Final Paper

Katilyn Mccoy

Sarab Ahluwalia

CYSE 368

Spring 2024

Table of Contents

Introduction

Deciding on an internship often involves a mixture of curiosity, ambition, and a yearning for personal development. For me, the choice to intern at Brooks Crossing Innovation Lab was sparked by an insatiable curiosity for technology and a deep-seated passion for nurturing young minds through education. The prospect of immersing myself in a vibrant environment where cutting-edge machines intertwine with educational initiatives to ignite creativity in young learners was simply irresistible.

Learning Outcomes/Objectives:

Throughout my internship tenure, I set out to achieve three specific objectives tailored to my growth within the dynamic setting of Brooks Crossing Innovation Lab.

1. Leadership Development: My primary objective was to refine my leadership qualities, particularly in the realm of education and mentorship. By guiding groups of students through various technological activities, I aimed to enhance my communication skills, adaptability, and ability to ignite enthusiasm for learning, fostering an environment where curiosity thrives and creativity flourishes.
2. Technical Proficiency: Another pivotal goal was to deepen my understanding of creating projects using coding and the array of advanced machinery available at the lab. From conceptualizing designs to executing them using tools like Micro:bits or robotics programming, I sought to sharpen my problem-solving skills and technical prowess, crafting tangible solutions that bridge the gap between imagination and innovation.
3. Impactful Contribution: Beyond personal growth, my aspiration was to make a meaningful impact within the community served by Brooks Crossing Innovation Lab. Through engaging with students and undertaking projects that transcend mere technical proficiency, I aimed to inspire a passion for technology that resonates on a deeper level, fostering a culture of curiosity, creativity, and inclusivity that empowers young minds to shape the future with confidence and ingenuity.

General introduction

In essence, my internship journey at Brooks Crossing Innovation Lab was fueled by a fervent desire to explore the intersection of technology and education, while also embracing the opportunity to grow as a leader and a catalyst for positive change. As I navigated through this transformative experience, I remained steadfast in my commitment to seizing every opportunity for learning, growth, and impact, emerging not only as a proficient technologist but also as a compassionate educator and visionary leader.

Beginning of internship

The beginning of my internship at Brooks Crossing Innovation Lab marked the commencement of an exciting journey into the realm of STEM learning and creative problem-solving. Situated within a secure facility, Brooks Crossing serves as an instructional hub where

individuals of all ages and backgrounds converge to explore the wonders of technology and innovation.

Established as a beacon of collaboration and teamwork, Brooks Crossing is dedicated to fostering learning opportunities that transcend conventional boundaries, enabling students and participants to design innovative solutions to real-world challenges. The organization's commitment to STEM education is evident through a diverse array of programs tailored to cater to various demographics and skill levels.

One of the notable facets of Brooks Crossing is its emphasis on community engagement and professional development. From teacher training programs and student fabrication experiences to family-friendly events and summer camps, the organization offers a comprehensive suite of initiatives designed to nurture curiosity and ignite passion for digital technology and machining.

During my initial orientation and training at Brooks Crossing, I was greeted by a welcoming atmosphere and a palpable sense of excitement. The building, fortified with security measures due to its government funding, exuded an aura of professionalism and dedication to excellence. Upon entering the lab, I was greeted by an impressive array of machines, each brimming with potential and awaiting exploration.

The orientation process was both informative and relaxed, with a focus on acquainting me with the organization's mission, values, and my specific responsibilities. Through a combination of paperwork and one-on-one discussions with my supervisor, I gained insights into the diverse range of activities and programs offered by Brooks Crossing.

As my training commenced, I found myself immersed in a hands-on learning experience that seamlessly blended theoretical knowledge with practical application. Under the guidance of my supervisor, I received comprehensive instruction on the operation of various machines and equipment, gaining proficiency through real-time learning during trips and events hosted at the lab.

My initial impressions of Brooks Crossing were overwhelmingly positive, characterized by a sense of enthusiasm, innovation, and a shared commitment to empowering individuals through STEM education. As I embarked on this transformative journey, I felt inspired by the boundless possibilities that lay ahead and eager to contribute to the organization's mission of fostering creativity, collaboration, and lifelong learning.

Management environment

The management environment at my internship is characterized by its simplicity and flexibility, fostering a dynamic and empowering atmosphere for personal and professional growth. At the helm of the organization is my direct supervisor, who oversees the entire program and orchestrates various events and activities. As the driving force behind Brooks Crossing's initiatives, my supervisor plays a pivotal role in setting the tone for the internship experience and ensuring its effectiveness.

In terms of supervision, my interactions with my supervisor are frequent and constructive. She provides guidance, support, and feedback to ensure that I am equipped with the necessary resources and knowledge to fulfill my responsibilities effectively. Whether it's assisting with event planning, facilitating activities, or troubleshooting technical issues, my supervisor is readily accessible and responsive to my needs, fostering a collaborative relationship built on trust and mutual respect.

One of the standout aspects of the management environment is the level of autonomy and freedom afforded to interns like myself. While I work closely with my supervisor and contribute to various projects and events, I also have the flexibility to pursue independent initiatives and projects that align with my interests and goals. This level of freedom empowers me to take ownership of my learning experience, experiment with new ideas, and explore areas of personal and professional interest without constraints.

The management structure at my internship is highly effective in facilitating a conducive learning environment while promoting autonomy and self-directed learning. By providing ample support and guidance while also encouraging autonomy and initiative, my supervisor and the management team enable interns to thrive and make meaningful contributions to the organization's mission of fostering creativity, innovation, and lifelong learning.

Major work duties and assignments

During my internship at Brooks Crossing Innovation Lab, my major work duties encompass a diverse range of responsibilities, assignments, and projects aimed at supporting the organization's mission of fostering STEM learning and innovation. These duties are essential to the smooth functioning of the lab and the successful execution of various events and initiatives.

1. Event Assistance: One of my primary duties involves assisting with the planning, organization, and execution of events hosted by Brooks Crossing. This includes setting up equipment, facilitating activities, and interacting with participants. For example, I was responsible for hosting a robot battle arena at an elementary school, engaging with both students and parents to showcase the lab's offerings and promote STEM education. By actively participating in these events, I help ensure a positive experience for attendees and contribute to the broader goal of inspiring interest in technology and innovation.

2. Independent Projects: In addition to event assistance, I have the opportunity to work on independent projects that leverage my skills and interests in technology. For instance, I undertook the development of an automatic watering system as a practical application of coding and engineering principles. Similarly, I explored the concept of cybersecurity by creating a "bad USB" device that simulates a hacking scenario when plugged into a computer. These projects serve as tangible examples of innovation and problem-solving, demonstrating the transformative potential of technology in addressing real-world challenges.

3. Support for Supervisor: Another aspect of my role involves providing support to my supervisor, particularly during busy periods or when additional assistance is needed. By

taking on tasks such as equipment maintenance, inventory management, and administrative duties, I help alleviate the workload of my supervisor and ensure the smooth operation of the lab. My proactive approach to problem-solving and willingness to take initiative contribute to the overall efficiency and effectiveness of the organization.

Each of my internship duties and projects is integral to the business for several reasons:

- Event assistance ensures the successful implementation of educational programs and activities, enhancing the lab's reputation and attracting participants.
- Independent projects showcase the innovative potential of technology and serve as inspiration for future initiatives and collaborations.
- Support for my supervisor enables her to focus on strategic planning and program development, ultimately contributing to the long-term sustainability and growth of the organization.

My work duties, assignments, and projects at Brooks Crossing Innovation Lab are essential components of the organization's operations, serving to advance its mission of promoting STEM learning, fostering innovation, and empowering individuals of all ages to explore the possibilities of technology.

Skills

During my internship at Brooks Crossing Innovation Lab, my involvement in cybersecurity was a multifaceted experience that encompassed both leveraging prior knowledge and acquiring new skills on the job. Drawing upon my existing skills and expertise, I was able to navigate the intricacies of cybersecurity concepts and technologies while also expanding my proficiency through hands-on learning and experimentation.

Prior to the internship, I possessed a foundational understanding of cybersecurity principles gleaned from coursework, self-study, and practical experience. This included knowledge of basic cybersecurity concepts such as encryption, network security, and threat detection. Additionally, I had experience with coding languages such as Python, which proved invaluable in understanding the underlying mechanisms of cybersecurity tools and protocols.

Upon joining Brooks Crossing, I encountered a diverse array of technologies and machinery, each requiring a unique set of skills and knowledge to operate effectively. To adapt to these new challenges, I engaged in on-the-job training to familiarize myself with the operation of machines such as 3D printers and laser engravers. Through hands-on practice and guidance from my supervisor, I quickly gained proficiency in using these tools to bring creative projects to life.

My internship provided me with the opportunity to delve into the realm of embedded systems and microcontroller programming, particularly with devices like Micro:bits and Raspberry Pis. By learning how to code and deploy these devices, I gained insight into the intersection of cybersecurity and hardware, exploring concepts such as secure communication protocols and device authentication.

My on-the-job experience with cybersecurity not only enhanced my technical skills but also broadened my understanding of the subject matter. By applying theoretical knowledge in real-world scenarios, I gained a deeper appreciation for the practical implications of cybersecurity practices and the importance of secure design principles in technology development. Moreover, collaborating with peers and industry professionals exposed me to diverse perspectives and approaches, enriching my understanding of cybersecurity as a dynamic and evolving field.

Curriculum preparation

The curriculum at Old Dominion University (ODU) provided me with a solid foundation in the field of technology, equipping me with general knowledge and conceptual understanding that proved valuable during my internship at Brooks Crossing Innovation Lab. While the curriculum did not specifically prepare me for the hands-on application of building projects like those undertaken at the lab, it instilled in me a deep understanding of how technology functions, the principles of coding, and the potential applications of various technologies.

One of the key connections between my academic studies and my internship experience was in the realm of conceptual thinking. The theoretical knowledge gained through coursework enabled me to approach new challenges with a critical mindset, drawing upon past concepts to learn and adapt to new ones. For example, my understanding of coding principles learned at ODU allowed me to quickly grasp the basics of coding on devices like Micro:bits and Raspberry Pis during my internship.

While the curriculum provided a strong theoretical foundation, there were aspects of the internship that revealed new concepts, techniques, and skills that I had not yet encountered in school. Working with actual devices like Raspberry Pis and learning how to code for embedded systems was a novel experience that exposed me to the practical application of technology in real-world scenarios. This hands-on experience reinforced my understanding of theoretical concepts while also introducing me to new skills and techniques that are highly relevant in today's technology-driven world.

Outcomes and Objectives Fulfillment

While the ODU curriculum provided me with a strong theoretical background in technology, my internship at Brooks Crossing Innovation Lab offered invaluable hands-on experience that complemented and reinforced my academic learning. By bridging the gap between theory and practice, the internship enabled me to apply and expand upon the knowledge gained in school, while also introducing me to new concepts and skills that are essential for success in the field of technology.

1. Leadership Qualities: The internship at Brooks Crossing provided ample opportunities for me to develop and demonstrate leadership qualities by teaching and leading groups of kids during various activities and events. I took on the responsibility of guiding students through coding games, operating machinery like 3D printers, and facilitating hands-on projects. By providing clear instructions, fostering a supportive learning environment, and effectively managing group dynamics, I was able to lead engaging and educational sessions that inspired curiosity and enthusiasm among the participants.

Thus, the internship fulfilled the goal of developing leadership qualities to teach and lead groups of kids.

2. Learning Projects Using Coding and Machines: Throughout the internship, I had the opportunity to learn and create projects using coding and the advanced machinery available at Brooks Crossing. From conceptualizing designs to bringing them to life using tools like Micro:bits, Raspberry Pis, and 3D printers, I gained valuable hands-on experience in project creation and execution. By immersing myself in these projects and receiving guidance from my supervisor, I deepened my understanding of coding principles, honed my technical skills, and expanded my knowledge of innovative technologies. Therefore, the internship successfully fulfilled the objective of learning more about creating projects using coding and available machines.
3. Impact on Kids' Future in Technology: One of the primary objectives of my internship was to have a positive impact on the future of the kids by expanding their possibilities in the field of technology. By actively engaging with students, inspiring curiosity, and providing hands-on learning experiences, I played a role in sparking interest and enthusiasm for technology among the participants. Whether through teaching coding concepts, demonstrating the capabilities of 3D printing, or guiding students through creative projects, I contributed to empowering them to explore and pursue opportunities in the technology field. Thus, the internship effectively fulfilled the goal of impacting the kids' future in technology by expanding their horizons and fostering a passion for innovation and learning.

Motivating, Discouraging, and Challenging aspects

The most motivating and exciting aspect of my internship at Brooks Crossing Innovation Lab was the unparalleled freedom and autonomy afforded to interns. The ability to work on projects of my choosing, explore innovative ideas, and take ownership of my learning journey was incredibly empowering. This freedom not only allowed me to pursue my interests and passions but also instilled a sense of responsibility and accountability, driving me to excel and make meaningful contributions to the organization.

Conversely, the most discouraging aspect of the internship was the requirement to commute to the office on a daily basis. As someone who values flexibility and autonomy, the rigid schedule of commuting to a physical location every day felt restrictive and less conducive to productivity. Reflecting on this experience, I realized that I prefer the flexibility of remote work, which allows for a better work-life balance and eliminates the stress of commuting.

Despite the freedom and excitement of the internship, the most challenging aspect was navigating the inevitable obstacles and setbacks encountered while working on projects. From technical glitches to unforeseen complications, I faced numerous challenges that tested my problem-solving skills and perseverance. However, overcoming these challenges was also the most rewarding aspect of the internship, as it allowed me to grow personally and professionally, gain valuable experience, and emerge with a heightened sense of accomplishment.

Recommendations for future interns in this internship.

Future interns embarking on the journey at Brooks Crossing Innovation Lab should brace themselves for a significant level of responsibility and autonomy. It's essential to cultivate self-discipline and motivation, as much of the work will require proactive action without explicit direction. Familiarizing oneself with basic coding concepts and the operation of common machinery like 3D printers and laser engravers prior to the internship can significantly ease the transition and maximize productivity. Additionally, honing problem-solving skills is crucial, as interns are likely to encounter challenges and obstacles while working on projects. Embracing creativity and thinking outside the box will be beneficial, as the internship provides opportunities to explore innovative ideas and pursue independent projects. Effective communication is key to success, so interns should strive to communicate openly and clearly with their supervisor and colleagues, providing updates, seeking feedback, and asking for guidance when needed. By preparing with these recommendations, future interns can enter the internship with confidence, ready to tackle challenges, seize opportunities, and make the most of their experience at Brooks Crossing Innovation Lab.

Conclusion

The internship at Brooks Crossing Innovation Lab has been an enriching and transformative experience, leaving me with valuable insights and takeaways that will shape my future endeavors. Firstly, I've learned the importance of self-discipline, autonomy, and proactive action in a professional setting. Taking ownership of projects and embracing responsibility has been instrumental in my growth as an individual and a professional. This experience has also reinforced the significance of creativity and problem-solving in navigating challenges and driving innovation.

Moving forward, my internship experience will undoubtedly influence the remainder of my college journey at ODU. Armed with newfound skills, knowledge, and confidence, I intend to approach my academic pursuits with renewed vigor and purpose. I'll seek out opportunities to apply what I've learned in the classroom to real-world projects and initiatives, fostering a more holistic and practical approach to learning. Additionally, I'll continue to prioritize self-directed learning and exploration, recognizing the value of taking initiative and pursuing my passions outside of the traditional academic curriculum.

Looking ahead to my future professional path, my internship experience has provided invaluable insights into the world of technology and innovation. It has reaffirmed my passion for leveraging technology to solve real-world problems and make a positive impact in the community. Inspired by my experiences at Brooks Crossing, I aspire to pursue a career path that combines my interests in technology, education, and community engagement. Whether in the realm of STEM education, project management, or social entrepreneurship, I'm excited to apply the skills and lessons learned during my internship to contribute meaningfully to the ever-evolving landscape of technology and innovation.