

The Growing Importance of Competency-Based Training and Assessment in Aviation

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Aviation is a highly regulated and complex industry, one in which safety takes precedence. Aviation professionals including air traffic controllers, maintenance technicians and safety inspectors require a wide range of technical and non-technical skills to perform their jobs safely and effectively.

Over the years, competency-based training and assessment (CBTA) has emerged as a critical approach to workforce development across various professions. Unlike traditional pass-or-fail models, the competency-based approach allows individuals to identify their weakness and work on improving them at their own pace, thereby fostering a more personalised and effective learning experience. Specifically within the aviation sector, CBTA plays a pivotal role in equipping aviation professionals with the knowledge, skills, and attitudes (KSA) necessary for maintaining the high safety standards expected of the sector.

The Beneficial Role of CBTA in Aviation

Competency refers to the dimension of human performance that reliably predicts successful job execution. It is demonstrated through behaviours that effectively apply relevant KSA necessary to carry out tasks under specific conditions. Competency goes beyond theoretical knowledge or skills. It is demonstrable through practical application in real-world scenarios, where optimal outcomes are achieved.

In the aviation industry where safety is paramount, CBTA in aviation is designed to ensure that aviation professionals are able to effectively acquire and maintain the competencies necessary for their role. It does so by applying the principles of competency-based education that emphasises hands-on, practical training, as well as by focusing on achieving clearly defined performance outcomes. It is not enough to simply complete a set number of training hours or courses. Instead, trainees must demonstrate their mastery in specific tasks and responsibilities essential for the safe and effective performance in their roles in order to pass the training programme.

To create a realistic training environment, CBTA often incorporates simulation-based training and practical exercises that replicate real-world scenarios. This allows trainees such as ground handling crew to practise technical skills, such as towing of the aircraft from hangar back to flight line. It also offers them a chance to handle complex situations in a safe environment, so that they are well-primed to meet unexpected challenges in the real world.

CBTA also offers structured pathways that guide learners through progressive stages of skill development. Each stage is designed to build upon previous competencies, offering a comprehensive and systematic approach to training. This training approach promotes a culture of continuous improvement by providing ongoing feedback to trainees. Each stage also incorporates lessons learned from real-world incidents and developments, integrating crucial skills such as crew resource management principles, emphasising teamwork, communication, decision-making and situational awareness. This approach thus allows for more personalised learning to meet individual needs and learning styles, offering flexibility to enhance engagement and support learning outcomes.





Industry Collaboration Strengthens CBTA

Collaboration among industry stakeholders, including regulatory bodies, training institutions and aviation companies strengthens CBTA. These partnerships ensure that CBTA programmes align with industry standards and best practices, delivering consistent, high-quality training for aviation professionals. For instance, ICAO guidelines play a vital role in setting the standards for CBTA programmes, guiding training institutions like the Singapore Aviation Academy (SAA), training arm of the Civil Aviation Authority of Singapore (CAAS), to develop courses that meet industry required competencies. Aviation companies support continuous learning through CBTA, fostering a culture of ongoing professional development.

Advancements in technologies such as virtual reality and artificial intelligence serve to enhance CBTA effectiveness, offering realistic training environments and personalised feedback, further enhancing learning outcomes. The adoption of CBTA is essential in an industry where precision and reliability are critical. Embracing CBTA ensures that the workforce remains skilled, adaptable, and capable of meeting the evolving demands of the industry.

Supporting the Industry with CBTA

In response to the evolving operating landscape, CAAS has advanced towards a CBTA framework within the aviation industry. The key transition was to introduce competency-based assessment to serve as a structured evaluation tool to measure trainees' practical application of skills, knowledge, and behaviour in real-world scenarios. Unlike traditional assessments that primarily focus on theoretical knowledge or a pass/fail criteria, competency-based assessments are tailored to determine whether learners are able to effectively apply their acquired competencies.

The assessment process begins with defining a clear set of competencies or skills required for various aviation roles, such as air traffic controllers, maintenance engineers and safety inspectors. These competencies may encompass technical skills, decision-making abilities, situational awareness, and evidence-based evaluation. This then allows for a fair evaluation of an individual's mastery of their specific responsibilities in real-world contexts, for instance their proficiency in flight operations, safety procedures, emergency protocols and customer service.

For example, an aircraft maintenance trainee undergoing on-the-job training must display proficiency in basic aircraft skills such as wire locking, basic torque loading, flight control rigging, aircraft skin patch repair, riveting and sealant application. Similarly, aircraft maintenance trainees practise their aircraft skin patch repair on an actual aircraft fuselage with aircraft-grade rivets prior to the actual assessment. As trainees receive feedback on their practical strengths and weaknesses, they are able to effectively translate their training and assessment into professional development.

It should be noted that such competency-based frameworks are adaptable to different aircraft types, operational environments and regulatory requirements. Organisations are therefore able to customise assessments to specific roles and operational contexts depending on their needs. By focusing on competencies and performance outcomes, CBTA fosters continuous improvement across all levels of aviation operations, encouraging the ongoing refinement of training programmes, assessment methods and operational procedures to enhance overall safety and efficiency.

SAA offers the ICAO Training Package (ITP): Oversight of Competency-Based Training (OCBT) that helps practitioners gain the KSA to conduct effective oversight of CBTA in accordance with ICAO provisions. The ITP on OCBT will run in September 2024 and be relevant across various aviation domains, including air traffic management, airport operations and aviation security, addressing both management and operational needs.

As training initiatives continue to evolve, CBTA will no doubt play a crucial role in shaping the future of aviation professionals and organisations worldwide.

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Civil Aviation Authority of Singapore

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2-6 Sep 2024	ICAO Training Package (ITP): Oversight of Competency Based Training

October

30 Sep-4 Oct 2024	ICAO Training Package: Personnel Licensing (PEL) System
30 Sep-4 Oct 2024	ICAO Annex 14 Requirements and Application
7-11 Oct 2024	Safety Oversight Inspectors (Aerodrome)
7-11 Oct 2024	State Safety Programme Implementation
8-10 Oct 2024	Aerodrome Safety Operations [jointly organised with UK Civil Aviation Authority International (CAAi)]

November

11-15 Nov 2024	ICAO Training Package: Oversight Aircraft Leasing Operations

December

2-6 Dec 2024	Human Factors in Aviation Workshop

2025

January

6-10 Jan 2025	Establishing and Operating on Independent Aircraft Accident and Incident Investigation Authority

February

3 -7 Feb 2025	ITP Training Managers Course
17-21 Feb 2025	Aircraft Accident Investigation Techniques
24-28 Feb 2025	Aircraft Accident Investigation Management
24-27 Feb 2025	ICAO Training Package: ICAO Government Safety Inspectors Operations - Air Cargo Certification

March

3 -13 Mar 2025	Safety Oversight Inspectors (Airworthiness)
3-7 Mar 2025	Incident Investigation: Effective Safety Risk Management
10-21 Mar 2025	Safety Oversight Inspectors (Flight Operations)
17-21 Mar 2025	Safety Management Systems Implementation
31 Mar-4 Apr 2025	Resolution of Safety Issues