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Introduction

The benefits of undergraduate research are well recognized by institutions of higher education (Salsman et al., 2013; Thiry et al., 2012), yet few papers are written by students on their perceived benefits, especially from those involved in a more intensive capacity. My involvement in undergraduate research was unique in that it was both extensive, lasting nearly four years, and comprehensive, including data collection and analysis, presentations, and paper writing. It began with the desire to improve my résumé for graduate school and developed into a passion for research. During the early stages, I noticed the advantages afforded by research participation. As my responsibilities increased, I recognized that more students could benefit from their own involvement.

This paper provides a description of my research experience. The research project that my research mentor and I collaborated on, followed three different groups of children through their first two years of schooling, focused on language development, and involved two variables: bilingualism and hard-of-hearing status. The groups were as follows: 1) bilingual Spanish-English children, normal hearing, 2) monolingual English children, hard-of-hearing, and 3) bilingual Spanish-English children, hard-of-hearing. The children's voices were recorded in person between 2017 and 2019 and analyzed with a speech-analysis software. I focused my research analyses primarily on Group 1 due to the amount of data collected. As a research assistant, I was intimately involved in all phases of this work. My duties involved assisting with field work, such as data collection and participant interaction, and computational work, including coding data, data analyses through statistical programs, article write-up, etc.

Although many undergraduate programs may not require research for graduation and many careers are not research-based, students can benefit from participating in an undergraduate research project. This participation can be passive, such as spending a semester observing a researcher. However, more extensive and active involvement could lead to more benefits (Salsman et al., 2013; Thiry et al., 2012). Fortunately, my undergraduate university has a robust undergraduate research program with established guidelines and infrastructure for student success. From my personal experiences in undergraduate research, I identified four categories of student benefit: career preparation, community exposure, individual growth, and collaboration with a mentor. While these categories are not comprehensive nor guaranteed for each student, they offer unique advantages to performing research before any graduate or professional schooling and can greatly improve competency for future endeavors.

Career Preparation

The activities and duties associated with undergraduate research teach students communication skills (Petrella & Jung, 2008; Salsman et al., 2013; Thiry et al., 2012) and logistic skills (Quigley,

2016; Russell et al., 2007), which are useful for future workforce members. There is general consensus that undergraduate research could achieve five goals (Crews, 2013), two of which correlate with the learning objectives mentioned above – “increasing disciplinary knowledge” and “preparing students for academia/graduate school” (Crews, 2013 p. 3). In my experience, these lessons served a dual purpose. They supplemented my undergraduate education by providing real experiences to explain textbook examples and prepared me for my career by strengthening my résumé and giving me foundational experience for future projects.

While working on research, undergraduate students are simultaneously fulfilling requirements for other classes of varying subjects (e.g., creating a presentation for a book report), learning to multitask, and prioritizing their daily tasks. As my schedule contained medically-related classes and my research was linguistics based, I had to balance a variety of responsibilities, which is what I will be doing often in my career. Students who participate in research can expand their prioritization skills as they manage their duties in a similar capacity. Additionally, many universities have integrated research into their courses (Shore et al., 1990). As such, established research processes, methods, and interpretations may be demonstrated in assigned readings and materials. From my experience as a research assistant, my readings for classes became more coherent as I learned to extract necessary information from texts. Through involvement in projects, students have a greater understanding of the materials presented to them (Petrella & Jung, 2008; Thiry et al., 2012) and can comprehend their significance, specifically the requirements to get research approved and published.

Undergraduate research offers training opportunities that may not be routinely offered as part of the general education (Thiry et al., 2012). These trainings are established to standardize research and ensure the safety of participants (Shamoo & Schwartz, 2007). The prerequisites to begin our project included ethical training for human subjects research, such as the CITI Program (Collaborative Institutional Training Initiative, n.d.), the approval from the International Review Board, and the formation of a clear testing procedure. Some other requirements included compliance training for each area of study, meeting requirements for approval from the university research department, and completing a conflict-of-interest form. These are all standard procedures for projects, although specifics may vary by discipline. Through these preparatory steps, I gained an appreciation for the process of obtaining permissions and licensure and became aware of the obstacles that investigators overcome to begin research, collect data, and publish papers. The rigors of submitting research designs and the established procedures for training demonstrate proper, standardized protocol associated with exceptional projects.

Collaboration is an integral part of interdisciplinary research (Stamp et al., 2015). Working with a research team is an exceptional way to learn to communicate and collaborate with others. In our project, the data moved through multiple phases, including analysis and interpretation. Our team was comprised of the principal investigator (PI; my mentor) and seven other research assistants. Together, we successfully coordinated job responsibilities and cooperatively completed tasks. This assembly-like setup required efficiency, clear communication, and dependence on each other to complete individual assignments while working toward the project’s conclusion. It was not a passive endeavor and success came only from dedication and consistent involvement. The reliance on my associates’ professionalism in their work mirrored that of a professional research team. The expectation to perform to one’s best ability, both individually and as part of a group, is extremely rewarding and would be useful for any student in any career.

Community Exposure

At a university, students can learn about and interact with their larger community. As few students have had these opportunities before beginning a college education (Hicks Peterson, 2018),

involvement in university-based volunteering and/or research is beneficial to the expansion of their understanding of local issues. Although the classroom functions to introduce the social, political, and humanitarian aspects of a community, it may not offer a comprehensive understanding of the obstacles faced by other members of society. Therefore, it is beneficial for students to take advantage of hands-on opportunities provided by the university, especially by way of human subjects research.

Research with community members could lead to interactions with different cultures, customs, and beliefs; as such, the recognition and practice of cultural competency is paramount (Shiu-Thornton, 2003; Yeager & Bauer-Wu, 2013). Among other benefits, cultural competency involves being aware of ourselves and others (Yeager & Bauer-Wu, 2013), recognizing our personal attitudes, including implicit biases (Holroyd, 2012), and fostering skills that aid in communication with those around us (Reeves, 2011). Salt Lake City, UT, where our participants lived, is not very diverse. In 2018, only about 13.6% of the city's population belonged to a minority race and 13.9% of the city's minorities were of Hispanic or Latino ethnicity (United States Census Bureau, 2018). However, there is a variety of cultural influences, such as Spanish-speaking radio and television stations and festivals celebrating different cultures. Although I have worked with these communities in other capacities, I am not a member of a minority group and therefore benefited from interacting with the participants. While observing the linguistic progress of the children, I became more aware of their individual needs and the needs of the bilingual and hard-of-hearing communities. This experience led me to educate myself about ways to improve my awareness of my impact on others, such as reading articles dedicated to improving cultural communication. I learned the importance of humility and focusing less on myself, as elaborated in the next section, which focused my attention on the participants and their needs above my own. As other college students investigate in the community, they too will grow in cultural sensitivity and obtain skills for improved interactions with other cultures.

Involvement in a project also increases recognition of the challenges a particular group may face and provides learning opportunities about adjusting to the needs of the group. To show awareness of these challenges and ensure participants are comfortable and safe, students can help facilitate accommodations to allow for inclusive research (Rios et al., 2016). Some examples include translating, using audience-appropriate language, and maintaining a physically safe environment. In our project, Groups 2 and 3 were composed of students who were hard-of-hearing and attended schools dedicated to people with hearing disabilities. My mentor demonstrated, by example, the need for patience and encouragement when the children were struggling. At subsequent recording sessions, I became more comfortable interacting with the participants and facilitating their speech production. Likewise, the children became more responsive when they understood I was attentive of their responses and sympathetic toward mistakes. This made the collection process more efficient and further improved the natural speaking situation we were trying to reproduce. Students may have similar experiences as they interact with community members and learn to adapt to the needs of their participants.

Research in the community provides opportunities for students to recognize the relationship between culture and trust. It is commonplace for inexperienced researchers to be unaware of trust's critical role in community interactions, especially when they are not members of the group of interest (Christopher et al., 2008). Student researchers should be respectful, create open dialogue, and foster partnership with the populations they are studying. Throughout the interviews with the children, my mentor and I would speak respectfully and respond to their communications, regardless of how "correct" they were. This both ensured that the students understood that we did not judge their language development, leading to a more trusting environment, and provided us with accurate representations of their natural speech. Through undergraduate research opportunities, the student

can learn new ways to facilitate communication with participants and witness how increased trust promotes openness with participants, even in brief encounters.

Of the benefits potentially afforded to students who participate in human subject research, those gained from community exposure could arguably be missed. If an undergraduate student decides to passively fulfill a research assistant position, they may never perform interactive tasks, such as interviewing community members, and therefore circumvent some experiences entirely. In our project, the first step of data analyses was often the point at which other group members stopped progressing. This limited their learning experience and prevented them from further achievements. My experience was probably unique in the variety of positions I participated in (i.e., data collection, analyses, and presentation). However, many research projects have tasks, such as statistical analysis, that are wholly computer-based and could be done without ever meeting the participants. For students to gain more benefits from undergraduate research, they should avoid passive participation and search for ways to further engage in their project.

Individual Growth

Research in the community is an exceptional way for undergraduate students to experience individual growth (Salsman et al., 2013), especially through engagement in unfamiliar and challenging tasks (Hicks Peterson, 2018). The classroom alone may not prepare students for potential emotional responses, and community research may involve difficult situations without simple solutions. When immersed extensively in a human subjects-based project, students will have many opportunities to experience these situations and learn to address them. For me, it was beneficial to focus on the purpose of the project and recognize the resilience of the participants, even as they encountered obstacles in their language development. Although student researchers may only be observing and not providing immediate relief, they will be able to witness the needs of the participants and recognize the potential impact of the research on future generations. The ability for an undergraduate to experience challenging situations before graduate education allows for careful contemplation and greater opportunities for growth.

As mentioned, performing human subjects research can provide opportunities for students to improve their cultural competence. It also allows students to practice humility, which is characterized by selflessness, restraint, and inclusivity of others (Akhtar, 2018). As individuals focus less on themselves and more on the needs of those around them, they can grow individually and “deepen interpersonal relatedness” (Akhtar, 2018, p. 2). By practicing humility and selflessness in a research setting, a researcher can perform in a way that does not alienate their study population but creates situations dedicated to the participants. Our project benefited from the expression of humility, especially when we focused our attention solely on the students. With younger children, it was imperative to perform the tasks in a patient and uncomplicated way. In one instance, one child could not focus and continued talking about unrelated subjects, such as his parents and family. Instead of abruptly redirecting him back to the task and being concerned about the diversion, I empathetically entertained his stories and repressed my eagerness for project continuation before refocusing the conversation. In this manner, I was present in the interview, actively listened to the child, and elicited responses that were genuine, further improving the efficacy of my research. Students in a research capacity may similarly gain valuable practice in humility and further their project’s end results.

Through research involvement, students may recognize the potential impact of scientific inquiry, such as policy change and community awareness. This realization could happen before project initiation, as the researcher or student researcher may choose their project based on the “limits of current knowledge in a... field” or “bringing something new” to a field (Cameli et al., 2018, p. 151), or upon research completion, as the results are published for or presented to the target audience. One of our project’s recommendations was that parents could increase native language use at home to

continue their child's maintenance and learning of native language skills. Similar research could further influence the community to provide more access to language learning programs to aid these parents (i.e., promoting dual immersion programs). The potential effect on future language instruction demonstrated the importance of research and inspired me to continue researching. Other students may have similar opportunities to see the effects of their work, promote change, and further the knowledge in their field.

However, students can also realize that project completion may not resolve all problems being investigated and that change may not be seen immediately, if at all (e.g., Wheeler, 2016). In other words, research is less straightforward and more dynamic than students may understand (Reiff et al., 2002) and research efforts may only be the first step towards change. In our project, we had to exclude a large portion of data after the team had completed hours of collection and review. Although it was disappointing, it forced me to adjust my expectations and encouraged continued diligence toward the completion of the larger project. Through exposure to various populations and consistent support from a mentor, undergraduate students can increase in maturity and recognize that the benefits of research are not always immediate.

Collaboration with a Mentor

Mentors provide constructive feedback (Crews, 2012), methodological guidance (Raman et al., 2016), and motivation for students to become independent thinkers (Petrella & Jung, 2008). Collaborating with a trained professional is another established goal of undergraduate research: “forming relationships between students and faculty mentors” (Crews, 2012, p. 3). Because faculty mentors understand the educational aspects of their roles, they encourage students to hypothesize, question, and contemplate the processes and interpretations of research to fully enter the role of an investigator and think critically.

Students can realize individual growth while receiving personal and academic benefit through collaboration with a mentor (Battaglia et al., 2019; Ishiyama, 2002). This is especially true as the mentor's expertise in their respective fields allows them to create an independent but supervised research experience for the student (Crews, 2012). Starting from one responsibility, the undergraduates can move up in their respective project as they learn new tasks. As a research assistant, I began with simple transcriptions that were verified by other team members before I moved on to participant interviews. My mentor was crucial to my progress. She provided opportunities for me to work independently and collaboratively and was always accessible for questions. Once a foundation of knowledge was established, I had the capacity to check my own work, create my own interpretations of data trends, and aid other research assistants. Students who participate in undergraduate research can have similar opportunities if they engage extensively in a project, get to know their mentor, and actively seek experiences to expand their understanding.

The research mentor is important, both as a source of technical information (Raman et al., 2016) and as a guiding influence for the student (Ziwoya & Falconer, 2018). Along with stress associated with the seemingly overwhelming requirements for research preparation (Cameli et al., 2018), students may also initially be nervous or less confident in themselves (Petrella & Jung, 2008; Russell et al., 2007), notably in situations involving direct, human-to-human interaction. In our project, it was extremely beneficial to review my responsibilities and discuss any concerns with my mentor. In turn, my mentor shared personal experiences through which she reduced my uncertainty associated with the research processes and gave me confidence in my decisions. As noted by Osborn & Karukstis (2009), I became more comfortable with difficult processes, obtained disciplinary knowledge, and exuded confidence. As students engage with their own mentors and learn to become independent, these developments promote further educational advancement and develop a foundation of experience to address more complex research questions. Students are thus prepared to pursue new

endeavors, interact meaningfully with community members, explore novel experiments, and utilize critical thinking to succeed.

Mentor feedback is crucial for assessing and advancing student comprehension of research practices (Berry & Chew, 2008). As undergraduates perform assigned duties, they need consistent progress review from supervising individuals, which are the opportunities to identify, learn from, and avoid repeating mistakes. My mentor consistently asked me questions and pointed out any opportunities for improvement. Many of the measurements we made in analyses were double-verified and could be visually evaluated. For example, the spectrogram, or visual spectrum of sound frequencies, was measured via computer analysis software. My mentor would show me a picture of a vowel length that I measured and explain why it was incorrect. This improved my accuracy on each subsequent file. These structured reviews promoted improved research practice and increased my self-awareness as I progressed in the project. Each failure became a learning opportunity as my mentor empathetically addressed the needed changes and encouraged me to continue progressing. Therefore, through interactions with a mentor, students can receive constructive criticism and feedback from an accomplished research professional as they progress in their respective field.

Working with a research professional also provides unique opportunities for recognition (Thiry et al., 2012). Such opportunities include but are not limited to presenting at content area-specific conferences, applying to receive distinct research designations, and improving graduate school applications. These benefits are less commonplace at the undergraduate level when compared to graduate educational levels. In my experience, my mentor was more than just a supervising presence. She actively sought out resources for me to expand my experiences. I presented preliminary data at my university's undergraduate research conference, received a research-scholar distinction on my official transcript, and detailed my research experience in graduate applications. Without my mentor, many of these accomplishments would have been impossible. As students work on their projects and follow their work through stages of presentations and publications, they too can improve their understanding of research while improving their résumé, especially with a proactive mentor (Raman et al., 2016).

Conclusion

The advantages of student involvement in undergraduate research extend beyond those provided through general education and directly affect future opportunities. Through undergraduate research, students can become more culturally competent (Shiu-Thornton, 2003; Crews, 2012), grow as an individual (Salsman et al., 2013; Thiry et al., 2012), learn how to collaborate with a research professional (Ziwoya & Falconer, 2018), and prepare for future careers (Petrella & Jung, 2008; Salsman et al., 2013). Although some of these opportunities may be achieved through passive involvement in a project, greater benefit comes from more extensive participation (Salsman et al., 2013; Thiry et al., 2012). Therefore, undergraduate students should view involvement in research as a worthwhile investment of time and resources. Overall, undergraduate research, especially at a university with established undergraduate research infrastructure, provides students with impressive personal career advantages while also aiding the progress of important investigations in the community.

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