Evaluating Experiential Learning: The Impact of Undergraduate Equine Research Experiences on Undergraduate Education and Career Readiness

Introduction and Review of Literature

There has been an increase in urbanization over the last decade. More specifically, a 2018 USDA study examined urbanization rates over 10 years. Over the preceding 10 years, the metropolitan population increased by 6.3%, whereas the population of the non-metropolitan farming and rural agriculture community declined by 1.8% (United States Department of Agriculture, 2018). Consequently, there has been a notable decline in the number of students with direct experience in animal health and production before starting college. In 1987, 92.5% of students entering college had prior livestock experience (Reese et al., 1987), compared to 2010, when only 42.9% of students had prior livestock exposure upon entering college (Bundy et al., 2010). College curricula must address this shortfall in livestock knowledge and skills, as there is still a high demand for qualified individuals in the workforce.

College curricula often do a good job of providing didactic information; however, a disconnect exists between college instruction and workforce demands, which prioritizes students with hands-on, practical experience over content knowledge. As this evolution continues, there is a pressing need to support undergraduate students in their respective fields (Manyanga et al., 2017). To improve undergraduate experiences, experiential learning has been integrated into college instruction over the past few decades. Experiential learning enhances undergraduate experiences by incorporating real-life, practical experiences into their education (Clements & Cord, 2011). Undergraduate research opportunities have been established as an example of experiential learning to build learning opportunities and pave the way for new career pathways (Fiechter et al., 2021).

The overarching goals of undergraduate research experiences are often related to higher educational outcomes and skill development, as well as personal and professional outcomes (Miller et al., 2022). Students often believe that they improve their critical thinking, oral, and written communication skills through undergraduate research experiences (Fakayode et al., 2014). Students can also gain a deeper understanding of the research process by learning lab techniques and analyzing their own data (Colclasure et al., 2024). These skills are beneficial, enabling students to clarify their career path and envision where they see themselves going in the future (Patrella & Jung, 2008).

To address the decreasing number of students with animal backgrounds and the need for workforce-ready graduates, a multi-university 8-week summer undergraduate research program was developed. To encourage participation by students with limited livestock experience, equine was used as the research model. Equines were chosen because they are frequently selected by students as a primary species of interest, particularly among those with limited prior experience with livestock (Peffer, 2010).

Theoretical Framework

The undergraduate research project was grounded in experiential learning theory (Kolb, 1984). Engaging students in hands-on research experiences, followed by structured reflection

and discussion with mentors, was crucial to the program's success. Through weekly check-ins and project development, students were encouraged to think critically about their progress, apply new thought processes, and connect their learning to real-world applications and future career goals. Mentorship played a key role in guiding reflection and fostering a deep learning environment by helping students navigate challenges and adapt their approaches.

Purpose

The purpose of this study was to investigate the influence of an immersive undergraduate research experience on participants' knowledge of equines and their career goals. The research question guiding this study was:

1. How does participation in an immersive undergraduate research experience influence a student's perception of agriculture and their future career goals?

Methods

This exploratory, qualitative study focused on an 8-week immersive undergraduate research experience held during the summer of 2024 at four different four-year agricultural research institutions nationwide. The USDA-NIFA funded this program as part of the AFRI 009041, Award Number 2023 68018-40320. The summer research experience engaged participants in equine science-related independent research projects. The program included several components, such as online educational modules, weekly cohort meetings, one-on-one advisor meetings, individual research projects, and a summer symposium for program participants. Eight students participated in the program, with two placed at each of the four institutions. Among the eight students, three were sophomores, three were juniors, and two were seniors. A key goal of the program was to recruit students from underrepresented groups. Five of the students identified as members of an underrepresented group. Each pair of students was assigned a faculty mentor to guide them through their independent, equine-related research project. Throughout the program, students completed onboarding activities, worked through educational modules, familiarized themselves with the facilities, developed and implemented their research projects, analyzed their data, and presented their findings at the summer symposium. Each student also submitted an abstract summarizing their work. In addition to these activities, students attended weekly online cohort meetings via Zoom and met with their faculty mentors every week.

One-on-one, semi-structured interviews were conducted in person at the end of the summer program symposium (n = 8). The same interviewer conducted the interviews with all students. The data collected through the interviews included six questions, four of which contained multiple parts. The five principal research investigators reviewed the initial interview questions before the start of the program.

Following data collection, the interviews were transcribed. Three researchers individually completed the initial coding of two interview transcripts using open-coding methods to ensure consistency among coders (Saldaña, 2016). From there, codes were triangulated by comparing the initial one another. Two researchers then subsequently coded the remaining six interviews

following a similar pattern to the first two transcripts. We were able to triangulate our analyses and compare our results across all interviews. Together, we combined the codes into categories, which were then joined into three overarching themes.

Positionality Statement

As a graduate student in the Animal Science Department with experience in undergraduate teaching and mentoring, I firmly believe in the value of experiential learning and undergraduate research for student development. My role as a program assistant and graduate researcher instilled in me the perspective of both an insider to the program and an observer of its outcomes. I recognize that my previous interactions with the students, as well as my enthusiasm for advocacy, experiential learning, and student success, may have influenced my interpretations of their experiences. Throughout this study, I practiced reflexivity to remain aware of these potential influences and critically examine my assumptions.

Findings

Several categories emerged from the data, but the three most influential themes relevant to student success are presented here.

Theme 1: Independent Research

Students reflected on the autonomy and ownership they experienced throughout the design and conduct of their research project, from start to finish. The independent research project provided students with the opportunity to engage in hands-on learning and decision-making, which are key components of a successful research project. The experiences and opportunities provided throughout this process were ones that students had not encountered before. Although the autonomy initially made some students uncomfortable with the ambiguity of the research space, they were able to turn those feelings into valuable learning opportunities. Jenna said, “We had to stay flexible. There were a couple days, the workload was stressful and fast-paced, where we reached our limit. We had to really get this done now…so that was a little more stressful.”

Though the research projects were student-led, the presence of a competent mentor played a critical role in guiding the students’ experiences. The impact the mentors had on these students was indescribable, as each student discussed the importance of their presence despite their carefulness not to overstep the process the students had laid out. Breanna shared, “Our advisor was very patient; she would answer all of my questions really well, and she took her time and explained a new concept of a piece of machinery to me.” Supportive mentors allowed students to take responsibility for their projects. Additionally, students were quick to appreciate the opportunities, technologies, and research areas they may not have otherwise been exposed to if not for this experience.

Theme 2: Diverse Skill Development

Upon reflection, many students expressed their appreciation for the various skills that they learned. Students reflected on the development of three main types of skills, including research, technical, and transferable skills. Several students shared that they developed increased confidence in working with equines, handling animals, and conducting lab techniques involving equines. All students collected their own data by attaching monitors and other data collection tools to horses daily. In some cases, students were even surprised by how much they enjoyed the technical side of conducting research. For example, Sadie expressed

> "I honestly thought that I would hate data collection because…I'm not great with technology. When I thought of data collection, I thought of the statistics, which I did find I don't love, but I just thought of like all the numbers and the tediousness of it. And actually, I really enjoyed it, like getting to do all the hands-on part of data collection: putting on the markers and walking the horses and all that stuff."

For many students, this was their first experience with the research process. Some came into the experience with preconceived notions about research. "It's very hands on, and that surprised me," said Steven. However, at the end of the experience, participants felt a change in their appreciation for research, realizing that it was not as intimidating as they once thought it could be. John even expressed a possible interest in future research opportunities, saying

> "I'm definitely more motivated to look for more opportunities, say yes to more opportunities, and seek out more opportunities specifically related to research in the more distant future. I guess I would be interested in involving myself in research professionally in some capacity."

Additionally, students expressed an appreciation for academic opportunities through reading literature, conducting statistical analysis, and engaging in scientific research presentations. Participants reported that they developed critical, transferable skills, including teamwork, collaboration, networking, leadership, and communication, throughout the process. Breanna remarked, "It surprised me all the things that I learned, how many projects I got to experience, and also all the networking that I did."

Theme 3: Personal Growth

In addition to academic gains, students noted they learned about themselves personally and professionally. The intensive eight-week process helped many students gain a deeper understanding of themselves, including their work habits and future career interests. Several students expressed an increased appreciation for developing a strong work ethic and accountability, particularly in managing their own research projects. Sadie and John expressed themselves as being "humbled," by the experience. Students learned that adaptability goes a long way in research and were able to apply this concept to their everyday lives. Several students even acknowledged that the independent research process was challenging at times, but learning to navigate those difficult moments meant a great deal to them in the end. In some cases, the experience even altered their career trajectories. An example was Steven, "I've been officially admitted to the grad school for the start of my master's degree at [university]."

Students were also exposed to the reality of what it takes to reach their career goals after feeling behind in comparison to their peers. Jenna shared,

> "There are a lot of struggles and problems…we can lose some self-confidence about how good we are in the world and how we are doing. But this program is really getting me through the process of what I really want to make of my life."

Though students experienced both challenges and successes, they described gaining clarity, humility, and a solidified sense of direction in their academic and professional lives.

Conclusions & Implications

This study provided insights into how an experiential-based undergraduate research experience influenced participants' equine knowledge and shaped their career goals. The data suggests that undergraduate research experiences are capable of benefiting students' futures personally and professionally. These experiences provided students with the opportunity to gain autonomy in their own research projects, develop a wide range of technical and transferable skills, and reflect on their long-term goals. The experiential nature of the program, with projects led by students under strong mentorship, created a positive environment that allowed students to grow beyond the opportunities provided in a traditional classroom setting.

One of the most influential outcomes was students' increased confidence in their ability to apply what they learned through the research process to real-world situations. Students left feeling more confident in their communication skills, had a deeper understanding of the research process, and were more motivated toward their future academic and career goals, which supports previous research (Miller et al., 2022). Some students even reconsidered or changed their future goals as a result of their participation in the undergraduate research experience. All of these skills are crucial in the workforce and are assets that students will utilize throughout their academic and professional careers. These outcomes suggest that immersive undergraduate research experiences can play a crucial role in preparing workforce-ready individuals in equine science by equipping them with the practical skills, confidence, and clarity necessary to succeed in the field.

These findings help highlight the benefits of integrating undergraduate research opportunities into academic programs. Specifically, within agriculture, hands-on experience is essential. One of the program's components was providing students with the opportunity to work with technologies they may not otherwise have access to. These hands-on opportunities are crucial due to the direction the industry is headed (Sassenrath et al., 2008). Doing so not only prepares students to meet the demands of the workforce but also helps shape adaptable, reflective professionals who are more likely to pursue advanced education opportunities or leadership roles in the field (Colclasure et al., 2024).

A limitation of this study is that the findings are not generalizable beyond the participants of this study. Thus, future research should be conducted to assess the benefits of experientially based undergraduate research experiences on students' content knowledge, livestock handling self-efficacy, career decision-making, and the development of transferable skills.

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