

ANI Procedure Design Training Program and Concept

All ANI Procedure Design/PANS-OPS courses cope with ICAO document 9906 "Quality Assurance Manual For Flight Procedure Design", vol. II "Flight Procedure Designer Training".

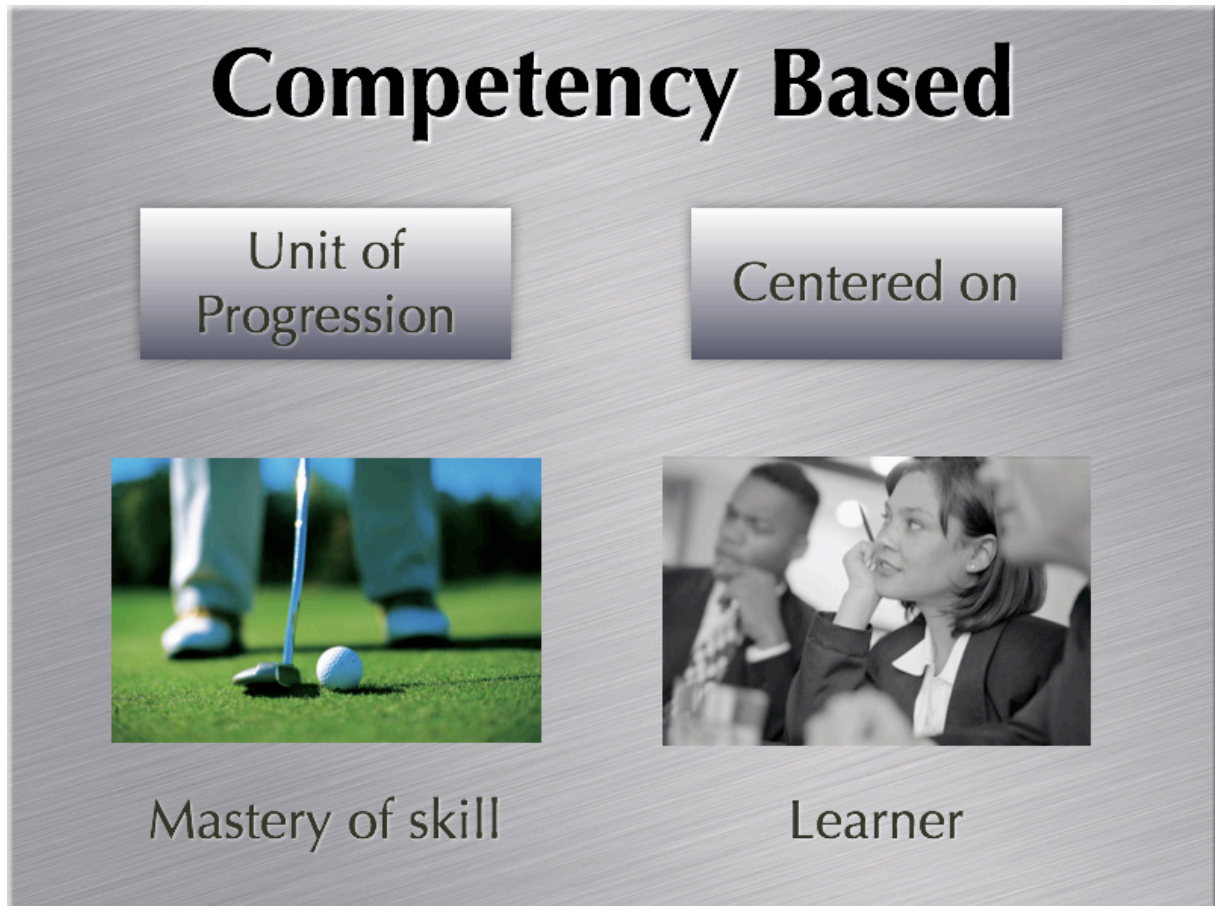
General Concept

According ICAO doc. 9906, vol. II, Flight Procedure Designer Training must be competency based. This results in a fundamental difference from traditional education. Traditional education is centered on the teacher and the unit of progression is time. In other words, the class will progress to the next topic whenever the teacher says so. It is up to the student to understand the material in the allocated time.



In competency based education however, the teaching is centred on the learner and the unit of progression is the mastery of the skill. That leads to the conclusion that everybody in the class

must understand and prove mastery before progressing to the next topic.



This is no problem when the timeframe of the education is not limited. Typical examples of competency based education are the training for the Private Pilot's Licence or musical instrument education. The progress is tailored to the learner.

In Procedure Design courses we encounter the issue that the course must be delivered in a certain timeframe. Therefore the allocated time for the individual topics must assure that the learner will master the skill. For that reason, the ICAO doc. 9906 vol. II specifies pre-requisite Skills, Knowledge and Attitudes (SKAs) for initial training. When the student complies with these, reasonable assurance exists that the individual topics and skills will be mastered in a given time.

Pre-requisite SKAs

(extract from ICAO do. 9906, vol. II)

3.3.1 Mathematics

3.3.1.1 Algebra

Students should be competent in Algebra to at least the level of resolving equations with 2 unknowns and handling operations of the 3rd level (Exponentiation, Radical, Logarithms, Angular functions). This requirement will assure the understanding of formulas given in the relative criteria documents as well as the ability to follow rationales, on which certain criteria are based.

3.3.1.2 Geometry

Students should be familiar with the classical Euclidian Geometry (Plane Geometry, Solid Geometry) as well as Thales and Pythagoras constructions.

3.3.1.3 Trigonometry

Students should be competent in all Trigonometry Functions such as Sine, Cosine, Tangent, Cotangent, Secant and Cosecant. Furthermore they should be familiar with Trigonometry Theorems such as the Theorem of Sines and the Theorem of Cosines.

3.3.1.4 Probability and Statistics

Students should have basic knowledge of Statistical and Probability Mathematics, particularly an understanding of the Gaussian (Normal) distribution.

3.3.2 Aviation or Aviation-related pre-requisites

The job profile of an Instrument Flight Procedure Designer requires knowledge in various fields of activity in aviation. Training providers are encouraged to offer ab-initio training and that the following prerequisites are met by the student so as to ensure that the length of training can be optimized.

3.3.2.1 Air Traffic Management

Students should demonstrate fundamental knowledge of Air Traffic Management (ATM) as in ICAO doc. 4444 (PANS-ATM), as well as understanding the broad concept of ATM which consists of ATS including ATC (Air Traffic Control), ATFM (Air Traffic Flow Management) and ASM (Airspace Management), other fields related to ATM such as route spacing, ATC separation, aviation weather, etc.

3.3.2.2 Navigation, Navigation Systems and Geography

Students should demonstrate knowledge of Navigation, Navigation Systems and Geography to the level of any pilot's licence with Instrument Rating (IR). It is however not a requirement to hold such a license.

3.3.2.3 Aircraft Operations

Students should demonstrate knowledge of the basics of flying and aerodynamics. It is however not a requirement to hold a pilot's license.

3.3.2.4 Aircraft Performance

Students should demonstrate knowledge of Aircraft Performance to the level of any pilot's license with Instrument Rating (IR). It is however not a requirement to hold such a license.

3.3.2.5 Aeronautical Information Services

Students should demonstrate fundamental knowledge of Annex 15 (Aeronautical Information Services).

3.3.2.6 Aerodrome safeguarding

Students must be familiar with the basic requirements for aerodrome safeguarding (Annex 14 Obstacle limitation surfaces, Aerodrome reference codes).

3.3.2.7 Geodesy

Geodesy, also called geodetics, is the scientific discipline that deals with the measurement and representation of the earth, its gravitational field and geodynamic phenomena (polar motion, earth tides, and crustal motion) in three-dimensional time varying space. Geodesy is primarily concerned with positioning and the gravity field and geometrical aspects of their temporal variations, although it can also include the study of the Earth's magnetic field.

Students should demonstrate fundamental knowledge in the following areas of Geodesy:

- Geoid and reference ellipsoid
- Coordinate systems in space
- Coordinate systems in the plane
- Heights
- Geodetic Datums and Datum conversion
- Point positioning
- Units and measures on the ellipsoid
- Geodetic Principal Problem
- Geodetic Inverse Problem

3.3.3 Language

In order to progress through the competency-based training outlined above, trainees need to demonstrate their ability to achieve terminal objective related to the competency elements. As training will be delivered within a certain timeframe, it is important that trainees learn the material within the time allocated. For this reason, proficiency in the language in which training will be delivered (instruction and training materials) is essential.

For courses in English, it is suggested that training providers require a score of 550 in the written TOEFL (Test of English as a Foreign Language), 213 in the TOEFL Computer Based Test, 79 in the TOEFL Internet Based Test and 750 in TOEIC (Test of English for International Communication) for students whose native language is not English. Alternatively, a score of 6.5 in the IELTS Academic Module (International English Language Testing System) can be accepted. Students having studied at an English speaking institution for one year or longer can be exempted from providing a TOEFL or IELTS score.

(end of extract)

Training Phases

The above pre-requisite SKAs refer to entry into "initial training", which according to doc. 9906 is the first time that a Flight Procedure Design Student gets in touch with actual Flight Procedure Design criteria. Any required training to get to that level is called "ab-initio". Initial Training MUST be followed by an On-the-Job training phase. The length of such a phase can be specified by the PDSP (Procedure Design Service Provider). Typically an OJT phase will not be shorter than 15 weeks.

Initial Training Program

The ANI initial training program consists of 2 levels.

Level 1: All basic concepts, non-precision approach design, departures, holdings, en-route, all according conventional ground-based navigation

Level 2: ILS, RNAV non-precision approaches, RNAV departures, holdings

Due to the complexity and the quantity of the material in PANS-OPS, APV-Baro VNAV, SBAS-APV and GBAS criteria as well as RNP and RNP AR (Authorisation Required) criteria are classified Level 3 and are NOT part of the initial training but are part of the advanced training concept.

For educational reasons (cognitive load, sensory overload) the initial training at ANI is split into 2 parts of 3 weeks each. The break in between the parts is typically around 4-8 weeks. Sometimes as short as 2 weeks, depending on the schedule and location. The break allows the students to consolidate the fundamentals and to relax their brain a bit before learning the more demanding and more complex material in part 2. We are fully aware that this requires 2 trips to the training location, but the fact that the student will absorb the learnt material much better will make up for this. Furthermore it limits the time out of the office and away from families to 3 weeks.

An e-learning package is sent to the students before both part 1 and part 2, which is an integral part of the whole course. **Note:** The e-learning is checked on the very first day of the course part to assure students actually learnt the material and understood it. If students fail the test they can repeat it one week later. Failure to pass the test twice results in a no-pass for the course. Pass mark is 90%.

OJT

An OJT phase must be provided by the employer, allowing the student to apply his skills in a practical environment. This must be under the supervision of a trained and experienced Flight procedure Designer.

If an employer cannot provide such OJT because there is no person who can coach the student, ANI can assist finding OJT positions. This will be quoted and charged individually and separately.

For an OJT outside the employer's company we will look at the individual procedure design environment of the employer:

1. Is there any procedure design automation software used
2. Is it based on AutoCAD, Microstation or a stand-alone product.
3. Is the student already skilled on the respective platform

Before allocating an OJT position we will advise the employer to train the student on the procedure design platform used. After that we shall contact potential OJT providers using the same platform and work out an OJT program with them.

The OJT will be organised through ANI and the OJT fee paid to ANI.

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