

A Students Perspective of Professional Development in Engineering Technology

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Caeden Goodnough, growing up on my grandparents' farm, I was immersed in the world of machinery. SUNY Canton welcomed me, and has given me hands on experience that has helped me greatly. I am currently a junior in the Mechanical Engineering Tech program. Beyond classes, I co-founded three clubs, including the Society of Manufacturing Engineers, fostering a community of enthusiasts. My farm experience instilled in me a strong work ethic and problem-solving skills, shaping my academic path. Now, on the brink of my mechanical engineering career, With a blend of practical knowledge and academic foundation.

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Dr PS (Puttagounder Dhanasekaran Swaminathan) has PhD degree in mechanical engineering from Wichita State University, Wichita, KS. He is currently working as an Associate professor, at SUNY Canton, NY. He has taught, CAD/CAM, FEA, Machine design, Statics, Strength of Materials, and various courses on materials and materials selection, for both undergraduate and graduate programs. He also authored and co-authored a text book chapter and research papers on machining of composites. He has a diverse industrial experience for 27 years, in design, research and manufacturing of electro mechanical systems, such as design of various types of gear and gear boxes, antennas and light and heavy fabricated structures, for communication, TV telecast, natural disasters management and Telemedicine application. Dr PS, designed and manufactured various types of antenna's weighing from 200 pounds to 100,000 pounds. He was also actively involved in configuring the antenna controls and selection of motor and motor controllers. Dr PS, has advised senior/capstone projects over 5 years. Has reviewed papers for ASEE, SAMPE, ASME and SME.

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Abstract:

Professional development in engineering encompasses a deliberate and continuous endeavor to enhance an individual's skills, knowledge, and capabilities throughout their career. It is a structured approach focused on mastering new technologies, staying ahead of current regulations, and refining problem-solving techniques. Professional development offers more than just new skills; it can also boost job satisfaction. As engineers become more adept and self-assured, they experience greater fulfillment in their work. This, in turn, creates a more harmonious and stable work environment. Additionally, research shows that engineers engaging in ongoing professional development enjoy more significant employment opportunities. Employers value their adaptability and drive, making them highly sought-after candidates. It is pertinent to view its significance from the viewpoint of a Mechanical Engineering Technology Student at SUNY Canton; most students tend to put professional development on the back burner and focus on finishing their degree. This is a prevalent problem that students must recognize as the journey toward becoming adept engineers commences when we choose this path. In the dynamic realm of engineering, where innovation reigns supreme and solutions are crafted to improve society, personal growth is not merely significant; it is indispensable. The ever-changing landscape of the field necessitates a commitment to lifelong learning and development to ensure excellence and readiness for the challenges. This paper aims to explore the concept of professional development for achieving excellence and preparedness in the engineering world, along with strategies for effectively positioning oneself for future success. The advantages and criticality of professional development and how a student still in college can plan to take these next steps to become a complete engineer will be discussed.

Introduction:

This paper explores the realm of professional development for engineers. This study aims to understand what exactly professional development is, and how students can better themselves in the future by planning. In the dynamic and ever-evolving field of engineering, professional development stands as a cornerstone for individual growth and career advancement. It encompasses a deliberate and continuous effort to enhance skills, expand knowledge, and refine capabilities throughout one's professional journey. This structured approach is not merely about mastering new technologies or staying abreast of regulations; it is about fostering a mindset of lifelong learning and adaptability essential for success in the engineering world [1].

According to Lian Parsons of Harvard's Division of Continuing Education, she defines "Professional Development" as gaining new skills through continuing education and career training after entering the workforce [1]. I disagree with this statement as engineers should plan and act upon professional development before joining the workforce. For engineering students, the significance of professional development cannot be overstated. Yet, it is a facet often overlooked amidst the demands of academic pursuits. As a Mechanical Engineering Technology student at SUNY Canton, I have observed a prevalent tendency among peers to prioritize degree completion over investing in their professional growth. However, students must recognize that the journey toward becoming adept engineers begins long before graduation.

This paper seeks to delve into the concept of professional development within the engineering realm, exploring its advantages, criticality, and practical strategies for achieving excellence and readiness. By examining the nexus between personal growth and professional success, we aim to provide insights that empower students to proactively navigate their career paths and cultivate the skills necessary for thriving in the dynamic landscape of engineering.

How to Plan for Professional Development

Developing oneself professionally requires a well-organized and systematic approach that involves identifying one's objectives, evaluating the areas where improvement is needed, and implementing effective strategies to enhance one's skills, knowledge, and expertise.

When it comes to understanding the importance of self-assessment and professional development in engineering, scholarly articles like Lent, Brown, and Hackett's (1994) "Toward a unifying social cognitive theory of career and academic interest, choice, and performance" provide valuable insights. In this article, the authors delve into the significance of self-assessment within the broader context of social cognitive theory, emphasizing how individuals' beliefs, interests, and goals shape their career trajectories and academic achievements. Lent et al. (1994) argues that self-assessment processes, such as reflecting on one's skills, strengths, areas for improvement, career goals, aspirations, and professional interests, play a pivotal role in guiding career decision-making and goal setting. By examining one's competencies and aspirations, engineers can better align their professional development efforts with their long-term career objectives, ensuring that they acquire the necessary skills and knowledge to thrive in their chosen field. Lent et al.'s (1994) work underscores the importance of self-awareness and goal setting in fostering career success and provides a theoretical framework that resonates with the practical realities of professional development in engineering and other disciplines [2].

Setting clear objectives is an essential aspect of effective planning for professional development. Adhering to the principles of SMART goals ensures that these objectives are focused, achievable, and actionable. By establishing Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) goals, engineers can provide clarity and direction to their development efforts. This approach allows individuals to define tangible outcomes and milestones, making it easier to track progress and evaluate success [3]. Moreover, prioritizing objectives based on their alignment with career aspirations and organizational needs ensures that engineers invest their time and resources in areas that have the greatest potential for personal growth and impact within their roles. By breaking down long-term goals into smaller, actionable steps, engineers can make progress incrementally and maintain momentum toward achieving their objectives [3, 4]. This approach not only facilitates a sense of accomplishment but also enables individuals to adapt their plans as needed in response to changing circumstances or priorities. In essence, setting clear objectives using the SMART framework empowers engineers to take a structured and strategic approach to their professional development, ultimately enhancing their skills, capabilities, and career prospects in the field of engineering.

Identifying development opportunities is a crucial aspect of professional growth. It involves exploring various resources and avenues for learning and skill enhancement. Engineers can benefit from researching a wide array of professional development resources, including workshops, seminars, conferences, webinars, online courses, and certification programs [5].

These resources offer targeted learning experiences that cater to different skill levels, interests, and career objectives. It is essential to consider both formal and informal learning opportunities for a comprehensive development plan. Mentoring, coaching, networking events, and self-directed learning activities provide valuable avenues for skill enhancement and personal growth outside of traditional classroom settings [6].

Professional associations, industry organizations, academic institutions, and online platforms offer specialized training, industry insights, and networking opportunities tailored to engineers' unique needs and interests. Exploring these resources can provide engineers with access to a wide range of opportunities for enhancing their skills and knowledge [6]. Internships also play a pivotal role in providing hands-on experience and practical skills that complement academic learning. They allow engineers to apply theoretical knowledge in real-world settings, gain exposure to industry practices, and develop critical workplace skills such as communication, problem-solving, and teamwork. Engaging in internships also allows engineers to explore different career paths, industries, and work environments, helping them make informed decisions about their future career trajectories. Internships also provide valuable networking opportunities, allowing engineers to establish connections with industry professionals, mentors, and potential employers. By participating in internships, engineers can bridge the gap between academic learning and professional practice, acquire valuable industry experience, and enhance their employability in the competitive job market. Thus, integrating internships into the professional development plan can significantly contribute to engineers' overall growth and success in their careers [5, 6, 7].

Creating a development plan is a strategic approach to guide professional growth and effectively achieve career objectives. It begins with formulating a personalized professional development plan that meticulously outlines goals, objectives, and actionable steps. This plan serves as a roadmap, aligning individual aspirations with development needs. Engineers should identify specific activities and initiatives that resonate with their goals and objectives, ensuring that each action step contributes meaningfully to their professional advancement. By pinpointing activities such as workshops, courses, certifications, or networking opportunities, engineers can tailor their development plans to address specific skill gaps and career aspirations. Along with this, establishing a timeline for completing each activity is crucial for maintaining momentum and tracking progress. Allocating resources, including time, budget, and support, is equally important, as it ensures that individuals have the necessary means to pursue their development endeavors effectively [8]. Whether it's dedicating time to self-study, investing in professional courses, or seeking mentorship, proper resource allocation empowers engineers to execute their development plans efficiently. In essence, a well-crafted development plan provides a structured framework for engineers to pursue their professional aspirations.

Impact of Professional Development

As professionals progress in their careers, investing in continuous education and accumulating valuable experience becomes paramount not only for personal growth but also for financial success. Earning advanced degrees, such as master's or doctorate degrees, can significantly enhance an engineer's expertise and proficiency. These degrees offer a wealth of specialized knowledge, advanced problem-solving abilities, critical thinking, and a deeper comprehension of

intricate engineering principles. Additionally, those with advanced degrees are often able to command higher salaries, as their added value to their organizations is widely recognized. Individuals who possess advanced degrees in engineering typically receive higher median annual salaries. In general, those with a master's degree earn more than those with a bachelor's degree, and those with a doctorate may earn up to 35% more than their counterparts with a bachelor's degree [9].

The value placed on advanced education highlights the significance of continuous learning and professional growth in the engineering field. Engineers who are dedicated to broadening their knowledge through higher education not only enhance their career opportunities but also position themselves as valuable contributors within their organizations. Additionally, their increased expertise empowers them to take on intricate challenges, foster innovation, and make meaningful contributions to the progress of their respective industries.

Professional development in engineering includes personal growth and fulfillment, which are essential for an engineer's career satisfaction and well-being. Engineers can improve their leadership, communication, and interpersonal skills through professional development initiatives, contributing to their personal growth by navigating workplace dynamics and connecting with others. Workshops and self-assessment exercises provide clarity about career goals and aspirations, aligning strengths and values with their professional trajectory, and fostering a sense of purpose and direction [10]. Professional development also promotes resilience and adaptability by encouraging engineers to embrace new challenges and opportunities, building confidence in their abilities to overcome obstacles. Work-life integration initiatives promote a healthy balance between professional and personal responsibilities, leading to greater overall satisfaction and fulfillment among engineers [4, 8].

A Student Perspective of Professional Development in Engineering Technology:

The importance of internships and field experiences in complementing academic learning and offering practical insights into the engineering industry is highlighted from a student perspective. SUNY Canton's proactive approach towards enhancing professional development opportunities for students is praised through the establishment of the SME club. The student emphasizes the value of hands-on experiences, such as the field visit to Alcoa's Massena Operations, in exposing students to different engineering disciplines and industrial processes, thereby better preparing them for future careers.

The results of this research underline the importance of incorporating practical experiences and industry exposure into the academic curriculum of Mechanical Engineering Technology programs. Proactive measures, such as setting up student clubs and arranging visits to industrial facilities, are crucial in bridging the gap between academic learning and industry expectations. By providing students with hands-on experiences and insights, universities can better equip aspiring engineers with the necessary skills and knowledge to tackle the challenges and demands of the engineering industry.

Enhancing professional development opportunities within Mechanical Engineering Technology programs is essential for preparing students for successful careers in the engineering industry. The perspectives shared by the student highlight the need for proactive measures, such as

establishing student clubs and organizing field visits, to provide students with hands-on experiences and exposure to different industries. By incorporating such initiatives into the academic curriculum, universities can better equip students with the skills, knowledge, and confidence needed to excel in their future careers as engineers.

Conclusion:

This paper explores the concept of professional development in engineering from various perspectives. Professional development is the continuous effort to enhance skills, expand knowledge, and refine capabilities throughout one's career. It is not just about mastering new technologies or staying abreast of regulations, rather it fosters a mindset of lifelong learning and adaptability, which is essential for success in the dynamic engineering field [1, 2].

Practical experiences, internships, and industry exposure are critical for responsive academic learning and preparing students for future careers. Initiatives such as student clubs and field visits to industrial facilities can bridge the gap between academic learning and industry expectations. These initiatives provide students with hands-on experiences, insights, and exposure to different engineering disciplines and industrial processes. In turn, it better equips individuals with the challenges and demands of the engineering industry. Ultimately, investing in professional development benefits not only personal careers but also contributes to the advancement and innovation of the engineering field as a whole.

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