I am now more certain that I want to pursue a career in research and development within the biotechnology field.

The skills I developed during this placement, particularly in microbiological analysis and quality control, will be invaluable as I seek roles in biotechnology and research. I am confident that the experience has equipped me with the technical expertise and soft skills needed to succeed in a competitive scientific environment.

In the future, I hope to apply the knowledge I gained during this placement to contribute to advancements in water quality testing and public health. I am also considering pursuing further education, such as a Ph.D., to deepen my expertise in microbiology and biotechnology.

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8. Conclusion

In conclusion, my WIL placement at SAS Laboratory was an incredibly enriching experience that allowed me to develop both technical and soft skills that will serve me well in my future career. The challenges I faced, from managing multiple tasks to correcting errors in the lab, taught me valuable lessons in resilience, adaptability, and attention to detail. This experience has solidified my passion for microbiology and biotechnology, and I am excited to continue building on the knowledge and skills I gained during this placement as I pursue a career in research and development.