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Patrick Ross

Janet Cosman-Ross

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ANDRAGOGICAL METHODS FOR TEACHING ADVANCED COCKPIT FLYING SKILLS TO PROFESSIONAL PILOTS

Patrick Ross and Janet Cosman-Ross

ABSTRACT

This paper is an examination of the adult (andragogical) learning methods required to teach flying skills to pilots of state-of-the-art, computerized aircraft. The concepts of the learning process, andragogical teaching methods, student need-to-know, student motivation, and self-directed learning are examined. The paper concludes that andragogical methods must be used in order to transfer the required skills.

In the last ten years aircraft cockpits have become increasingly complicated with the introduction of Flight Management Systems, Electronic Instrument Systems with various display formats, Enhanced Ground Proximity Warning Systems, Traffic Collision and Avoidance Systems, Fly-by-Wire, and Head-Up-Displays. This article is an examination of the adult learning methods required to teach flying skills for advanced cockpits. The following concepts will be examined:

The learning process
Andragogical (adult) teaching methods
Student need-to-know
Motivation
Self-directed learning.

This article concludes that andragogical teaching methods must be used in order for professional pilots to develop the skills required to manage advanced cockpits.

LEARNING AS A PROCESS

Knowles, Holton, and Swanson (1998) define learning as a process in which the learner gains knowledge and/or expertise. The word process is an important one. Understanding the importance of process can help an instructor become a successful teacher. When the learning process is good, learning objectives will be met. This is described by learning theorist Harris and Schwahn (Knowles et al., 1998)

By nurturing a sound learning process, the required training milestones (phase checks and evaluations) become small steps in a building block process that gradually improves the student's flying skills, insight, and self-awareness. If instructors focus on milestones instead of the learning process, the student will not completely develop the necessary insights and mental models required to operate sophisticated aircraft.

ANDRAGOGICAL TEACHING METHOD

The best way to teach professional pilots is with andragogical teaching methods as opposed to pedagogical teaching methods. Andragogical methods place the instructor in the role of facilitator. Pedagogical methods place the instructor in the role of lecturer or narrator. Pedagogical teaching methods are often used to teach children.

Andragogical (adult) methods have the following characteristics:

The instructor treats the student as an equal.
The instructor and student learn together in a collaborative atmosphere.
The instructor encourages the students to ask questions at any time.
The instructor creates a relaxed atmosphere.
The instructor always considers that the students' experiences and knowledge may have application to the learning process.

Andragogical teaching goals should agree with the ones described by Gagne (Knowles et al., 1998). These include motor skills, verbal information intellectual skills, cognitive strategies, and attitudes.:

Motor skills - These skills consist mainly of the hand-eye coordination skills required to fly in the aircraft.
Verbal information - Some verbal information must be taught in the classroom using a mixed pedagogical and andragogical teaching approach that includes lectures, quizzes, and discussion. This verbal information provides the necessary skills required to pass oral exams and written

tests. Verbal information also provides a "big picture" understanding of the curriculum.

Intellectual skills - These skills are taught in the classroom, simulator, and aircraft and also required a mixed andragogical/pedagogical teaching method. The intellectual skills required by the student included problem solving activities such as FMS programming, enroute flight plan changes, and crew resource management issues.

Cognitive strategies - In order to develop cognitive strategies the instructor may place the student in difficult situations in which they have to formulate a plan in order to safely negotiate the situation. The aircraft simulator provides the best environment for this type of practice. An full andragogical approach works best when developing cognitive strategies because the students' prior flight experiences often contribute to their reasoning processes.

Attitudes - This is perhaps the most difficult thing to teach students. In order to fly safely, pilots must develop and nurture safety oriented attitudes. Most professional pilots are usually open to the idea that a good safety attitude is important and that it is a skill that can be developed with practice.

NEED-TO-KNOW

Knowles et al. (1998) state that "adults become ready to learn when their life situation creates a need to know" (p. 144). This is evident immediately in advanced flight training. Most professional pilots have a strong urge or need to learn how to fly. This need is an important aspect of a successful andragogical learning process. Professional pilots like to prove to themselves that they can master new skills.

MOTIVATION

Adult students must be motivated in order for retention to take place (Knowles et al., 1998). The more motivated the students are, the more often they practice in the simulator, the more questions they ask, and the more fun they seem to have. All this adds up to retention.

Professional pilots that are not motivated are slow to learn, do not retain skills or knowledge very long, and often wish they were somewhere else during sessions in the airplane and the classroom.

Professional pilots that are motivated spend extra time in learning facilities, listen to other students and instructors, and pick up every scrap of knowledge that they can They learn quickly, retain information, and have fun doing it.

SELF-DIRECTED LEARNING

Caffarella (1993) defines self-directed learning as learning in which the individual assumes responsibility for their learning and the teacher serves as a facilitator or guide. Self-directed learning is a major aspect of advanced cockpit learning. The successful student must spend time studying outside the training facility. For example, there are some FMS training courses available for PCs. In an andragogical method the instructor serves as guide/facilitator. S/he allows the student to explore and become familiar with the vagaries and idiosyncrasies of the equipment. This is the essence of advanced flight training. As the student explores and learns, the instructor also learns. An instructor can evaluate their teaching performance by checking to see if they are learning anything as they teach.

SUMMARY

"Teaching is an occupation that is involved with changing human behavior (Hiatt-Michael, 1999, P. 2). Teaching professional pilots how to operate advanced cockpits is a very serious occupation. People's lives depend on complete and accurate instruction that will impart very specific skills and changes in behavior. In order to impart these skills and behavioral changes, the following concepts should be considered by the instructor:

The instructor should recognize that a sound learning process will result in an eager student. This process must consist of good two-way communication between instructor and student.

Modern andragogical teaching methods should be used in which the instructor assumes the role of facilitator.

The instructor should understand the psychological roots of the student's need to know.

The motivation of the student should be understood and nurtured.

The students should be taught an efficient method to develop self-directed learning. This will allow the students to learn on their own.

Freire (2001) discusses the disadvantages of narrative type (pedagogical) teaching methods in which the instructor narrates and the student passively listens. Freire argues that in this case the teaching content becomes "lifeless and petrified". The pedagogical (narrative) method of teaching would completely fail in the business of teaching advanced aircraft operations to professional pilots. In fact, it may even cost lives.❑

Patrick Ross earned an MBA/A and a Master of Aeronautical Science both from Embry-Riddle Aeronautical University. He is an adjunct instructor at Embry-Riddle Aeronautical University teaching management, airline operations, corporate flight operations, crew resource management, and aircraft/spacecraft development. He is also editor for the aircraft operating manual at the Boeing Company . He is currently an Ed.D. student at Pepperdine University, California and holds an Airline Transport Pilot certificate.

Janet Cosman-Ross earned an MBA/A from Embry-Riddle Aeronautical University. She is an adjunct instructor at Embry-Riddle Aeronautical University teaching various business classes. She is also a senior accountant for the Boeing Company. She is currently an Ed.D. student at Pepperdine University, California.

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