Educating aviation professionals: a comparison of the multi-crew pilot licence and the traditional commercial pilot licence

Steven J. Thatcher† & Sofia Michaelides-Mateou‡

Central Queensland University, Cairns, Australia†
Abu Dhabi University, Abu Dhabi, United Arab Emirates‡

ABSTRACT: In this article, the authors review two different approaches to pilot training to produce entry level airline flight crew. They outline the aeronautical experience required to gain a commercial pilot licence (CPL) and the aeronautical experience to gain a multi-crew pilot licence (MPL). The authors also discuss the competencies required by the International Civil Aviation Organisation (ICAO) for applicants of the commercial pilot licence and the multi-crew pilot licence. The most obvious differences between the two licences is the amount of solo or pilot in command, flight experience required and the detail of the prescribed competencies. There is also a lack of detailed competencies that a multi-crew pilot licence holder must be able to achieve. Further, there is no explanation as to how a multi-crew pilot licence holder can satisfy the requirements of a command instrument rating and, therefore, be able to qualify as an applicant for an air transport pilot licence (ATPL). It is, thus, not clear how a multi-crew pilot licence holder can transition from first officer to captain in the airline.

INTRODUCTION

The aviation industry is facing a critical shortage of airline pilots trained to fly the highly advanced, high technology aircraft of the present and the future. Boeing in their Current Market Outlook 2016 to 2035 identified that:

As global economies expand and airlines take delivery of tens of thousands of new commercial jetliners over the next 20 years, there is extraordinary demand for people to fly and maintain these airplanes. To meet this tremendous growth, the 2016 Boeing Pilot and Technician Outlook forecasts that between now and 2035, the aviation industry will need to supply more than two million new aviation personnel - 617,000 commercial airline pilots, 679,000 maintenance technicians, and 814,000 cabin crew [1].

Further, in order to meet this demand Boeing suggests that:

Meeting this demand will require innovative solutions - focused on educational outreach and career pipeline programs - to inspire the next generation of pilots, technicians, and cabin crew. New technologies, devices, and training methods will be needed to meet a wide range of learning styles. The growing diversity of aviation personnel will also require instructors to have cross-cultural and cross-generational skills to engage tomorrow's workforce [1].

Boeing's predictions for the next 20 years reveal that the Asia-Pacific region will lead this worldwide growth in demand for pilots, with an estimated requirement for 248,000 new pilots. North America will require an estimated 112,000, Europe 104,000, the Middle East 58,000, Latin America 51,000, the Commonwealth of Independent States (CIS)/Russia 22,000 and Africa 22,000 [1].

Traditionally, the majority of airlines have relied on student pilots to fund their own flight training through local flying school or colleges. More recently, universities have been offering Bachelor programmes in aviation; some of which include the flight training [2-4].

The usual pathway for an aspiring airline pilot was to enrol in a local flight school or university, or in some cases, both university and flight school. After graduation with a commercial pilot licence (CPL) and the so-called frozen air transport pilot licence (ATPL) - the theory component of the ATPL - a graduate pilot would try and obtain a job working in the general aviation sector to *build up hours* and progress to flying twin engine aircraft.

Once the pilot had obtained somewhere between 500 and 1,000 hours as pilot in command (PIC), they could begin to apply to the airlines for a position flying turbine aircraft. In this traditional pathway, the airline had no part in a pilot's

training and education before the pilot entered the airline as an employee. If an airline had a critical shortage of type qualified pilots, they would attempt to lure type qualified pilots away from other airlines.

Some airlines have tried to solve the problem of pilot shortage by establishing cadet pilot programmes. These cadet pilot programmes range from airlines:

- offering an aircrew position to a self-sponsored student who follows an airline's approved training programme at the airline's preferred flying school, to;
- an airline sponsoring a pilot's training at an airline's preferred flying school, to:
- an airline sponsoring a pilot's training at an airline's own flying school.

In these cases, an airline would usually attempt to bond the graduate pilot to remain an employee of the airline for a number of years to prevent other airlines recruiting the pilot. But, even with these solutions, a pilot would not be ready to start as an active flight crew member for at least three to four years from the beginning of training, because a graduate pilot would have to gain the minimum 500 hours pilot in command required for an ATPL or meet a higher experience requirement of an airline.

One solution to the relatively long delay in producing a pilot that is ready to operate on the flight line has arisen fairly recently - the multi-crew pilot licence (MPL). The MPL allows a pilot to be trained, during their *ab-initio* flight training, as a part of a crew within a multi-crew environment. At the end of 15 to 18 months of training, a graduate pilot can join the airline's flight line as a first officer. During the graduate's time as a first officer, they can build the necessary hours to gain their ATPL. This saves an airline considerable investment in time and money in the training of their pilots. This is the changing face of pilot education and training in order to meet an airline's need for pilots.

In this article, the authors review the two different approaches to pilot education and training - the traditional CPL and the newer and, perhaps revolutionary, MPL. Both the CPL and MPL are prescribed for member states in the International Civil Aviation Organisation's (ICAO) Annex 1, Personnel Licencing [5].

TRADITIONAL COMMERCIAL PILOT LICENCE

From the information below, it can be seen that the ICAO training and competencies required to gain a CPL are very prescriptive. The competencies listed are very specific and detailed. They cover all aspects of flight proficiency that is essential to become a commercial pilot. In terms of the mandated flight training:

> *…an applicant shall have completed not less than 200 hours of flight time, or 150 hours if completed during a course of approved training, as a pilot of aeroplanes. 10 Hours maximum simulator* [5].

These 200 (or 150) hours of flight training must include:

a)   100 hours as pilot-in-command or, in the case of a course of approved training, 70 hours as pilot-in-command;
b)   20 hours of cross-country flight time as pilot-in-command including a cross-country flight totalling not less than 540 km (300 NM) in the course of which full-stop landings at two different aerodromes shall be made;
c)   10 hours of instrument instruction time of which not more than 5 hours may be instrument ground time; and
d)   if the privileges of the licence are to be exercised at night, 5 hours of night flight time including 5 take-offs and 5 landings as pilot-in-command [5].

ICAO further directs that the student pilot must also have received dual flight instruction in aeroplanes of the class and/or type rating from an authorised flight instructor. The student must have received flight instruction in at least the following areas to the level of performance required for a commercial pilot:

a)   the instructor shall ensure that the applicant has operational experience in recognising and managing threats and errors;
b)   pre-flight operations, including mass and balance determination, aeroplane inspection and servicing;
c)   aerodrome and traffic pattern operations, collision avoidance precautions and procedures;
d)   control of the aeroplane by external visual reference;
e)   flight at critically slow airspeeds; spin avoidance; recognition of, and recovery from, incipient and full stalls;
f)   flight with asymmetrical power for multi-engine class or type ratings;
g)   flight at critically high airspeeds; recognition of, and recovery from, spiral dives;
h)   normal and crosswind take-offs and landings;
i)   maximum performance (short field and obstacle clearance) take-offs; short-field landings;
j)   basic flight manoeuvres and recovery from unusual attitudes by reference solely to basic flight instruments;
k)   cross-country flying using visual reference, dead reckoning and radio navigation aids; diversion procedures;
l)   abnormal and emergency procedures and manoeuvres including simulated aeroplane equipment malfunctions;
m)   operations to, from and transiting controlled aerodromes, compliance with air traffic services procedures; and
n)   communication procedures and phraseology [5].

COMMAND INSTRUMENT RATING (CIR)

The CPL only allows a holder to fly under the visual flight rules (VFR); it does not include training to fly under the instrument flight rules (IFR). VFR applies to flying in visual meteorological conditions (VMC) and IFR applies to flying in non-VMC or instrument meteorological conditions (IMC). In order to fly for an airline, a pilot will need some form of instrument rating and to act as captain or pilot in command the pilot will require a CIR.

In order to obtain a CIR on a pilot licence, ICAO stipulate that a student must have completed a minimum of:

a) 50 hours of cross-country flight time as pilot-in-command of aircraft in categories acceptable to the licensing authority, of which not less than 10 hours shall be in the aircraft category being sought; and
b) 40 hours of instrument time in aircraft, of which not more than 20 hours or 30 hours where a flight simulator is used, may be instrument ground time. The ground time shall be under the supervision of an authorised instructor [5].

CREW RESOURSE MANAGEMENT (CRM) AND CREW-CENTRED FLIGHT TRAINING (CCFT)

In 1980, following a series of fatal accidents NASA held a workshop to discuss the issue of resource management on the flight deck at its Ames Research Centre in California [6]. Further investigation and research has concluded that some 70% of accidents are caused by human error, which involved a breakdown in crew communication, lack of appropriate action or incorrect action by the flight crew; rather than flight crew technical proficiency [6]. Airlines have used CRM training to reduce human factors related accidents. This has been very successful and accident rates have been reduced to a very low level.

Thatcher, at an airline industry conference in Melbourne, Australia, in 1996, argued that if team or group processes were important, they should be delivered during a pilot's *ab-initio* training as an integral part of the training [7]. This was further elaborated on in 1997 at the International Aviation Psychology Symposium in Columbus Ohio [8]. The rational to include CRM training and principles in *ab-initio* flight training was presented in 1998 and 2000 [9][10]. The means to introduce CRM into *ab-initio* flight training was through crew-centre flight training (CCFT) [9-11]:

> *The aim of Crew-Centred Flight Training (CCFT) is to provide a nurturing environment in which a pilot can learn to be safe and proficient in the technical aspects of flying, and more importantly, learn the educational and team processes, embodied in the training, which will provide a foundation for further development* [9][11].

The skills and knowledge learned are taught as solutions to real-life problems or situations, which have application in the present rather than the future. Therefore, in CCFT, the instructor-student crew has a mutual responsibility for decisions regarding what, how and when knowledge and skills are learned. Student performance, assessment and further training is mutually negotiated by the crew. In CCFT, the flight instructor adopts the role of flight facilitator and facilitates student learning within the multi-crew flight environment. The concept of CCFT has led to the ICAO MPL.

MULTI-CREW PILOT LICENCE (MPL)

In order to qualify for the MPL, ICAO mandates that a student pilot completed in an approved training course not less than 240 hours as pilot flying and pilot not flying of actual and simulated flight. It also states that the actual flight experience must meet the flight experience requirements of the private pilot licence (PPL) (detailed below), upset recovery training, night flying and flight by reference solely to instruments [5].

In addition, the applicant for the MPL shall have gained, in a turbine-powered aeroplane certificated for operation with a minimum crew of at least two pilots or in a flight simulation training device approved for that purpose by the licensing authority, the experience necessary to achieve the nine advanced competency units shown below:

1. apply threat and error management (TEM) principles;
2. perform aeroplane ground operations;
3. perform take-off;
4. perform climb;
5. perform cruise;
6. perform descent;
7. perform approach;
8. perform landing; and
9. perform after-landing and aeroplane post-flight operations.

Private Pilot Licence Requirements

As stated above, ICAO require an applicant for the MPL to have had at least the same flight experience as an applicant for a PPL. This aeronautical experience shall consist of not less than 40 hours of flight time or 35 hours, if completed

during a course of approved training as a pilot of aeroplanes appropriate to the class rating sought. Credit for simulator time is limited to a maximum of 5 hours. Also, within these hours, the applicant shall have completed in aeroplanes not less than 10 hours of solo flight time appropriate to the class rating sought, under the supervision of an authorised flight instructor, including 5 hours of solo cross-country flight time with at least one cross-country flight totalling not less than 270 km (150 NM) in the course of which full-stop landings at two different aerodromes shall be made [5].

DISCUSSION

The authors have presented the flight experience and competencies required by ICAO for the issue of both the traditional CPL and the relatively recent MPL. Both of these licences allow a person to serve as first officer on the flight deck of a multi-crew airliner. During their training a CPL holder would have had to demonstrate competency in a wide variety of flight activities. These activities include, glide approaches, unusual attitude recovery, stall recovery, cross wind landings, engine failures to name, but a few. The list of competencies is quite large.

The CPL holder is also authorised to fly single pilot operations in the type of aircraft they are certified for. In contrast, the number and specificity of competencies for an applicant for a MPL is quite small. These competencies include taxi, take off and land as detailed above. The competencies are not as comprehensive as for the CPL.

As examples, there is not a requirement to be proficient at stall recovery, at recovery from unusual attitudes, at cross wind landings. These are not specified in the key competencies. Further, the only actual real (rather than simulator) flight experience required by a MPL holder is the same as that required by a PPL holder. Given this, an MPL holder may not have the required flight experience to apply for a CIR. This may prevent the MPL holder from transitioning to captain and pilot in command. It is, thus, not clear how a multi-crew pilot licence holder can transition from first officer to captain in the airline.

However, when CCFT was proposed almost 20 years ago, it was a development to incorporate CRM and team/crew processes into *ab-initio* flight training, so as to compliment and enrich the CPL training and give CPL holders the skills needed to operate in a multi-crew environment; so that CPL holders could function equally well in both single pilot operations and multi-crew operations. It was not designed to substitute the complete experiential learning of flight or technical skills with the learning of team skills and assisted learning of flight skills.

Many, if not most, airlines have an urgent requirement for pilot to fly their aircraft. The MPL offers a solution to decrease the amount of time from start of training to becoming a first officer. This makes the MPL an attractive proposition for airlines that have their own *ab-initio* training facilities. It also encourages airlines to consider starting their own cadet pilot programms and becoming engaged in the *ab-initio* training of their pilots. This in itself is a good thing and will have a positive effect on the number of pilots undergoing flight training.

Further, given the number of recent fatal accidents involving loss of control, it might perhaps be wise to require more actual flight hours in the MPL and move closer towards the original CCFT model.

REFERENCES

1. Boeing. Long Term Market, Current Market Outlook 2016-2035, 16 November 2016, http://www.boeing.com/commercial/market/long-term-market/pilot-and-technician-outlook/
2. Thatcher, S.J., The development of a new discipline in aviation education and training at the University of South Australia. *Proc. 5th Global Congress on Engng. Educ.*, New York, USA, 17-21 July, 85-88 (2006).
3. Thatcher, S.J., Mapping the aviation curriculum. *Inter. J. of Technol. and Engng. Educ.*, 6, **1**, 5-10 (2009).
4. Thatcher, S.J. and Michaelides-Mateou, S., Producing aviation professionals: a review of two different educational methods. *Global J. of Engng. Educ.*, 18, **2**, 83-88 (2016).
5. International Civil Aviation Organisation. *International Standards and International Practices, Annex 1 to the Convention on International Civil Aviation, Personnel Licencing*. (11th Edn), ICAO (2011).
6. Cooper, G.E., White, M.D. and Lauber, J.K. (Eds), Resource Management on the Flightdeck. *Proc. NASA/Industry Workshop. (NASA CP-2120)*. Moffett Field, CA: NASA-Ames Research Center (1980).
7. Thatcher, S.J., Flight instruction or flight facilitation: pedagogy vs andragogy. Paper presented at the Australian Aviation Psychology Association Industry Conf., Melbourne, November (1996).
8. Thatcher, S.J., Flight Instruction or flight facilitation: a foundation for crew resource management. *Proc. Ninth Inter. Symp. on Aviation Psychology,* Columbus, OH (1997).
9. Thatcher, S.J., The foundations of crew resource management should be laid during ab-initio flight training. *Proc. 4th Australian Aviation Psychology Symp.*, Manly, Australia (1998).
10. Thatcher, S.J., *The Foundations of Crew Resource Management should be Laid during Ab-initio Flight Training*. In: Lowe, A.R. and Hayward, B.J. (Eds), Aviation Resource Management. Aldershot, England: Ashgate (2000).
11. Thatcher, S.J., Crew-centred flight training: a methodology for improving technical flight training. *Proc. 4th Asia-Pacific Forum on Engng. and Technol. Educ.,* Bangkok, Thailand (2005).