

Preparing Future Aviation Maintenance Technicians: What Licensure and Experience Can Inform Us

Asso. Prof. Efren P. Cuellar

efrencuellar273@gmail.com



***Asso. Prof. Efren P. Cuellar** is currently a faculty member under the Institute of Engineering and Technology of the Philippine State College of Aeronautics (PhilSCA), Basa-Palmayo Campus, located at Floridablanca, Pampanga. He is a holder of a Ground Instructor's license with ratings on All Airframes and Powerplants subjects and an Aviation Maintenance Technician license (A & P ratings), duly issued by the Civil Aviation Authority of the Philippines (CAAP), ICAO Annex II. He held various designations such as Sports Director and a member of the Board of Management of the State Colleges Universities Athletic Association in Region III (SCUAA III) (2000-2006); Head of the General Services*

Department (2022-2023); He is also a founding member of the Aviation Professionals Association of the Philippines (APAP Inc.). He has presented a research study at the 3rd Annual Philippine Aviation Research Conference (PARC 2024) and at the Global Research Conference (GRC 2024).

Introduction

The growing importance of preparing future maintenance technicians for the aviation industry is driven by technological advancements and changes in aviation safety standards. Aviation maintenance technicians are responsible for maintaining aircraft in a manner that protects lives and maximizes operational effectiveness; therefore, training and licensure are essential to the aviation industry's continued safety and operational effectiveness. Emerging technologies, such as automation and data analytics, require future aviation maintenance technicians to develop a wide range of skills beyond traditional mechanical skills. These skills also include the ability to work with complex systems, analyze data, and use sophisticated diagnostic equipment.

As noted earlier, the recent changes in licensure practices highlight the importance of continuous training and development to maintain technicians' current skill sets and capabilities. As regulatory agencies update their requirements to include modern competencies, they recognize the limitations of older training methodologies and are equipping technicians with the skills needed to operate in the current aviation maintenance environment. By emphasizing the general competencies technicians will require in the future, the aviation industry will prepare technicians to meet engineering challenges, reduce human error, and ultimately increase aviation safety.

The importance of examining the role licensure plays in aviation maintenance provides a strong foundation for developing a licensing framework for aviation maintenance technicians. An effective licensing framework verifies the technician's qualifications and promotes a culture of continual improvement in education and training, aligning with changes taking place within

the aviation industry. The results provide a foundation for reviewing the role of licensure in the educational and performance development of aviation maintenance technicians. Licensure plays an important role in aviation maintenance by serving as the basis for technicians to demonstrate they meet industry standards & regulatory requirements. Aircraft maintenance certifications are a standard way to measure the required skill & knowledge levels necessary for safe aircraft operation.

Regulatory authorities specify minimum qualifications for technicians, including education & on-the-job training or experience as part of the certification process; as such, aviation maintenance technicians demonstrate their competence to meet aviation safety needs through licensure.

Licensure impact on safety cannot be overstated: technicians holding appropriate licenses possess both mechanical knowledge of aviation-related systems & knowledge of the regulatory framework associated with aviation safety, thereby enabling risk-reduction techniques through hazard identification and implementation of preventive measures.

The licensure renewal process promotes continued job skills development by requiring technicians to engage with advances in technology, as well as current aviation safety practices, through a culture that supports lifelong learning within the aviation industry.

There are many new challenges facing the aviation industry as a result of rapid technological developments; consequently, the importance of effective aviation maintenance licensure will continue to increase. Aviation maintenance licensees will be required to be able to not only service currently available aviation systems, but also adapt to the changing needs associated with future technology innovations. The effect of this change will ultimately influence how aviation maintenance education evolves to align with emerging industry standards & technological advancements; therefore, the discussion of aviation maintenance licensure leads to an examination of existing trends in aviation maintenance education.

Major Changes Currently Affecting Aeronautical Maintenance Education

In the past few years, there has been a major shift in aeronautical maintenance education. The newest generation of technicians needs both traditional (hands-on) training and high-tech (technology-based) skills to manage the complexity of modern aircraft. As a result of this shift, many educational institutions are updating their aeronautical maintenance programs and curricula to include more high-technology equipment so that the next generation of technicians can manage modern aircraft.

In addition to providing traditional and high-technology training, educational institutions are offering new learning opportunities through computer-based, virtual reality, and simulation-based training. These types of training provide students with real-world experience by allowing them to practice their skills in a safe, controlled environment.

Aeronautical maintenance education will incorporate both theoretical and practical learning to develop the critical-thinking and problem-solving skills needed in today's aviation industry.

In addition, schools are designing collaborative learning opportunities in which students participate in team-based projects that represent how they will work in an aviation

environment. This collaboration fosters a sense of community among the student population and enables students to develop critical communication and teamwork skills to prepare them for their careers after graduation. Collaborative projects will also create a greater understanding of team dynamics; this understanding will be important for their future careers. To ensure that graduates of their programs possess the required skills and knowledge necessary for placement in the industry, educational institutions partner with aviation employers (Manuel, 2017).

The aviation industry is continuously changing its technology-based systems, including the use and implementation of artificial intelligence (AI) and data analytics. The evolution of the aviation industry will result in changes to aeronautical maintenance education programs to incorporate new technological advancements. Technicians will need to understand how to apply and use the new high-tech systems required to maintain and troubleshoot the advanced systems found in the current generation of aircraft.

Integrating high-technology systems into aviation maintenance education will help learners prepare for the future. In the next section of the paper, we will explore how technological advancements will shape the future of aviation maintenance (Manuel, 2017).

Aviation Maintenance and New Technologies

New technologies are changing how we perform aviation maintenance by making those tasks more efficient, faster, and easier. One example of this is drone technology, which helps us perform inspections and maintenance on aircraft. Drones can inspect aircraft surfaces and inaccessible areas faster and more safely than technicians, reducing inspection and maintenance time. Additionally, the use of drones in inspections increases safety by decreasing the number of technicians required to work at height, thus creating a safer working environment. Drones also provide high-resolution images of aircraft surfaces for detailed analysis.

Another developing technology changing aviation maintenance is predictive maintenance. Predictive maintenance uses data analysis to identify potential problems before they escalate into major issues. Maintenance teams can monitor the health of aircraft components using sensors and data analytics, thereby being proactive in aircraft maintenance. This results in less downtime during maintenance, more effective use of resources, and lower maintenance costs.

Artificial intelligence (AI) is rapidly evolving within aviation maintenance. AI algorithms can analyze large amounts of data to identify trends and predict failure with great accuracy. This will allow aviation maintenance technicians to focus their repair efforts on the highest-priority areas, ultimately improving safety. As technicians learn to work alongside these technologies, their roles will also be affected and will require additional training to understand and interpret data and manage technology.

As more advancements become mainstream in the aviation industry, the need for hands-on experience will continue to grow. Technicians must be able to operate these tools and demonstrate their proficiency in actual aircraft repair environments, ultimately leading to safe, dependable aircraft.

Importance of Hands-on and Real-world Practice

Hands-on & real-world experience will be the foundation of education and training programs offered to these professionals in the aviation maintenance field. As classroom proceedings establish a solid theoretical foundation, the application of these theories in practical contexts through on-the-job training or internship opportunities is critical to the success of the development process for all aviation maintenance-related tasks in realistic environments. Internships give aviation maintenance students the ability to apply the principles taught in the classroom during internship tasks at literally thousands of locations worldwide. Here, students will see how a company actually operates on a daily basis, the safety protocols associated with this operation, and the differences between a normal daily operation and a crisis situation.

Internship experience creates a bridge between theory and practical application of the skills required to support successful operations. In addition, this experience will further instill confidence and competence as they enter the workforce.

Mentorship programs will continue to enhance these "real-world" experiences. Through mentorship programs, seasoned professionals can provide their newer counterparts with knowledge, guidance, and assistance throughout the early years of their aviation maintenance career, helping them become familiar with first-hand processes of conducting maintenance. Additionally, these mentorships will foster a culture of education and support among mentors and mentees by providing opportunities for newer technicians to ask questions, troubleshoot, and resolve issues that are not typically addressed in standard training programs or books. As a result, mentorship will accelerate learning and foster accountability and professionalism within the aviation maintenance industry.

In an industry where technological advancements require technicians to maintain a general level of proficiency through continuing education, there are obstacles that create tension between retaining these experienced technicians and providing them with opportunities for continuing education through practical experience. With ongoing advancements in the aviation industry, it will be essential that any training gaps are addressed to equip the next generation of technicians with the skills needed to meet today's and future demands.

Problems Facing Aviation Maintenance Training

There are many problems with aviation maintenance training that affect how well technicians are prepared for the workforce. The most significant of these is funding, as many educational institutions need funds to upgrade their facilities, equipment, and curriculum to keep pace with technological advances. Without adequate funding, educational institutions will not have access to the latest diagnostic tools and simulators for hands-on training, creating a workforce with inadequate skills to maintain today's aircraft.

Another significant issue facing aviation maintenance training programs is access to training resources. Many aviation maintenance training institutions lack partnerships or other connections with companies in the aviation industry, which provide students with real-world experience and exposure to today's aviation practices. The lack of access to updated training tools and environments diminishes the effectiveness of training and dissuades highly motivated students from entering the field of aviation maintenance.

A third issue is that training programs are required to constantly modify their curriculum to keep pace with **technological change**, and therefore have an ongoing need to support students through financial investment and collaboration with aviation technologies and businesses that are aware of changing technologies and trends in the aviation industry.

Collaborations between educational institutions and aviation businesses can help facilitate overcoming these challenges. Establishing cooperative agreements with aviation businesses can provide educational institutions with access to training resources, funding, and real-world experience necessary to prepare students for careers in a rapidly evolving aviation industry.

Industry Partnerships

Industry collaborations are becoming increasingly critical in aviation maintenance training by providing support for improved training programs. By partnering with businesses in the aviation industry, educational institutions can align their training programs with industry standards and equip their students with the skills and knowledge to succeed. Through collaboration with aviation businesses, education institutions can encourage the implementation of the latest technologies and processes into their training programs, ultimately enhancing students' ability to enter the aviation workforce.

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