

Teaching Tips/Notes



Expectations and Realities of My First Undergraduate Research Experience

Undergraduate research experiences (URE) were traditionally considered an opportunity reserved for students voicing their interest in pursuing subsequent graduate degrees (Dodson et al., 1997; Seymour et al., 2003). Today, URE are common among universities and are valuable to the overall development of undergraduate students-whether interested in advanced degrees or not (Dodson et al., 1997; Seymour et al., 2003, Wimbush and Amstutz, 2011). Prior to participating in undergraduate research, I held several misled opinions toward researchers and Animal Science as a discipline. Subsequently, my opinions changed completely, causing me to feel a bit judgmental and wonder why I had not gotten involved sooner. The goal of telling my story is to help nudge other undergraduates with similar reservations towards participating in a research effort. Although presented with challenges, the time I spent in the laboratory was beneficial in establishing a sense of belonging while at Washington State University (WSU), utilizing the scientific method, and for clarifying an exciting area of physiological research.

Initial Expectations

After a two year integrated ecological agriculture curriculum and attaining a bachelor's degree from a liberal arts university, I entered my second undergraduate degree program in biology at WSU. My goal was to complete prerequisites for physician's assistant school, and previous interests in both medical and veterinary sciences caused me to cross department lines. I enrolled in my first Animal Science course because I thought the class would be interesting; however I did not consider it appealing as a career. I also recall wondering if I would have to modify my wardrobe to include Carhartt's and rubber boots to gain acceptance amongst the "Aggie" students I had seen around campus.

Three times a week I crossed campus into a different "city", and as expected, I felt out of place. My first week was sprinkled with various uncomfortable encounters and students showing me an outsider's welcome. But as time progressed, my rank was promoted from "that stranger" to "he's ok, I have a class with him", I began to feel at ease in my new environment. I discovered that the students were in fact quite pleasant and would often work together in the study lounge to ensure that those having difficulty became successful. I was surprised to see that even at a large university, there was a strong sense of community among students and faculty in the department, and I felt fortunate to become a part of it.

One month after the class began, the professor observed my growing interest in molecular biology. He offered me the opportunity to "hang around" his laboratory and shadow a Ph.D. student working with primary adipocyte culture. The informal invitation left me feeling a bit apprehensive as I had attended general chemistry and biology laboratories but had never been exposed to a professional research environment. I had seen the Ph.D. student in lectures; but had never spoken with him personally, and was intimidated of being evaluated by someone with much more experience than me. I assumed that he would be arrogant and treat me as an inconvenience which kept me from participating initially. Believing that this experience was important to my future, I overcame my fears of being embarrassed or judged and decided to participate in hopes of taking my education to its next level. When I approached the graduate student, I was surprised to hear that he was excited about the prospect of my involvement in the laboratory. At minimum, I was a new face that presented an outlet for discussion topics other than fat cell metabolism; at most, I could be a prospective predecessor when he returned to his home country of Brazil. My maturity compared to most undergraduates, and non-traditional background facilitated our initial connection and improved my outlook going into the experience.

My First Day

Upon entering the lab, my initial reaction was one of cautious optimism. I was relieved to see familiar equipment around the room, but uneasy in knowing many objects were still foreign and that I was expected to apply classroom knowledge to actual scientific experiments. Following an introduction to the various features of the laboratory and having had my formal safety lecture, my first tasks included

preparing buffers, counting cells and changing media in culture flasks. I was so concerned with making mistakes that I weighed reagents multiple times and asked for approval on every measurement, which took considerable time. Luckily, my inexperience and apprehensions were familiar to my supervising graduate student. He responded by offering tips on working efficiently in the laboratory and stressed the importance of keeping meticulous notes. As the day progressed, I regained my composure and was later praised for my ability to take direction and learn quickly. I remember the excitement of using my laboratory skills acquired earlier in my education for actual scientific research. It felt rather rewarding and increased my desire to return the next day.

As the weeks passed, my fears of contaminating the laboratory or damaging technical (and expensive) equipment dissipated. I also began to gain competency in communicating scientifically by becoming frequently engaged in laboratory activities. As this was a voluntary opportunity, it was up to me to show initiative. I spent many free hours before and after class asking questions in the laboratory, meeting other members of the department and gaining credibility as a member of the research team by being present day to day. Towards the end of my research experience, I was invited to the meat processing facility on campus to assist in acquiring tissue samples from cattle. Actively participating in collecting the samples felt like an affirmation of initiation/nod of approval from my mentor for my commitment and efforts in the lab, and it has left a lasting impression to this day. In addition, my first hand encounters with animals and industry workers disproved negative misconceptions I had previously held about meat production and improved my interest in Animal Science as a career.

Hurdles

Regardless of my studious efforts, I recall routinely leaving the laboratory with more questions than answers. When my supervisor could not provide the answer, I turned to my faculty mentor for insight. Unexpectedly, I was not provided answers outright, rather I was directed to specific journal articles and encouraged to decipher the answers on my own. This was a new technique to me and required expansion beyond my familiar resources. I was startled to learn that there were not definitions in book chapters on the material I was expected to be familiar with, but also excited to be involved with such a fresh area of research. Initially, the literature was overwhelming. Meticulous details and unfamiliar language frequently left me feeling confused and frustrated. Through perseverance, repeated exposure to the literature, and additional clarification from my mentor, I did eventually become comfortable with the dynamic language of muscle biology and lipid metabolism. I must say there is no easy way to become familiar with a large body of information other than to dive in. While in my first weeks, I regularly found myself following literature sources backward to find additional information needed to communicate effectively with the group. However, the research experience facilitated my ability to navigate scientific literature which is a skill I am grateful to have attained. Therefore, I feel it is of great benefit to become accustomed to the literature review process before graduate school, and UREs present that opportunity.

Expectations and Realities

Some students may be under the impression, as I, that working in a laboratory setting is for those who prefer to work independently and avoid social interaction. My experience did not involve any solitary confinement at a fume hood. Instead, it required working collaboratively in a group and utilizing member's diverse backgrounds and skill sets to contribute to the current body of knowledge regarding lipid metabolism. It was a positive environment that was energizing to be around. By participating in undergraduate research, I gained exposure to a professional environment/network, made a few friends, and developed core skills required of all successful scientists.

My mentor and supervising graduate student also provided me with an opportunity for participation in the publication process. As undergraduates are low ranking members of the research team, opportunities for publication are quite rare. However, it is an attainable achievement as undergraduates here in the Animal Sciences department at WSU have made significant contributions to scientific literature. For example, from 1993 – 1997, at least twenty undergraduate students participated in research projects in the muscle biology laboratory, resulting in five scientific publications (Dodson et al., 1997). The ability to be published in one's field of study as an undergraduate is unique, and provides a significant advantage when applying for graduate schools or industry positions. In addition, becoming familiar with the process of revision was worth all the extra hours I spent reading journals and loitering outside of offices waiting to ask questions of my supervisors. I gained access to advantaged information

and I am grateful to have been given insight to the challenges graduate students commonly encounter in their first years of research.

Current Perspectives

Undergraduate research experiences allow enthusiastic students access to knowledge and resources customarily reserved for established members of academia. To be successful in research, a student must be self-motivated, willing to become thoroughly familiar with scientific literature and communicate effectively with others in a concise, meaningful way. Therefore, faculty mentors often handpick URE students observed to be capable and enthusiastic because they must donate time outside of class and demonstrate patience by allowing for mistakes and learning to take place (Dodson, 1997; Seymour et al., 2003). Through my research experience, I encountered many challenges but ultimately improved my skills in reading comprehension, communicating scientifically and thinking critically. In addition, I gained a sense of confidence in my abilities as a member of a research team and found a place to belong amongst thousands at a major university. In my opinion, it would greatly benefit anyone with the opportunity to participate in an URE to do so. In addition to the positive results I have experienced, completion of URE has also been reported to result in many tangible benefits such as higher starting salaries (Coco, 2000; Gault et al., 2008), higher job satisfaction (Devine et al., 2007; Gault et al., 2008) and increased job opportunities after graduation (Coco, 2000; Devine et al., 2007). Looking back, I realize that many of my initial expectations about participating in a scientific research setting were unfounded and the reality of being a researcher was more exciting and rewarding than I anticipated.

Conclusion

Through my time spent in the laboratory, I gained competence in basic cell culture techniques and became a contributing member of a research team. In addition, I expanded my opportunities by taking chances and testing my personal boundaries. This required a thick skin, persistence and the ability to be flexible and grow as an individual. Interestingly, I was told these were all qualities of a good researcher on my first day in the laboratory. I developed lasting relationships with faculty members whom I may later call upon for letters of recommendation and whom will forever be an inspiration to me in my future endeavors. I plan to take knowledge and skills from my research experience and apply them to the pursuit of a professional career in health sciences, working to treat disorders such as cancer, metabolic syndrome and obesity. For better or worse, my mentor and supervisor gave me an accurate portrayal of life as a researcher and changed my perspectives about careers in laboratory research settings in a positive way. Although my abilities to think critically, work effectively in a group, and manage time, were tested to their limits, overall my undergraduate research experience was an enjoyable and rewarding journey with benefits that will last a life time.

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