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Trainer as a Subject Matter Expert

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Trainer as a Subject Matter Expert

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TRAINER AS A SUBJECT MATTER EXPERT

Trainer as a Subject Matter Expert

Training is the key for all safe aviation activities. Training of Pilots is even more important. The competency levels of the Pilots have to be maintained to standards in order to ensure safety. The minimum competence standards are acceptable for tasks related to routine and repetitive activities. When the task becomes specialized and critical, the competence must be higher. The Instructors, who train the Pilots, therefore, must have a higher level of Knowledge and Skill. This means that they should be not just Competent but Proficient and in some cases Subject Matter Expert. This paper emphasizes the level of Competence to be achieved by Trainer in order to impart effective training and the attributes possessed by people who are subject matter experts. It questions the fact that the trainee and the trainer cannot be at the same level of competence and refers to the ICAO documents, quoting the main objectives of training.

Training and Subject Matter Expert

Training can be viewed as a process of transfer of Knowledge and Skill development. The three main elements are the Trainee, Trainer and the Content. Where as the three, individually are critical elements; the interaction amongst each other has significant importance too.

According to Association of Talent Development (ATD) USA, the need for adequate training may be greater now than ever as the skills gap between the organization's current capabilities and the skills it needs to achieve its goals is substantial, both in USA and globally (Association of Talent Development, *Basic Training for Trainers* Jan 2016, Issue 1613).

The talent development field has transformed substantially in the past decade. Four factor have played a major role in this:

1. economic uncertainty and volatility
2. advances in digital, mobile and social technology

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3. demographic shifts in the workforce
4. increased globalization

Against this background, the basic training for trainers will provide a primer of the training landscape. The trainer must be armed with the best in terms of competencies to elevate the levels of training and meet the current and future challenges (Basic Training for Trainers, TD Jan 2016, Issue 1613, P1).

Being Competent is like a qualification. If a person is competent, he qualifies to carry out work, which is repetitive or routine in nature. When the task becomes more complex and when higher stakes are involved, mere competence will not suffice. The competence levels have to be raised to that of expert. E.g. if a company is looking at engaging a lawyer to contest an important legal suit which will decide the outcome of the business or when the stakes are high, a mere competent lawyer will not suffice. The company will look for an expert or renowned lawyer who has higher level of knowledge and skills. One who is more likely to succeed.

“Nothing beats experience”. In his bestselling book *Outliers*, Malcolm Gladwell advocates that 10,000 hours is the amount of time it takes to get really good at anything — "the magic number of greatness". Certainly with experience comes a deeper and truer understanding of the subject matter.

A subject matter expert, or SME, is a "person with bona fide expert knowledge about what it takes to do a particular job. (Office of Personnel Management online)

The single most misunderstood and mismanaged asset in training and curriculum development is the SME. From time immemorial they have proved an enigma to generations of training professionals. Like Professor Moriarty was to Sherlock Holmes, they may prove to be a constant riddle to our best instincts, yet they are irreplaceable in our work. They make us better trainers and designers in areas no other resource can even remotely hope

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to influence, while still nudging us toward a higher level of achievement in our broad role.

(The Subject Matter Expert's Role in Training and Instructional Design by Chuck Hodell

Thursday, May 16, 2013)

Competence is the behavioral aspect, which can be defined as the ability to do something effectively. It involves Knowledge, Skills and Attitude. Competencies can be divided into performance indicators by defining the qualifying statements. The performance indicators of each competency determine standards. The standards can be divided into High, Medium or Low. The grades of measured performance and the consistency will determine the level of standards.

Emergence of Competence in Training

Training in Aviation has developed at a very slow pace, as compare to education sector and other high-risk industries. Nevertheless, it is acknowledged that the foundation of learning is training and needs to be given its due importance. Great deals of research has been done in the field of training and learning as basic concepts and have been implemented in other fields, they have slowly percolated to training in aviation as well.

The popular buzz in the aviation training industry is Evidence Based Training (EBT). Medicine and Engineering have been using the concept of EBT since ages and is well documented. There is extensive use of Data, Research work before the diagnosis and treatment process is implemented in Medicine. Similarly, the Engineers use Data and Research on material and building methods based on past evidence before creating new structures.

The origin of EBT's concept of competencies originated from the education sector in USA. In the late 1960's when extensive demands for curriculum reform, large investment of federal funds in curriculum development and a concurrent dissatisfaction with teacher training were features of the climate when Competence based Education and Training

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(CBET) emerged. Call for greater relevance in the training of teachers (Conant, 1963;Koerner, 1963) and for a more visible accountability to the taxpayers were prominent.

The genesis of CBET, as a distinct response to societal changes was fuelled by the US office of Education in 1968 when it gave ten grants to colleges and universities to develop model training programs for the preparation of elementary school teachers. These models had certain characteristics including ‘ the precise specification of competencies or behaviors to be learned, the modularization of instruction, evaluation and feedback, personalization and field experience’ (Swanchek and Cambell, 1981). For many it easily and simplistically followed that there must be a connection between teacher competence and pupil learning.

Moreover, it followed from this that only competent teachers must be allowed to enter the profession and that teacher preparation and certification should be centered on producing and verifying competence.

Thus by the early 1970’s it seems that competency based teacher education had become a self-sustaining movement. Teacher’s over-supply made the quest for quality more urgent and permitted a greater stringency in applying certification procedures. Some state departments saw CEBT, as the means of creating and enforcing the standards so long talked about.

Competence in Aviation Training

One of the benefits of EBT in aviation (ICAO Doc9995 Chapter 2.3.1) is that it refocuses the instructor population onto analysis of the root causes to correct inappropriate actions, rather than simply asking a flight crewmember to repeat a maneuver with no real understanding as to why it was not successfully flown in the first instance.

Finally, it is recognized that in today’s high-fidelity simulator environment, very sophisticated training tools exist that are often not used effectively, as regulation is biased much more towards checking. EBT seeks to redress the imbalance between training and

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checking. It recognizes that an assessment of competence is necessary, but once completed, pilots learn more effectively when being trained by competent instructors to perform tasks and manage events measured according to a given set of behavioral indicators, while not under pure test conditions (ICAO Doc9995 Chapter 2.3.2).

The core principle of EBT is training to competency. It is based on a systematic approach through which assessment and training are based on the measurement of how well a trainee demonstrates a set of competencies.

The role of the Instructor/Trainer is critical to the outcome of the training objectives. It is acknowledged that the trainer must also be trained and evaluated on the competencies and the same are defined in the ICAO Doc 9868 Chapter 6.

Competency-based training programs, such as EBT and ab-initio Multi-Crew Pilot License (MPL) courses, are highly dependent upon the analytical and assessment skills of the instructor cadre. Furthermore, it is important that only those individuals who possess a good understanding of the learning process and how to positively influence human behaviour are considered for instructor positions. Prospective instructors should be selected, trained and qualified in accordance with the provisions in Chapter 6, paragraph 6.1.2 of the Procedures for Air Navigation Services – Training (Doc 9868).

ICAO Doc 9868 elaborates on the Instructor, Examiner, Inspector and Course Developer competencies. In order to qualify, all four categories need to possess competencies as described in the attachment.

Instructor:

- Prepare for delivery of training
- Conduct competency-based training module
- Evaluate trainee performance
- Prepare course delivery report

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Examiner:

Gather evidence

Evaluate evidence

Report assessment decision

Instructors conducting EBT should be knowledgeable about the competencies contained in Appendix 1 to Part II of ICAO Doc 9995, in order to enable them to make effective assessments, provide guidance to flight crewmembers to improve performance and make recommendations for additional training where necessary.

ICAO Doc 9995, Para 6.3.2, Instructors should undergo suitable training in order to adapt to the needs of training within an EBT programme. Training should provide the framework for existing instructors to develop their competence to undertake EBT training and assessment.

The training programs for the instructor role should focus on development of competence in the following specific areas:

- a) the competencies contained in Appendix 1 to Part II, in particular the measuring of behaviors observed according to the defined grading system used by the operator or ATO;
- b) in accordance with the assessment and grading system of the operator or training organization, making assessments by observing behaviors;
- c) gathering objective evidence regarding the behavioral indicators in Appendix 1 to Part II;
- d) correlating between observed behavior and potential outcome in training situations;
- e) recognizing and highlighting good performance;
- f) determining root causes for deviations below the standards of performance; and
- g) identifying situations that could result in unacceptable reductions in safety margins.

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Even though competencies are defined exhaustively, the level of competency to which the trainer is trained and assessed as, will define the quality and accuracy of the data recorded. This will in-turn control the measurable standards which are required to meet with the training objectives.

The Dreyfus model of Skill Acquisition

The Dreyfus model classifies skill acquisition into 5 levels. The Dreyfus model is an integrative overarching approach to professional action, which incorporates both routings and the decisions to use them, while still maintaining that the term 'skilled behavior connotes semi-automatic rather than deliberative processes. They cite two group of examples: those taken from application of rational methods such as decision analysis, mathematical modeling and 'intelligent' computer systems which are used to demonstrate inadequacy of those methods; and those judged as authentic representations of expertise which are taken from the areas of chess, car-driving, plane-flying, senior management and daily life.

Summary of Dreyfus Model of Skill Acquisition

Level I Novice

Rigid adherence to taught rules or plans

Little situational perception

No discretionary judgment

Level 2 Advance Beginner

Guidelines for action based on attributes or aspects

Situational perception still limited

All attributes and aspects are treated separately and given equal importance

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Level 3 Competent

Coping with crowdedness

Now sees actions at least partially in terms of longer-term goals

Conscious deliberate planning

Standardised and routinized procedures

Level 4 Proficient

See situations holistically rather than in terms of aspects

See what is most important in situation

Perceives deviations from the normal pattern

Decision making less labored

Uses maxims for guidance, whose meaning varies according to the situation

Level 5 Expert

No longer relies on rules, guidelines or maxims

Intuitive grasp of situations based on deep tacit understanding

Analytical approaches used only in novel situation or when problems occur

Vision of what is possible

(Developing Professional Knowledge and Competence, Michael Eraut, Chapter 7, P123)

The instructor must therefore attain the level of a minimum of Proficient, if not an Expert. A level higher than the trainee is required to help build the confidence in the trainee and secondly for effective flow of information. Amongst other aspects, the instructor must have a good conceptual knowledge of the areas of competencies. The instructor needs to record, assess, evaluate and provide solution or recourse in the event of a

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problem identified during the training. An expert level in the competencies will help achieve these critical requirements.

According to ATD, if you are conducting training, it's important that you develop understanding of the topic. If you're not a subject matter expert on the training topic, you can easily lose all credibility with the audience, along with their attention.

According to Dreyfus, Competence is the climax of the rule guided learning and discovering how to cope in crowded, pressurized contexts. Whereas proficiency marks onset of quite a different approach to the job: normal behavior is not just routinized but semi-automatic; situations are apprehended more deeply and the abnormal is quickly spotted and given attention. Thus progressing beyond competence depends on a more holistic approach to situational understanding.

Progression from proficiency finally happens when the decision making as well as the situational understanding becomes intuitive rather than analytical; and thus requires significantly more experience. Dreyfus does acknowledge that experts will deliberate before acting on some occasions, either because the outcomes are particularly critical or because they feel uneasy with their first choice of action. (Developing Professional Knowledge and Competence, Michael Eraut, Chapter 7)

Experts have acquired extensive knowledge that affects what they notice and how they organize, represent, and interpret information in their environment. This, in turn, affects their abilities to remember, reason, and solve problems.

Key principles of experts' knowledge and their potential implications for learning and instruction are:

- a) Experts notice features and meaningful patterns of information that are not noticed by novices.

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- b) Experts have acquired a great deal of content knowledge that is organized in ways that reflect a deep understanding of their subject matter.
- c) Experts' knowledge cannot be reduced to sets of isolated facts or a proposition but, instead, reflects contexts of applicability: that is, the knowledge is "conditionalised" on a set of circumstances.
- d) Experts are able to flexibly retrieve important aspects of their knowledge with little attention effort.
- e) Though experts know their disciplines thoroughly, this does not guarantee that they are able to teach others.
- f) Experts have varying levels of flexibility in their approach to new situations.

Intuitive thinking

Mathematics experts are also able to quickly recognize patterns of information, such as particular problem types that involve specific classes of mathematical solutions (Hinsley et al., 1977; Robinson and Hayes, 1978). For example, physicists recognize problems of river currents and problems of headwinds and tailwinds in airplanes as involving similar mathematical principles, such as relative velocities. The expert knowledge that underlies the ability to recognize problem types has been characterized as involving the development of organized conceptual structures, or schemas, that guide how problems are represented and understood (e.g., Glaser and Chi, 1988).

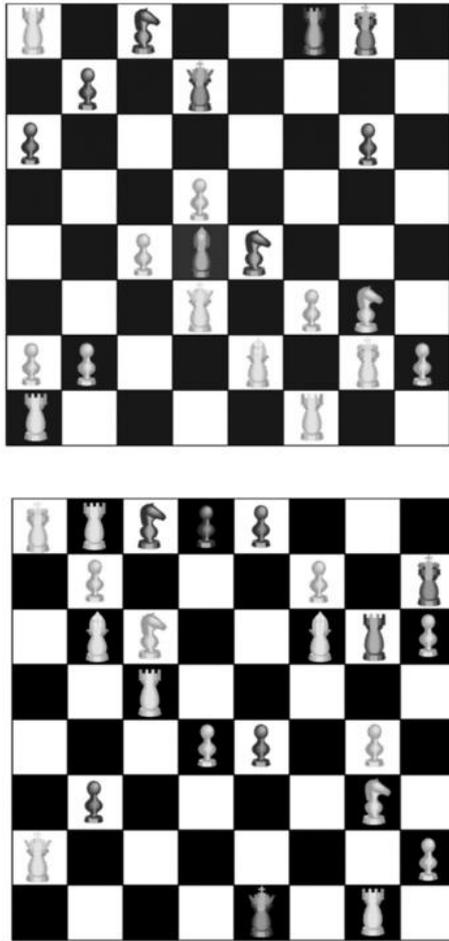


Figure 1.

In one study, a chess master, a Class A player (good but not a master), and a novice were given 5 seconds to view a chess board position from the middle of a chess game; see figure 1. After 5 seconds the board was covered, and each participant attempted to reconstruct the board position on another board. This procedure was repeated for multiple trials until everyone received a perfect score. On the first trial, the master player correctly placed many more pieces than the Class A player, who in turn placed more than the novice: 16, 8, and 4, respectively.

However, these results occurred only when the chess pieces were arranged in configurations that conformed to meaningful games of chess. When chess pieces were randomized and presented for 5 seconds, the recall of the chess master and Class A player were the same as the novice—they placed from 2 to 3 positions correctly.

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“The idea that experts recognize features and patterns that are not noticed by novices is potentially important for improving instruction. When viewing instructional texts, slides, and videotapes, for example, the information noticed by novices can be quite different from what is noticed by experts” (Sabers et al., 1991; Bransford et al., 1988). One dimension of acquiring greater competence appears to be the increased ability to segment the perceptual field (learning how to see). Research on expertise suggests the importance of providing students with learning experiences that specifically enhance their abilities to recognize meaningful patterns of information (Simon, 1980; Bransford et al., 1989).

Current Aviation Training

The implementation of EBT in ICAO Doc 9995, gives guidelines for operators to train the Trainers, existing and future. Instructors should undergo suitable training in order to adapt to the needs of training within an EBT programme. Training should provide the framework for existing instructors to develop their competence to undertake EBT assessment and training. This should be considered at the earliest possible opportunity and can be created in advance of any planned implementation of EBT.

Given in Appendix “A” is a typical EBT training program of a leading Airline covering 07 days. The training curriculum covers teaching core competencies as a combined subject and are allocated 120 minutes. The question arises here is, weather the 120 minutes for a Pilot to upgrade his/her knowledge and skills from a mere competent to Expert level is adequate or not. This time is grossly in adequate for an instructor to either become proficient leave alone a achieve mastery.

The learning objective as given in the Airline Instructor EBT program is to become familiar with the Company core competencies. Familiarity with a subject doesn’t give an edge to the trainer and justification of the assessment recorded is of diminished value.

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E.g. An Instructor who is going to train and assess a trainee on Competency in Communication should have been proficient or have achieved mastery in communication in order to impart training and identify the progress or areas of deficiency and suggest corrective action.

ICAO Doc 9995 defines 8 core competencies, namely:

1. Application of Procedures
2. Communication
3. Aircraft Flight Path Management, Automation
4. Aircraft Flight Path Management, Manual Control
5. Leadership and Teamwork
6. Problem solving and Decision making
7. Situation awareness
8. Workload Management

Demonstration of the competencies can be assessed using the behavioral indicators, which should meet the required level of performance, as established by the operator for its specific operation. Generally these are graded from 1-5.

A trainee needs a minimum 3 in all competencies to be assessed as Satisfactory. A performance grade of 5 in all competencies would be indicative of Proficient level as per Dreyfus skill levels. An expert therefore needs a new set of behavioral indicators to be defined, which prove his/her ability for Intuitive grasp of situations based on deep tacit understanding, analytical approaches using only in novel situation or when problems occur.

English language proficiency for pilots is graded from level 1-6. It is classified into 8 sub-sets. All pilots need to have achieved a minimum Level 4 in English Language Proficiency in order to meet the licensing requirements. There is however no requirement

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for an Instructor or Examiner to have achieved a Level 6, which is an Expert level.

Trainees, difficulty in communicating could be due to a number of reasons.

Refer to table 1, which is an extract of the EBT grading criteria. The competency being assessed is “Communication”. The performance indicator is from 1-5, where a minimum 3 is required to “Pass”. For an instructor to assign a grade of 4 or 5, the grading criteria require the instructor to have knowledge of performance indicators. Therefore, an instructor needs to have an in-depth knowledge of the subject himself.

Table 1 is an example of analytical rubric whereas Dreyfus model is a Holistic rubric. Analytical rubric gives grading or performance standards based on the competence assessed. The advantage is that, an in-depth detail of the competencies can be derived but it does not give the overall assessment. Analytical rubric is good during initial training of a pilot, where it is important to ensure that all aspects of the training are covered and graded. At the advanced level of a trainer, analytical rubric is important too, to ensure that proficiency or mastery is achieved in all individual aspects or competencies but it is more important to ensure the holistic development of the trainer so that he/she has a clear understanding of the entire subject material and the training process. This is also required since; the instructor will be utilized to make changes to the training methodology or the process, to meet with changes in order for the training to be current and relevant. In order to determine the final skill level as per Dreyfus model, a holistic rubric needs to be followed. The holistic rubric will determine if the instructor is competent, proficient or and expert. By undermining the level of skill required and development, the long-term effect would be that the Data recorded by the instructor would not be as accurate.

The EBT Instructor training course foot print assigns less than 15 minutes of training for Communication, which is grossly inadequate to even reach proficient levels.

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COMM	5	The pilot communicated in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot communicated effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot communicated adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot communicated at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not communicate effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation

Table 1:EBT Grading Scale

In order to solve a problem, we may require knowledge or skill from different fields. Experts have a vast repertoire of knowledge that is relevant to their field of work or discipline, but only a subset of that knowledge is relevant to any particular problem.

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Experts do not have to search through everything they know in order to find what is relevant; such an approach would overwhelm their working memory. For example, the chess masters consider only a subset of possible chess moves, but those moves were generally superior to the ones considered by the lesser-ranked players. Experts have not only acquired knowledge, but are also good at retrieving the knowledge that is relevant to a particular task. In the language of cognitive scientists, experts' knowledge is "conditionalized" —it includes a specification of the contexts in which it is useful (Simon, 1980; Glaser, 1992). Knowledge that is not conditionalized is often "inert" because it is not activated, even though it is relevant (Whitehead, 1929).

Expertise in a particular domain does not guarantee that one is good at helping others learn it. In fact, expertise can sometimes hurt teaching because many experts forget what is easy and what is difficult for students.

Recognizing this fact, some groups who design educational materials pair content area experts with "accomplished novices" whose area of expertise lies elsewhere: their task is to continually challenge the experts until the experts' ideas for instruction begin to make sense to them (Cognition and Technology Group at Vanderbilt, 1997).

Expert teachers know the kinds of difficulties that students are likely to face; they know how to tap into students' existing knowledge in order to make new information meaningful; and they know how to assess their students' progress. Expert teachers have acquired pedagogical content knowledge as well as content knowledge.

In the absence of pedagogical content knowledge, teachers often rely on textbook publishers for decisions about how to best organize subjects for students. They are therefore forced to rely on the "prescriptions of absentee curriculum developers" (Brophy, 1983), who know nothing about the particular students in each teacher's classroom.

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Pedagogical content knowledge is an extremely important part of what teachers need to learn to be more effective.

An important question for educators is whether some ways of organizing knowledge are better at helping people remain flexible and adaptive to new situations than others. For example, contrast two types of Japanese sushi experts (Hatano and Inagaki, 1986): one excels at following a fixed recipe; the other has “adaptive expertise” and is able to prepare sushi quite creatively. These appear to be examples of two very different types of expertise, one that is relatively routinized and one that is flexible and more adaptable to external demands: experts have been characterized as being “merely skilled” versus “highly competent” or more colorfully as “artisans” versus “virtuosos” (Miller, 1978). These differences apparently exist across a wide range of jobs.

Conclusion

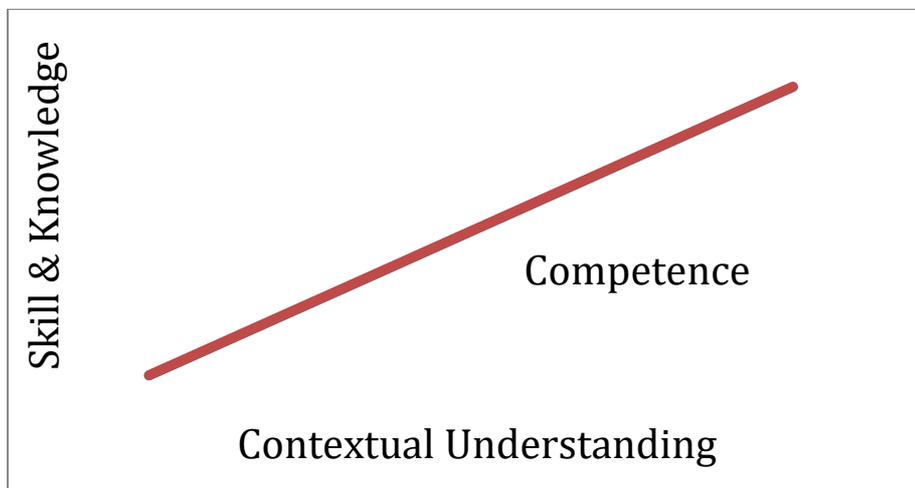
The objective of EBT therefore, as defined in the ICAO Doc 9995, that of refocusing the instructor population to carry out root cause analysis and improve the effectiveness of training can be achieved, primarily by ensuring that the Instructor himself has achieved mastery in the subject. The current status of being competent, needs to be upgraded to either proficient or Mastery. From the level of Proficient, the Instructor begins to get a holistic view and has in-depth understanding of the subject.

The notion of minimum competence levels is useful for certification purposes but carries some risk if these are the only standards available. Many organizations depend on high-level performers for their success. We should be looking for ways of cultivating excellence in occupational competence and the recognition of enhanced performance.

According to ATD following these steps will ensure that the trainer has mastered the content.

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- a) Take any pre-test or post test you deliver to the class before delivering them. You should score 100 percent. If you do not, go back to the books.
- b) Conduct interviews with subject matter experts to determine exactly what is relevant and important to those in this field.
- c) Observe subject matter experts during their daily routine to see first hand what obstacles and challenges they encounter on a regular basis.
- d) Read as much background information as you can get your hands on. Even if you think you'll never need some of this knowledge, you never know when one of your learners will pose a question – and you don't want to be stuck without a clue.



Competence occurs because of possession of right combination of facts and skills, on the one hand, and contextual knowledge on the other. Without the later, not only may the individual not know how and when to deploy the knowledge and skills they possess, they may not have the basis which to further develop and adapt them as the circumstances change.

Logically, the trainer must have a higher level of Knowledge than the trainee for an effective transfer of knowledge or facilitation. Competencies must be re-classified to

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include the performance levels and criterion for satisfactory achieving the grade. Even though there is a group of professionals who feel that training Instructors to SME level will not be cost effective and that the content be prepared by SME's and delivered by Competent instructors. This has the basic draw back of efficiency of delivery and upholding the standards. At the end of the process there has to be a review of the system based on the data recorded. If the Data is not accurately recorded, on account of instructor's lack of understanding of the details of the subject, the primary objectives will not be met with.

The following logical steps must therefore be followed.

1. Trainer must achieve level of mastery in all competencies that he/she is expected to qualify for and later train and assess the trainee for.
2. Trainer must observe and engage with a subject matter expert in order to debate and challenge learning. This will help with the conceptual understanding of the subject. One of the shortcomings of Computer based training is that there is no interaction with an expert. Therefore the trainee's knowledge is limited to the content of the CBT and creative learning is stifled.
3. Trainers must periodically interact with other trainers or be able to write papers on the subject of specialization so that future thinkers are promoted, who will bring about change. By being satisfied with achieving a minimum pass percentage of 80% will not encourage high achievers.
4. Root cause analysis is achieved by ensuring that the trainer has adequate knowledge, conceptual understanding of the subject and further is creative and can think of possibilities beyond his scope of subject of specialization.

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Appendix “A”

0	Introduction	60	Day 1
1	The Instructor	30	
2	Training Philosophy	30	
	Principles of Learning (Learning Theory)	30	
	Competency based training	60	
	Core Competencies	120	
	Wrap-up	10	
	Review	30	
	Techniques of Applied Instruction	120	
	EBT Overview	45	
	Facilitation	60	
	Competency based assessment	60	
	Grading Exercise	90	
	Wrap-up	10	

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	Review	30	Day 3
	Risk Management Model	90	
	Training Aids	60	
	Pre-Instructional Briefing	60	
	Techniques of Applied Instruction - Airborne	60	
	Synthetic Training Devices	60	
	Wrap-up	10	
	Review	30	Day 4
		12	
	Human Behaviour in Flight Training	0	
	Evaluation and Testing	60	
	Grading Exercise – Part 1	90	
	Grading Exercise – Part 2	90	
	Post-Instructional Debriefing	90	Day 5
	Duties of an Instructor	4hr	
	Practical Exercises Part 1		Day 6
	Practical Exercises Part 2		Day 7

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Appendix “B”

A P K	5	The pilot applied procedures in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot applied procedures effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot applied procedures adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation.
	2	The pilot applied procedures at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not apply procedures correctly, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
C O M	5	The pilot communicated in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot communicated effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot communicated adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot communicated at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not communicate effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
F P A	5	The pilot managed the automation in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot managed the automation effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot managed the automation adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot managed the automation at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not manage the automation effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
F P M	5	The pilot controlled the aircraft in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot controlled the aircraft effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot controlled the aircraft adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot controlled the aircraft at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not control the aircraft effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation

K N O	5	The pilot had exemplary knowledge, by always demonstrating all of the performance indicators when required, which significantly enhanced safety, effectiveness and efficiency
	4	The pilot had good knowledge, by regularly demonstrating all of the performance indicators when required, which enhanced safety.
	3	The pilot had adequate knowledge, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot had knowledge of a minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not have adequate knowledge, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
L T W	5	The pilot led and worked as a team member in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot led and worked as a team member effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot led and worked as a team member adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot led and worked as a team member at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not lead or work as a team member effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
P S D	5	The pilot solved problems and made decisions in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot solved problems and made decisions effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot solved problems and made decisions adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot solved problems and made decisions at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not solve problems or make decisions effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
S A W	5	The pilot's situation awareness was exemplary, all performance indicators were always demonstrated when required, which significantly enhanced safety, effectiveness and efficiency
	4	The pilot's situation awareness was good, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot's situation awareness was adequate, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot's situation awareness was at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot's situation awareness was not adequate, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation
W L M	5	The pilot managed the workload in an exemplary manner, by always demonstrating all of the performance indicators when required, which significantly enhanced safety effectiveness and efficiency
	4	The pilot managed the workload effectively, by regularly demonstrating all of the performance indicators when required, which enhanced safety
	3	The pilot managed the workload adequately, by regularly demonstrating most of the performance indicators when required, which resulted in a safe operation
	2	The pilot managed the workload at the minimum acceptable level, by only occasionally demonstrating some of the performance indicators when required, but which overall did not result in an unsafe situation
	1	The pilot did not manage the workload effectively, by rarely demonstrating any of the performance indicators when required, which resulted in an unsafe situation

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