Reflective Essay

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#3 Writing Assignment: Reflective Essay

Introduction

As my career in the Air Force nears its close, my educational journey at Old Dominion University (ODU) is also drawing to an end, marking two major milestones in my life. Reflecting on my studies in General Engineering Technology, an interdisciplinary degree, I see how the program deepened my understanding of core engineering principles, including mechanical, electrical, materials, and dynamics engineering. My experience as an avionics technician with the Air Force has taught me to analyze complex aircraft systems, and my ODU courses have expanded this knowledge, enhancing my problem-solving abilities and interdisciplinary approach.

Through the process of creating an ePortfolio, I have gathered a collection of artifacts that illustrate my academic growth and professional development. This reflective essay highlights three significant themes that have emerged throughout my education: integration of engineering disciplines, practical application of engineering knowledge, and effective communication in engineering. Each theme represents a core skill that I have developed during my studies, and all three will be critical to my success in my future career. This essay not only captures my academic journey but also explores how the ePortfolio artifacts demonstrate my mastery of these interdisciplinary skills, giving me a comprehensive understanding of engineering that extends beyond individual subjects.

Integration of Engineering Disciplines

A key component of my educational experience was learning the interdisciplinary process, specifically how to analyze problems from multiple disciplinary perspectives. The

IDS300W course, Interdisciplinary Theories and Concepts, taught me to find common ground between seemingly unrelated disciplinary theories and integrate insights into a cohesive solution (Repko & Szostak, 2021). This experience was transformative for me, as I realized how powerful an interdisciplinary approach could be in tackling complex engineering problems. For example, in my Interdisciplinary Research Paper on Lethal Autonomous Weapon Systems (LAWS), I integrated perspectives from computer science, legal studies, and ethics to analyze the multifaceted challenges posed by these systems. Each perspective added a layer of understanding, requiring me to consider legal constraints, ethical implications, and technological limitations simultaneously.

The process of creating this paper was challenging; it required hours of research and careful evaluation to find the most relevant theories and applications from each discipline. By taking complex topics like computer sensors and algorithms, legal accountability, and ethical standards, I learned to break each down to their basic principles. Once these core ideas were established, I applied them in unison, ultimately concluding that the deployment of LAWS would be premature without significant advances in all three fields. This artifact, showcased in my ePortfolio, illustrates my ability to integrate ideas from various fields to address complex, real-world issues. Such integration is crucial in the engineering field, where professionals often need to balance and apply multiple engineering disciplines—mechanical, electrical, and materials sciences, among others—to create a unified solution.

Learning this process has also shaped how I approach engineering problems. As an avionics technician, I often need to troubleshoot and resolve technical malfunctions in aircraft. This job requires an interdisciplinary mindset, as diagnosing issues demands knowledge from various engineering disciplines. For instance, identifying a fault in an aircraft's flight control

system requires understanding not only the electrical circuitry but also mechanical stress points, hydraulic pressure systems, and material properties. Through my coursework and projects, I have come to appreciate the importance of having an integrated skill set that allows me to see each engineering component as part of a larger system. My interdisciplinary training has given me the confidence to approach complex problems holistically, an essential skill for my future endeavors in the engineering field.

Practical Application of Engineering Knowledge

Throughout my coursework, I learned to apply theoretical knowledge in concrete ways, enhancing my problem-solving abilities and enabling me to adapt to real-world challenges. My ePortfolio includes various exams from courses such as Statics, Strength of Materials, and Fundamentals of Electrical Engineering. In Statics, I revisited vector analysis using trigonometry. Vector analysis is a fundamental skill for calculating forces on stationary structures so that systems can be designed to withstand the stress caused by the forces. This understanding was built upon in Strength of Materials, where I delved into the internal stresses within different materials to find the sheer and torsion forces. These internal forces are a direct result of the static vector forces, both are interrelated. The principles of vector analysis helped me calculate resultant forces, angles, and the secondary stresses accurately, demonstrating how interconnected these areas of engineering are in practical applications.

Working through these courses helped me realize how interconnected mechanical and electrical engineering truly are. My Fundamentals of Electrical Engineering course taught me to calculate reactance, a resistance-like property that opposes electrical current flow, in electrical circuits and analyze power systems. I observed a connection between the mathematical techniques used here and those I had learned in Statics, which was an “a-ha” moment for me.

The same principles of vector analysis and trigonometry were essential for both static force calculations and electrical reactance calculations. My assignments in this course deepened my understanding of how mathematical concepts like vector decomposition are used across different engineering disciplines.

Reflecting on these my exams from both courses highlighted the importance of each engineering principle in forming a complete and functional system. When designing or analyzing a system, every component, whether mechanical, electrical, or structural affects the others. For instance, in my pipeline system exam for my Fluid Dynamics course, I had to design a system to transport a specific volume of fluid in a set amount of time. I applied Bernoulli's equation to find the appropriate pump that could deliver the fluid according to the specifications of the problem statement. If this were a real-world design, I would have to consider the weight of the pump for structural integrity, its electrical power requirements, and the structural support material to ensure its durability. This example underscores for me the necessity of integrating multiple engineering fields in every stage of the design process. Looking back, I have a new appreciation for how these hands-on applications and complex problem-solving tasks have prepared me for engineering work that requires both depth and breadth of understanding.

Effective Communication in Engineering

An essential yet often overlooked aspect of engineering is the ability to communicate complex ideas effectively to diverse audiences. In my Digital Writing course, I developed skills in various media, including posters, websites, and a GIF essay. These projects allowed me to explore different ways to convey information visually and textually, each requiring careful consideration of design elements like fonts, colors, layout, and contrast (Ball et al., 2022). For example, in designing a website for a class project, I learned how crucial layout and color

contrast can be in conveying information clearly. I recognized that poor design choices, such as light-colored text on a light background, could obscure critical information and lead to misunderstandings. As a multimodal artifact in and of itself, my ePortfolio is also a demonstration of these design skills (Reynolds & Davis, 2013).

Incorporating this design knowledge into engineering presentations has proven invaluable. In professional settings, engineering projects are often accompanied by presentations to explain technical details to stakeholders, who may not have an engineering background. Miscommunication in these settings could lead to safety risks, project delays, or cost overruns. My digital projects taught me how small choices in presentation design—like spacing to reduce clutter or using contrasting colors for readability—can make a significant difference in the clarity of my message. In my ePortfolio, the artifacts from Digital Writing exemplify my growth in communication skills, which I now see as vital for my career. Being able to present complex engineering concepts in a clear and impactful manner will ensure that critical information is understood and acted upon correctly by all parties involved.

These lessons in digital communication have expanded my understanding of the importance of accessibility in engineering. For instance, if I am presenting a safety briefing on a newly designed aircraft part, I need to ensure that all relevant information is clearly visible and understandable at a glance. This skill translates into safer designs and improves operational efficiency, as clear communication prevents misunderstandings and mistakes. My ePortfolio showcases these digital projects as evidence of my dedication to effective communication—a skill that, although not strictly technical, is essential for any successful engineer.

Conclusion

Reflecting on my studies at Old Dominion University, I recognize how the interdisciplinary approach has profoundly shaped my professional identity and skill set. Each theme—integrating multiple engineering disciplines, applying practical engineering knowledge, and communicating effectively—has been crucial to my growth as a student and as a professional. My experience integrating various engineering principles, applying them in practical scenarios, and conveying them effectively has prepared me to tackle complex challenges beyond the classroom. The artifacts in my ePortfolio are more than assignments; they represent milestones in my growth as an engineer and as a communicator.

The interdisciplinary foundation I developed at ODU has helped me understand that engineering is more than technical knowledge. It is about viewing challenges holistically, applying knowledge across various fields, and presenting findings in a way that promotes safety, efficiency, and innovation. As I transition from a military career to new professional opportunities, I am confident that the skills gained through my interdisciplinary education will enable me to approach problems thoughtfully and innovatively. These foundational insights will serve as the cornerstone of my contributions in the engineering field, and I am eager to bring these skills into my next role, where I can continue to grow as both a professional and a lifelong learner.

References

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