

Competency-Based Education: A Framework for a More Efficient and Safer Aviation Industry

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OVERVIEW

Introduction

Pilots' Competencies & Aviation Safety

Competency Development in Collegiate Aviation

Discussions and Conclusions

INTRODUCTION

- ✈ Aircraft accidents → 80% due to Human Errors;
 - ✈ Latent conditions often permit or even motivate unsafe acts by the flight crew (and other aviation professionals)!
- ✈ Investigation process → should scrutinize if errors and/or violations suggest deficiencies in necessary knowledge, skills, and abilities to perform a job!
 - ✈ Flaws in pilot's competencies due to training inadequacies?



PILOT'S COMPETENCIES & AVIATION SAFETY

- ✈ Global aviation industry → moving towards Evidence Based Training (EBT);
- ✈ Colgan Air Flight 3407 (2009);
 - ✈ Major catalyst of significant changes in the US aviation industry, mostly focusing on flight crew training and qualifications!
- ✈ UPS 1354 (2013) → the NTSB highlighted several issues associated with poor decision-making, leadership, and communication by the flight crew!



Source: Garrison (2010).

PILOT'S COMPETENCIES & AVIATION SAFETY

- ✈ Accidents prior to and after Public Law 111-216 have suggested that flight hours are not a good predictor of pilot's performance!
- ✈ No empirical evidence to support the claim that more flight hours will make a pilot safer and / or more efficient!
- ✈ Aircraft design and reliability as well as flight education and training have steadily and significantly improved in the last 20 years;
- ✈ Nevertheless, high-profile accidents still occur, even when the aircraft and related systems are operating adequately along with experienced pilots;
 - ✈ Controlled Flight Into Terrain (CFIT);
 - ✈ Runway Incursions;
 - ✈ Loss-of-control-in-flight (LOC-I).



Poor / Inadequate
Aeronautical Decision Making
Leadership
Communication

COMPETENCY DEVELOPMENT IN COLLEGIATE AVIATION

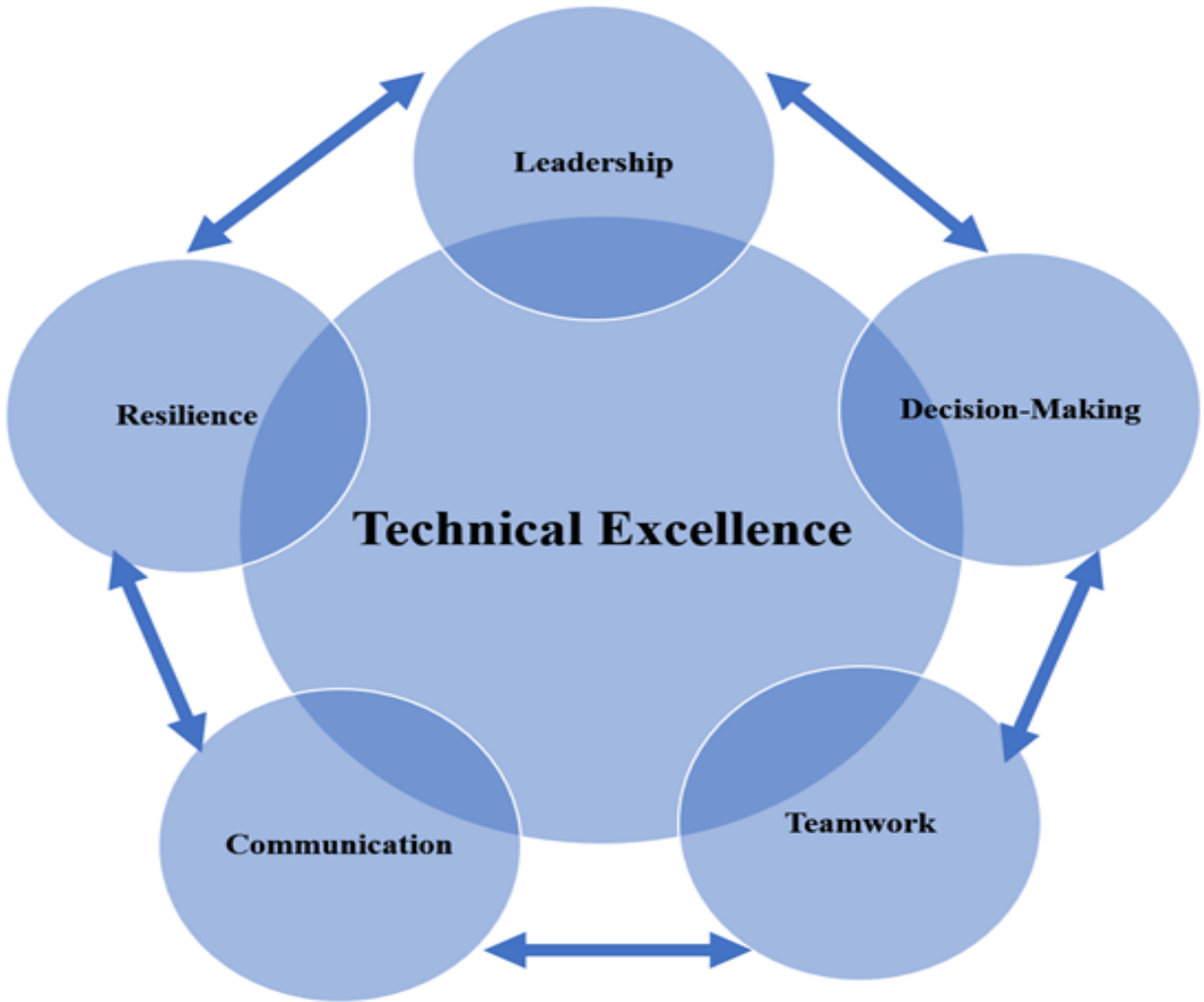
- ✈ By 2036 the aviation sector will need 554,304 new pilots;
- ✈ As a result of this massive gap in supply, there is a severe pilot shortage across the world and this issue has garnered attention from mainstream media;
- ✈ Most of the national and global conversations are focused on quantity rather than quality of the workforce;
 - ✈ Educators and researchers in several industries have advocated competency-based education for decades to focus on quality!
- ✈ Empirical evidence has indicated that high-quality education and flight training has a more positive impact on aviation safety and efficiency than flight hours accumulated;
 - ✈ A competency-based education program could provide pilots with technical and non-technical competencies needed to safely and efficiently operate in a highly-complex social-technical system.

COMPETENCY DEVELOPMENT IN COLLEGIATE AVIATION

- ✈ Started in Summer of 2018;
- ✈ Faculty across department participated in discussions;
- ✈ Involved Full-Time Flight Instructors;
- ✈ Sought guidance and feedback from the **Industry Advisory Board (IAB)**;
- ✈ Extensive review of literature;
- ✈ Consensus Decision-Making;
- ✈ Guidance from CBEN and USDOE;
- ✈ Hybrid Competency Model.



IDENTIFIED COMPETENCIES



COMPETENCY DEVELOPMENT IN COLLEGIATE AVIATION

✈ Each competency will be mapped to specific learning experiences within the flight program, and it will be developed at one of three levels of proficiency: Emerging (Level 1); Developing (Level 2); or Proficient (Level 3).

	Technical Excellence	Level 1	Level 2	Level 3
A	Airmanship	Demonstrates Airmen Certification Standards for the appropriate certificates and ratings.	Reflects upon strengths and weaknesses pertaining to the ACS. Identifies appropriate resources to address weakness and improve strengths. Creates goals towards the progression to transport category aircraft and or CFI and provides evidence towards achieving goals.	Exhibits orientation toward teams and transitions from SRM to CRM. Demonstrates appropriate knowledge, skills and abilities for operating transport category aircraft.
B	Integrates certification standards with academic standards and competencies	With coaching, recalls and practices basic skills to self-evaluate performance, set goals, and monitors their own progress towards advancement in all competencies.	With minimal coaching reflect upon one’s professionalism, knowledge, skills, and abilities. Creates a critical self-evaluation and provides objective evidence towards improvement.	Exhibits life-long learning habits such as creating goals, utilizing resources and demonstrating the ability to conduct themselves in accordance to discipline professional standards.

DISCUSSIONS AND CONCLUSIONS

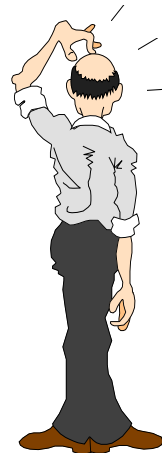
- ✈ The global air traffic is expected to double every fifteen years;
 - ✈ More flights will most likely increase the number of accidents, unless the aviation industry challenge itself with more ambitious approaches to reduce the accident rate!
- ✈ New pilots will often become air carriers' captains younger and with less flight experience than the last decades;
- ✈ A flight competence-based degree approach could provide the aviation industry effective opportunities to address several issues afflicting the industry.

BENEFITS OF A COMPETENCY-BASED FLIGHT PROGRAM

- ✦ The expected benefits of a competency-based collegiate professional flight degree include;
 - ✦ Emphasizing quality of education and flight training over flight hours;
 - ✦ Optimizing the safety training (e.g., CRM) of pilots;
 - ✦ Emphasizing quality of education and flight training over flight hours;
 - ✦ Developing empirical data that could assist aviation stakeholders, especially policy-makers, in assessing the effectiveness of the “1,500 hour rule”;
 - ✦ Establishing advanced training processes that will enhance the acquisition of knowledge, skills, and abilities; and
 - ✦ Providing opportunities for research.

QUESTIONS AND DISCUSSION

- ✦ What effective practices do you suggest for collegiate aviation competency development?
- ✦ What are the best practices for assessment development?
- ✦ Could aircraft accident investigators scrutinize if errors and/or violations by the pilots suggest deficiencies in any of those competencies?
- ✦ How should we utilize data and information from final reports of mishaps to improve collegiate aviation flight programs?





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Thank you!

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