FRANCESCO DANIELE PADOVANO

GLIDER FLIGHT

INSTRUCTOR MANUAL

Development of the first period-basic course based on the EASA SFCL regulation of March 2020 with the introduction of competence criteria.



Development of a CBTA (Competence Based Training and Assessment) and related mission sheets.

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INTRODUCTORY NOTES

This manual has been conceived as a support for the activity of teaching gliding, both in its first period and in a second phase of improvement, and its main purpose is the unification of teaching criteria, raising the qualitative standard.

This second edition aims to introduce proficiency criteria in gliding training since, although the current regulations do not yet reflect this need, it is true that in the higher licenses EASA has already published two manuals in this direction, together with a series of references that cannot be ignored and not taken into consideration in the current SFCL regulations (introduction of TEM analysis, integration of the theoretical part in the theoretical part of the training), integration of the theoretical part into the practical part, the application of competence criteria with regard to non-technical skills) and the firm will of EASA to extend the competence criteria to all licenses, although the main reason is the advantage in terms of standardization and training quality of the introduction of competence criteria in the field of gliding.

On the other hand, greater importance has been given to the analysis of risks and their integration into the training program in its two aspects:

- Risks related to the flight itself and which every pilot in command must be aware of and take into account during his career.
- Risks specific to the flight missions and respective sessions that every instructor must be aware of during his performance as such.

The existing ICAO, IATA and EASA documentation on competencies, Competency-Based Education in Aviation Exploring Alternate Training Pathways by Suzanne K. Kearns, to the official text of the Italian Federation of Gliding (FIVV), edited in 2006 and written by Flavio Formosa, and to the basic texts used by the English BGA, the New Zealand NZGA, the French FFVV, the American SSA, and to the flying manuals commonly used in German, English and Italian schools. In particular, textbooks edited by Derek Piggott, Enrico Bergomi, Flavio Formosa, Leonardo and Riccardo Brigliadori have been used, as well as articles in the magazines Gliding, Volare e sport and safety articles published on the websites of various federations.

The flight mission sequences are inspired by various schemes already in use worldwide, such as those of the Italian and English schools, and in particular the specific manual for XAIR-IN operations, the purpose of which is to be used at any operational base, making the appropriate adjustments according to local conditions.

In this text, the focus is on the quality of training, for which it is introduced:

- Quality criteria in the performance and personality of the instructor.
- Fundamental and basic criteria for appropriate teaching taking into account
  - o teaching and learning techniques
  - o Influences of human factors during the training process.
- introduction of competence criteria, their meaning, use and benefits
- Introduction of assessment criteria
- Safety policy and its implications
- Specific analysis of common undesired states

A generalised syllabus with the most important missions with their relative TEM analysis and ICAO proficiency elements adapted to gliding is proposed as an example and is the result of my personal experience, as well as the progress records shown.

The order of the flight missions responds to criteria of general logic, although at the instructor’s discretion, weather conditions and especially depending on the student's progress, they may be anticipated or postponed, trying to maintain a logical sequence in any case.

In each mission, only one new argument will be introduced to avoid overloading the student, who will be able to use any surplus time to retake concepts previously presented.

The entire course will be subdivided into three distinct phases, written in worksheets:

Phase 1: contains all the necessary missions from the start to the first solo flight.

Phase 2: contains all the missions necessary to consolidate the knowledge learnt with solo flights and dual control checks.
Phase 3: contains the missions necessary to achieve the 50Km or 100Km distance flight in dual control and training programmes for further training courses.

In all the mission sheets reference is made to the theoretical content necessary to tackle the mission, as well as the TEM analysis involved together with the most common errors that can be expected from a student.

Acknowledgements

As I have been reflecting on the ideas and focal points, I have realised that the "teaching and learning" criteria, as well as the introduction of competences, have been the result of my professional experience at CAE Madrid. In particular, I would like to thank Jaime Ferrer, director of CAE Madrid, for what has possibly been the best course for instructors that I have been able to participate in. I would like to personally acknowledge the great benefit I have obtained from this course and thank him for the opportunity to have been able to participate in his classes and to be able to put his teachings into practice during my activity as a TKI instructor in CAE itself.
The contribution of fellow experts in the evaluation of EBT scenarios and ATPL training has been fundamental for a deeper understanding of the advantages and usefulness of competence criteria.
In this respect I must necessarily thank the invaluable help of Ignacio G. Alemany (EBT Iberia) who, in a totally disinterested way, has advised me on the most important directions in which to adjust the new "Competence" paradigm to the gliding sector.
I cannot forget the long talks with Anna Bonnati whose constructive criticism has helped me to refine day by day the construction of my idea of CBTA for gliding.
Special thanks to James, a great glider pilot and Marina Loteryman, whose helped me to correct in the limits of possible, the English redaction of this manual.
The number of people who have supported me in this project is so many, it would be impossible to mention them all, so I would like to thank them all for their patience and availability.

THE ROLE OF THE INSTRUCTOR

A student approaching gliding often has many uncertainties and fears; he would never dare to take action without the support of his instructor. In fact, he attributes to him the task of eliminating his fears and insecurities by setting him up as a model to be imitated without discussion, so that, as a general rule, the instructor is endowed with a strong and indisputable authority, which must be used with caution and attention, as misuse can cause very serious damage. There are moments during the teaching process when authority is absolutely indispensable and no learning process would be valid if the learner did not maintain an attitude of absolute respect towards it. However, we must not confuse authority with authoritarianism. Authority is a consequence of leadership that achieves the necessary respect so that the learner can make the best use of the training process.

An instructor is the person who is going to teach skills and a way of behaving through training so that the student acquires the competences to be able to fly safely. As instructors we will be carrying out a very satisfactory activity at all levels, but we cannot forget that it implies a great responsibility.

For the students we are the most important person in the world during this phase and we are expected to have the maximum preparation and mastery of the subject we are going to teach together with the deep desire to help (facilitate) with the ability to teach everything that is necessary for them to become safe and efficient pilots.

Not only will we be expected to be concerned with their day-to-day safety throughout all phases of training, but especially that we have the necessary competence to be able to make a correct assessment of their capabilities for the transition to higher phases of training up to solo flight.

Much is expected of us and we must be prepared to meet the expectations. If we decide to become instructors in order to fly at the expense of our students, we will hardly be fulfilling the expectations that are placed on us.

On the other hand, apart from the economic retribution, the instruction will provide us with great rewards such as getting a student who progresses slowly to believe more in himself by breaking down the barriers that prevented his training. There are no bad students, only bad instructors.

In any case, the instructor must be sensitive enough to create a relationship of reciprocal esteem and respect, in which he/she must avoid assuming a dominant position, in which the situation leads him/her to place him/her in a natural way, since the student is the one to whom maximum attention must be devoted.

The flight instructor must maintain, apart from absolute moral integrity, a series of important characteristics:

EXEMPLARITY: a large part of the teaching process is based on imitation, so it follows that a flight instructor must be absolutely correct and be an example of the highest level. It must be remembered that students have a strong tendency to imitate negative behaviour more easily, so that an instructor who maintains a minimalist behaviour, who behaves lazily, will generate undisciplined students and pilots or will be generating situations in which he or his colleagues will have to face hard corrective work in the future. Example is not the best way to inspire people, it is the only way (Albert Einstein).

SELF-DISCIPLINE: is the natural complement to the need to set a good example; discipline cannot be demanded if the instructor himself behaves in an undisciplined manner. In an activity as highly regulated as gliding, everyone, and especially the instructor, must take pride in respecting the established rules dictated by common sense and experience.

MORAL INTEGRITY: All instructors must be correct and impartial at all times. There is nothing that diminishes an instructor's authority like favouring some students and not others. Similarly, stability in behaviour, coherence and consistency is an essential factor, as one cannot expect respect if one continually changes one's position between what is said today and what is done tomorrow.

EMPATHY: can be defined as the instructor's ability to put himself in the student's position, trying to live from inside the student's mind the difficult didactic process of learning to fly. It will be easy for the instructor to remember his own feelings during this phase and to understand what the student is experiencing in each phase of the instruction. It is clear and evident that at all times the instructor must

maintain an attitude of maximum respect towards the student, as a person, avoiding diminishing him, ridiculing him or subjecting him to useless authoritarian humiliation.

Sense of humour: The instructor must gain the confidence of his pupils and know how to win their sympathy. During the training phases, the pupil is subjected to high pressures, at the limit of his possibilities, so knowing how to release the tension with a simple joke or a brief digression is an important pause and relaxation of the stress level with the obvious positive consequences for the following actions.

KNOWLEDGE AND ABILITY: The instructor must have a level of knowledge far beyond the level at which he/she is teaching, as he/she must be able to answer all the inevitable questions that the students want to go into in depth, especially if the student has difficulty in understanding, he/she must be able to present the same concepts in different ways. What an instructor must never do is lie to the student, and if he is presented with a question that he does not know how to answer, the instructor must not be afraid to admit his difficulty in answering it, promising the due study and successive answer that absolutely must be given, on pain of the loss of the instructor's credibility.

MASTERY OF TEACHING TECHNIQUES: the instructor must be able to master the teaching techniques described in this manual.
LEADERSHIP: defined as the ability to guide people effectively, it is an essential quality of an instructor. It is not an easy quality to learn, especially for those who have not had teaching experience. An instructor with leadership can significantly raise the level of efficiency of the school, contributing in an important way to the creation of a group spirit that accelerates learning for each individual. A strong ability to guide people is fundamental, as the flight instructor has the responsibility to maintain:
a) The discipline of the students
b) high standards of safety
c) The proper use and safeguarding of the equipment used.
The instructor must be prepared to make decisions and take responsibility, taking care not to make hasty or erroneous decisions that could undermine his or her credibility.

DISCIPLINE: Maintaining a standard of discipline is fundamental in guiding a group of learners towards a common goal. Unfortunately, the term discipline has always been associated with a negative concept, loaded with punishments and rigidity; however, we must understand that discipline means training behaviour according to a series of established rules, and not exclusively sanctioning non-compliant behaviour. We can make a subdivision between:
- Positive discipline: when respect for the rules comes from the perception that the individual's aim coincides with that of the group or organisation.
- Negative discipline when obedience to rules derives from the fear of punishment.
It is clear that the former is more than advisable since compliance with the rules derives from respect for all and not from the fear that the instructor may instil.
In this respect, the instructor plays a vitally important role, as a student without discipline will end up swelling the ranks of undisciplined pilots, with serious consequences for the growth of the group and its safety.
CAPACITY TO CORRECT: making corrections is part of the instructor's daily work, being one of the tasks that requires the greatest effort. There is no one right way to correct, but there are many wrong ones, so it will depend a lot on the way in which the correction is proposed and the acceptance of it by the student. In certain cases, this can compromise the student/instructor relationship. An instructor should therefore try to reasonably follow the following decalogue:
- Always maintain an attitude of constructive criticism: criticising only to assert one's authority produces resentment.
- Never correct nervously: allowing time for calm and reflection improves the perception of the observation to be made.
- Listen to the facts beforehand: in particular, understand the causes of the error without interrupting the student before judging, taking into account the possibility that the error may have arisen from a situation beyond the student's control.
- Offer criticism in a friendly way: e.g. "I may not have made myself clear when I asked you not to do that" sounds better than "who told you to behave in that way?

- Do not blame the learner: as the role of the trainer is to correct a wrong attitude and not to judge it.
- Be careful not to ridicule the learner: do not use sarcasm, especially in public. As a general rule, criticism should only be expressed in public when it is of common use, in which case it should be made with great tact and care should be taken not to put the pupil who has made the mistake in the spotlight.
- Always treat pupils as adults: always show them the same respect that is expected of them.
- Ask, don't ask: as far as possible, try to make an invitation to perform a certain action rather than imposing it as an order.
- Use authority sparingly: in particular, try to put yourself in the position of the person who is to receive an order before giving it.
- Be consistent and impartial so that the same mistake is treated with the same yardstick no matter who the learner is.

CAPACITY TO PUNISH: the extreme consequence of a serious violation of the rules is punishment. As mentioned above, discipline is the consequence of the feeling of belonging to a group rather than the fear of punishment. Punishment should be the last possible solution and should be limited to cases where there is a serious violation that threatens the safety of the pupil, the group or the material.

CAPACITY TO PRAISE: this is one of the most effective motivating forces of the instructor. There is no need to be afraid of showing satisfaction for an attitude or an action well done in the belief that the trainee's abilities are overestimated. Studies confirm that people react positively to this kind of encouragement, significantly improving their ability to learn. It is obvious that exaggeration and false appreciation otherwise generate absolutely negative results, so the trainer should avoid this kind of attitude.

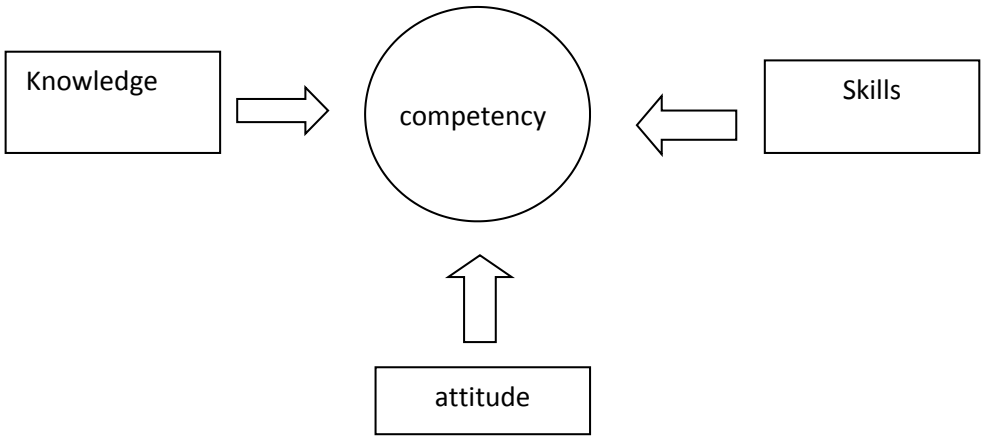
CAPACITY TO ACKNOWLEDGE ONE'S OWN MISTAKES: the instructor must be an honest person above all, because admitting one's own mistake is much more effective when it comes to consolidating a relationship with the student, than not trying to justify the unjustifiable, denying the mistake, in order to try to maintain an image of infallibility that is more than improbable.

COMPETENCY-BASED ASSESSMENT

One of the greatest difficulties an instructor faces is the assessment of the learner. The factors influencing the assessment are manifold and very personal and subjective.
For years the aviation industry has been looking for a system that could result in a more objective outcome by standardising the assessment system as well as the teaching.
The need to increase the level of pilot resilience has become evident, especially in commercial and professional aeronautics, and is a necessity in the evolution of gliding now that new models with characteristics unthinkable a few years ago are being introduced in the market. If we look at the EASA regulations, non-technical skills criteria are already being introduced into training, while in commercial licences the Evidence Base Training criterion has been strongly introduced, so it is worthwhile to look more closely at this new concept of teaching in the field of gliding.
It is clear that no instructor wants a well-trained chimpanzee as a pilot: light on, push the button, banana comes out..... On the other hand, it is impossible to try to reproduce the full range of abnormal situations that may arise during training.
For the above reasons, I understand that it is necessary to focus all training on producing pilots who are able to deal with unfamiliar situations safely and who are capable of:
- Apply their knowledge with judgement
- Carry out a correct risk analysis
- Apply established procedures
- Respect the rules
- Maintain self-control
- Maintain high situational awareness at all times.

In short, validate pilots capable of thinking and acting safely.
On the other hand, perfection cannot be expected after only 15 hours of flight time, which is the minimum required to obtain a licence, so the whole part related to aircraft handling has to be seen with a broader criterion.

To understand this better, if we look at the accident statistics of the last 30 years, we can identify the phases of flight in which the most accidents/incidents have occurred, which shows the need for a change in the established criteria that do not meet the safety objective that we as aviators are seeking.
If we look at the regulations presented by EASA and specifically in AMC1 SFCL.130 SPL, it introduces the need to apply non-technical skills criteria in training, taking into account the risks associated with licences and activity. In fact, a distinction is made between knowledge, skills and, more particularly, attitude. This is not to say that this is not already done intuitively, but there is no doubt that standardisation will help to reduce the breadth of criteria applied so far.
If we look at what has been done in commercial aviation, we can deduce a number of concepts which are perfectly applicable to the gliding sector and which, despite the initial apparent difficulty, will ultimately simplify training and, more importantly, standardise it with all the advantages that this entails.
This new training concept has been developed by experts from all fields, from medicine, industry, etc. and more particularly in the aeronautical field under the umbrella of the IATA Training and Qualification Initiative (ITQI) since 2007. From a working group formed by airlines, academic institutions, aircraft manufacturers, international organisations, pilot associations and flight schools, an innovative philosophy has been developed, establishing a methodology for the development of training, assessment and recurrent training of pilots known as Evidence-based-training.
This methodology has been recognised by ICAO in 2013, which describes and publishes it in the document DOC 9995 "Manual of Evidence Based Training" which is accompanied by the document published in 2013 "evidence-based training Implementation guide" edited by IATA/ICAO/IFALPA.
Competency-based training (CBT) proposes a structured methodology for training and assessment based on precise and specific learning objectives.
This facilitates the learning process so that the learner acquires sufficient skills and knowledge to be able to perform to a specific standard under certain conditions. For the method to work, the expected standard must be clearly specified so that the learner knows at all times what is expected of him/her. On the basis of the above, it is essential that the trainer has a thorough understanding of the training programme and the learning objectives to be achieved in order for the trainee to reach the set level of competence. The aim is to increase the level of resilience of the pilot so that he/she has the ability to emerge stronger from an adverse situation so that he/she can minimise the effects of a negative situation and is resilient in the face of adversity, adapting to challenges with flexibility and positivity, evaluating the situation through reflection during the action, trusting in him/herself and managing his/her stress. To achieve competence, therefore, several factors must contribute:



Definitions

CBE Competency-Based-Education: is a result-oriented aviation training model in which core competencies are defined that establish the objectives to be achieved by the trainee and ensure the quality and consistency of the training. The core competencies and their corresponding indicators with observable elements have been defined in a standardised manner, which contributes to greater uniformity in training and assessment between the various centres.
CBTA: Competence Based Training and Assessment

Non-technical skills: non-technical skills identify part of the human factors involved in training and air operations as an integral part of pilot training. The introduction of these skills is of great help in focusing on operational aspects, contributing to greater safety and to a simplification and standardisation of assessment by transforming subjective criteria into the detection of previously established observable elements. These are social and personal skills that reinforce the way of executing the technical part.

As with anything new, the introduction of new concepts and criteria involves an effort which is not without its difficulties. As a rule, different people and entities are involved in the whole training process, each with their own thoughts, as follows:

Who	**What does he think**
Aviation professional	Vaguely intuits that CBE is focused on quality of training rather than on flight-hour learning
Institutional training programme designer	Understands that CBE is a learner-centred learning process tailored to meet the learner's learning needs and the precise role he/she will have to play during his/her professional life.
MPL instructors	Understand that CBE is an application of the MPL training programme.
NAA	They understand CBE as an evolution of the training system in which new teaching techniques are incorporated and which must be adapted to the context of each organisation while considering that many FIs may not understand how to modify their teaching style to the CBE model.
Instructors with practical experience in CBE	They describe it as scenario-based training in which the FI acts as a facilitator for the learner.
Recruitment & Selection	They understand competencies as a list of attributes that can be used to select the right candidate.

To some extent they are all right and at the same time they are all wrong or incomplete. In order to deepen understanding it is necessary to broaden certain concepts:
Competence: the ability to participate in a complex social activity for which one needs:
- Skills
- Knowledge
- Attitude

Competences: a series of written statements intended to describe the ability to actively participate in a social practice and which include:
- The nature of the competence
- A specific number of statements needed to describe the competence
- An appropriate language to describe the competence

Competence-based training: institutional design, training, assessment that systematically refers to the competences described.
Core competences: a set of behaviours expected on the basis of a given task describing the minimum acceptable level of effectiveness by including in its definition the competence title with its associated behavioural indicators.
EBT: training and assessment based on operational data characterised by an assessment of candidates across a range of core competencies rather than a measure of performance of individual manoeuvres or events.

The above is the basis for the development of a curriculum (DACUM: develop a curriculum) considering the fundamental criteria by which people employed in various occupations are deemed to be able to describe the knowledge, skills and attitudes necessary to perform that job.

Competency-based training, focal points

Competency-based institutional design and assessment offers the following advantages:
- Quality rather than hours
- Expected outcomes described as competences
- It makes the training process flexible and gives some freedom by being relevant to the profession.
- Assessment determines competence versus competences

However, there are a number of threats that may hinder the development and application of this methodology as designers, trainers and learners need to actively interpret the competences and lead to some variability of interpretation of a given truth.
This may take some time to standardise, but the advantages are so great that it is only a matter of time before this is achieved.
Let's see what happens: if competencies are based on a written description based on what professionals and pilots have to do, it needs to be based on two fundamental principles:
- Technical approach: as a result of observation and interviews with professionals to describe these competencies.
- Consensual approach: as a result of data from professionals in the sector who end up describing these competencies.

As above, the competencies describing a pilot/professional should at least indicate:
- The performances, the specific conditions of the proposed scenario, the minimum expected standard.
- The theoretical integration involved in the flight exercise together with the cognitive aspects of the performance including the necessary applicable procedures.

The process itself is therefore based on research and analysis, but it is evident that there is a limit to how many proficiency performances can be described in writing along with the fact that certain descriptions may compromise or distort the basic elements of performance.
Therefore, the basis of the process has to be based on what pilots/professionals actually do within the specific scenarios and based on:
- The ability to perform the pilot role autonomously and with sufficient capacity.
- It requires relevant knowledge, practical skill and attitude.

What needs to be clear is that competence is a continuum between novice and expert so there is no single state of competence, no black and white that can be ticked off a chk list. Moreover, the whole set of competences has to be assessed in a group as well as an individual system context.

Criticism

While it is true that the term CBTA and EBT is becoming increasingly popular and the need for the adoption of this methodology is understood, there is no shortage of criticisms since, like any other method, it has its strengths and weaknesses. One of the problems we may encounter is reductionism.
Indeed, if we try to reduce something as complex as an expert's practice to a simple textual statement, we will artificially simplify complex aspects of real flight operations. The risk is to construct a training curriculum made up of poorly described competencies that will result in a tendency to demonstrate knowledge by simply filling in boxes on a check list when in fact the aim is to:
- Encourage the learner/pilot/professional to excel.
- Think critically

As opposed to a poor model which will end up limiting
- Intuition
- Experience
- Reflection
- A higher level of competence

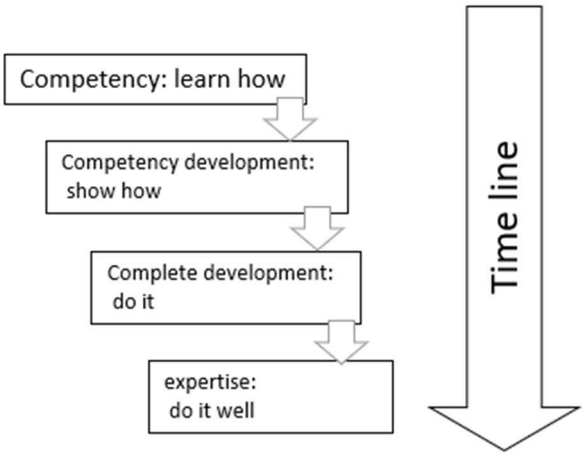
These are necessary elements for a complete, expert and well-organised practical performance. This is the reason why a good CBT must take into account non-technical competences such as problem solving,

teamwork, decision making, connecting each competence with the others and avoiding compartmentalisation.

Interpretation:

When a written text on competences is generated, even if it is well described with all its elements, its application lends itself to multiple interpretations. Different groups of people may interpret the same text in different ways. To give an example:
- Pupils with the limitation of their knowledge will conform exactly to what the text proposes.
- Legislators or regulators will focus on how performances can be standardised and assessed within a competency framework through a checklist when the scope of assessment is much broader than black and white.
- Trainers responsible for transforming competences into a training curriculum proposal may have different levels of understanding and assessment of the same competence.

It is essential to understand and accept that training must be personalised by focusing on competences, which, unlike hourly delivery, results in a system that is able to adapt to learners so that they can progress at their own pace. This will only increase motivation, better skills development, increased resilience leading to greater confidence, reduced teaching time and ultimately reduced costs. There is no doubt that time is an integral part of a CBT training programme, but it is translated and interpreted more as an integrated resource of the training programme or organisation than as its purpose.



The training processes

The objective of a CBTA and the introduction of competencies is only a stepping stone to experience and does not represent the goal of the student's development. It is not credible that a student will be able to acquire full expert competence after only 15 hours of flying and 45 launches.

We must be aware that expert competence is built up over years (Talbot 2004) and so during the basic training the student must be encouraged to understand the reality of his experience and that the training programme leads him to understand the "how", that during his pilot experience he will demonstrate that he is able to apply that "how", that throughout his flying life he "does it" and that further towards the end of his career he will be able to "do it well".

The rule itself reminds us of the progression throughout a pilot's career and the need to encourage them to excel through specific checks with an IF as a requirement of recent experience so that they do not get stuck in a base knowledge obtained during the training course.

Therefore, proficiency cannot be considered as an indicator of mastery level as the latter requires experience in the real flying environment and the time needed to achieve it.

Standardization

Standardisation is a term on the lips of every training centre, professional, inspection agency and pilot. The CBTA is a clear example of standardisation based on the understanding of the:
- Theoretical knowledge
- Skills
- Attitude

All points necessary for a pilot whatever his destination. The standardisation list is often proposed by the legislator, in our case by ICAO, IATA and EASA, among others, with the intention of generating a single model of interpretation at a global level. Hence, in our case, EASA has published minimum contents, but the risk is to focus on a standard of minimum acceptable performance, leaving aside the advantages that a CBTA can offer.

Administrative workload

The custom and practice of understanding a training programme as an obligation to receive an approval from the inspection agency in order to be approved after passing a Chk list examination considerably reduces the scope and benefits of a CBTA. It is true that the standard obliges to contain the programmes within a framework describing the minimum acceptable training, which is exactly what the inspection agency will check. This is a black-and-white approach when the reality is that a CBTA offers an infinite scale of greys through which the learner will achieve competence by following multiple training strategies. If, on the other hand, the training programme is understood as a working instrument with the aim of further training development, the mere exact copy of an AMC is a poor way that has little to do with the training process, the usefulness of which is to pass an exam and a chk list, preventing de facto the free possibility of the training organisation to propose a training programme adjusted to its reality as it believes best, as long as it complies with the minimum requirements of the standard.

It is clear that this phase represents a greater workload for the organisation, which will nevertheless find enormous advantages once the system has been implemented in the quality and standardisation of its training, as well as in the control of its instructors and the monitoring of its students.

It is also true that the implementation of this system represents a greater workload for the inspecting agencies that will have to learn to evaluate the infinite grey areas of a CBTA in exchange for a greater understanding and clarity that, despite appearances, will end up simplifying the inspection enormously.

It is clear that concentrating on hours, rather than on the analysis of the teaching itself, simplifies the control process as calculating hours is very simple and provides a quantifiable and globally standardised method in virtually all areas, representing the most efficient and convenient means of control for the inspection agency.

As a general rule, a safety recommendation based on an accident/incident investigation with reference to a particular licence or rating has the simple solution of increasing the experience hour requirements to meet the necessary requirement. Even so, there remains the possibility that the root cause of the recommendation could not be resolved, even if it could be mitigated by increased experience. To give an example:

On 12 February 2009 Colgan Air 3407 crashed with 4 crew members and 45 passengers plus one person on the ground all deceased. The causes identified by the NTSB were the captain's inadequate response to the stick shaker activation which resulted in an aerodynamic stall that could not be recovered, the first officer's failure to control airspeed, a non-sterile cabin condition without the application of established procedures, the captain's inability to manage the flight and the company's inappropriate procedure regarding icing conditions. The NTSB's recommendation was to increase the minimum first officer hour requirements which will surely have meant a mitigation of the threat, but it still leaves the root cause unresolved despite having been identified in the causes of the accident.

It is necessary to consider that, and more precisely in our field of gliding, experience does not exclude the possibility of an accident. Roberto Monti was an extraordinary pilot with more than 8,000 hours of flight time to his credit and participation in international competitions of the highest level. He crashed with his ASH 25 on the side of a mountain. The Italian federation detected, after investigation, a fault in the training of pilots and issued a recommendation, spreading it massively, about the entry into spiral by deflection of the aileron in hillside flight, especially for large sailplanes. In this case, it was not a problem of experience, but of ignorance of certain phenomena that have become more evident with the increase in wing aspect ratio of modern gliders. What is important in this last example is the massive disclosure of the root cause and the detected barrier.

In a training process, fault detection is a very important element to increase quality, which cannot be achieved if the training programme is considered as a mere administrative formality. CBTA becomes and has to be considered as an ideal instrument for fault detection.

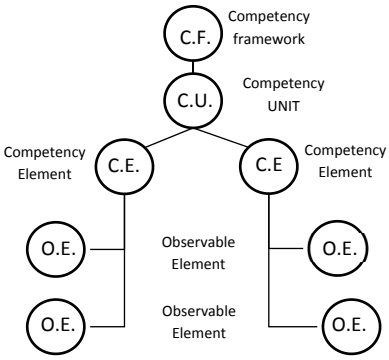
Conflict of interest

In the field of aviation, competencies have been described through a process of observation and documentation of in-flight behaviour and a consensus has been reached among experts who have agreed on definitions of competencies and their descriptors. Naturally, this way of defining is not free from personal and subjective assessments and there may be elements that remain within the realm of intuition

and cannot be described in a more objective or conscious manner. Nevertheless, the consensus between pilots, trainers and regulators, despite the fact that it is after all a political act, has managed to include the most important and determining elements for a CBTA process with a very complete description of competences and their indicators. Naturally, the agreed definitions are intended to cover as much as possible the field of aviation, which means that there are a number of competencies and observable elements that do not necessarily apply to gliding. Hence the necessary additional effort to adjust the process to the reality that may affect us, finding the necessary consensus in the field to find a balance and avoiding subjectivity as far as possible.

The structure of competence-based training

The proposed structure makes it possible to build a complete training programme in which the following is determined:



- the objective of the programme
- The learning objective and the competences sought
- The observable elements of competence
- the expected standards

Thanks to the above definition, evaluation is much simpler, standardised, much less influenced by subjectivity compared to previously used methodologies, and it will be easier to identify the failures of the training programme and to anticipate problems by issuing recommendations for improvement.

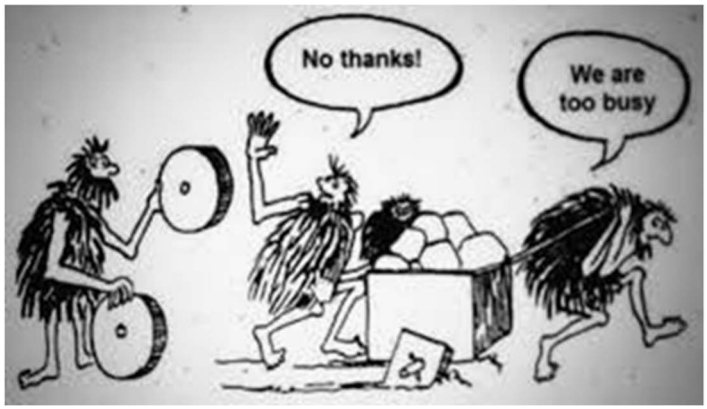
If, in addition to the structure presented, the TEM analysis is combined with the KSA100, the KSA100 will be applied without any doubt. Here is an example:

Mission: 00	**Title:** preparation for flight		**Learning objective:** State the mandatory documents on board. Apply complete glider check as indicate in glider manual. Check the minimum / maximum weight in the seat glider.Properly sit in the glider taking into account comfort, visibility, and ability to use all controls and equipment. Moves the glider in ground correctly						
CRM elements • Human capacity and its limitations, • TEM, • personality, self-critical attitude, • stress management, fatigue / alertness, assertiveness, • situational awareness, • information acquisition, • effective communication **TEM analysis** **Possible real scenarios:** • Does not anticipate possible failures • It does not control that the checklists are carried out correctly. **threats** • Technical failures in the take-off phase • induced yaw moving glider in ground **dangers** • Loss of aircraft control • Collisions in ground **Barriers** • Rigorous Checklist • Apply field procedures **Mitigation** the instructor stops the action and repeats the class NOTES:	Object: first Chk control of the day of glider and launch equipment		**Long Briefing:** How to move safely in the area of the aerodrome emphasize the importance of pre-flight controls. The glider daily check procedure with checklist at hand. Emphasize the importance of the checklist. Control of the towing cable, the hooks and the other launching equipment (fuses, winch cable brake parachutes, etc.). How gliders and vehicles are handled on the ground.						
			KSA assessment criteria						
	Competence	**Description**	**Behavioural indicator**	**Grading**				**Competence assessment**	
	Application of procedure	Identifies and applies procedures in accordance with published operating instructions and applicable regulations using the appropriate knowledge	• Identifies the source of operating instructions	1	2	3	4	**Expected standard** • Apply the checklist for a complete inspection • Identifies and recognizes the mandatory documentation on board • It is able to move the glider to the runway safely • He knows how to assemble and disassemble the glider and check the connections of the controls according to the manual. • Is able to move the glider on the platform being aware of the threats and dangers, mitigating them appropriately • Prepare the flight properly by setting the task, weather forecasts • List the necessary equipment for the flight • Check the maximum and minimum weight according to the manual. • Correctly perform external and internal pre-flight inspections and checks using checklists. • Memory items: pre-launch Chk (MIS: instrument controls and safety).	**Scenery conditions** Ground
			•	1	2	3	4		
			• Applies relevant procedural knowledge	1	2	3	4		
			•	1	2	3	4		**Theoretical knowledge integration** Glider Manual Notions of General aircraft knowledge
	communicatio n	Demonstrates effective oral, non-verbal and written communication, in normal, non-normal situations	• Selects appropriately what, when how and whom	1	2	3	4		
			• Listen actively and demonstrate understanding	1	2	3	4		
			• Accurately reads and interpreted documentation	1	2	3	4		
			•	1	2	3	4		
	Self-control work load management	Manage resources effectively to prioritize and perform tasks in the expected manner and	• Maintains self-control in all situations	1	2	3	4		**Training methodology** The instructor demonstrates and the students repeat. Students complete the full check under instructor supervision. They tow the glider to the runway. In the case of pilots of different abilities, the assembly exercise is changed to oral supervision and effective control of connections. Carrying out check-ups by supervised students
			•	1	2	3	4		
			• Manage and recovers from interruptions	1	2	3	4		
	Decision making	Uses the appropriate decision-making process by risk assessment and prioritize	• Seeks accurate and adequate information	1	2	3	4		
			• Identifies what and why tings gone wrong	1	2	3	4		
			•	1	2	3	4		
	Problem solving	Accurately identifies problems and risks	• Identifies and consider options effectively	1	2	3	4		KSA application • Real scenarios are presented. • The student will be asked about conditions that make it necessary to use the checklist • corresponding TEM analysis to the ground tow on platform • Real examples of connection failures for MIS bypass
			• Employ proper problem-solving strategies	1	2	3	4		
			•	1	2	3	4		
	Situation awareness	Perceive and comprehends all the relevant information available and anticipates what could happen that may affect the operation	• Identifies and assess accurately the aircraft state	1	2	3	4		
			•	1	2	3	4		
			• Identified and manage threats to the safety	1	2	3	4		
			•	1	2	3	4		
	Flight Path Management	Plan, monitor, maintain the necessary flight parameters	•	1	2	3	4		
			•	1	2	3	4		
			•	1	2	3	4		
	Aircraft control	Control the aircraft flight path, including appropriate use of control	•	1	2	3	4	Excluding elements Do not use Chk list	
			•	1	2	3	4		
			•	1	2	3	4		
			•	1	2	3	4		

Complacency: the biggest threat

The famous saying "the devil you know is better than the good you don't know" can be representative of the difficulties that can arise in the face of change. For several decades, training in the field of gliding has not had to undergo small changes and it is always very difficult to leave a well-trodden and known path. Human beings are creatures of habit: we often do things in our daily lives in exactly the same pattern: park the car on the same pavement, leave the house keys in the same place, and so on. The day we don't do this for a different reason, we will be annoyed and may even have some difficulties. The same thing happens with CBTA training. Leaving our comfort zone when faced with a change involves an enormous

mental effort and a priori we reject it even though we can sense the great advantages that we could obtain.
The most common excuse: I don't have time, I can't afford the effort, it's too complicated. .....
There is no doubt that such a significant change requires an effort, but in the end, it pays off!
Indeed, CBTA develops a new vision on both training and evaluation as a consequence of the analysis of historical evidence, so that a CBTA programme must identify, develop and evaluate key competencies in order to result in safety and efficiency.
The effort must therefore be directed to the study of the most relevant and evident threats and errors, adapting it to the expected scenario of operations. For this reason, there cannot be a single CBTA that fits all, although it is also true that many points will coincide (especially with regard to the minimum regulatory requirements). Thinking that once the initial effort has been made, implementation is over is another mistake that should be avoided: the CBTA is a living instrument that is constantly being transformed as failures are detected and that must be adapted to the causalities in order to improve the training programme, increase the level of safety and improve student assessment. This is the reason why the standard places so much importance on the communication of potentially dangerous events and accidents and recommends the holding of FI seminars more frequently than the minimum required.



If we consider the increasing use of powered gliders, it is obvious that a change is needed in pilot training so that pilots are aware of the procedures, threats and dangers involved in the operation of such vehicles. Can we really say that most glider pilots are concerned about calculating the density height of a field and the performance of their aircraft before planning an autonomous take-off?
It is certainly advisable to carry out a study as wide as possible to determine the most common failures in order to be able to implement them in the training and in the part that affects an FI to determine which could be the most common errors of a student in order to be able to mitigate them.

Communication in a CBTA process (competence Based Training and Assessment)

The CBTA process, the structuring of a training programme, the successive trainings with established FIs (2 flights in the last 24 months) propose a system very similar to an EBT and for its effectiveness it requires a communication effort with the aim of achieving maximum standardisation and an unconditional increase in safety. There is no point in setting up a CBTA process if, when failures are detected, the change is not implemented and communicated on a massive scale.
Let's take an example: if during the launch phase with a tug aircraft, the influence of the propeller wash on certain models of tug aircraft is detected, which could lead to a more or less serious accident, the event is not implemented within the training programme identifying it as a threat, the probability that this event could be repeated with this precise model of tug and the applicable mitigations are not communicated, the possibility of having a similar event again could be repeated without any solution of continuity. At the communication level, it is not sufficient to limit such notification to the restricted scope of the organisation, but it is appropriate to broaden it as much as possible to enable any operator with that particular tugboat model or similar to prevent and mitigate a potentially hazardous event.

Assessment of the student/candidate

The very structure of a CBTA shows that the aircraft handling represents a small part of what needs to be assessed and in fact it is what has been given most importance so far. In practice, the student's ability to perform a chained series of piloting sequences to follow within a flight pattern has been assessed. Intuitively an FI checks the student's ability in other competencies but so far without a more standardised measuring instrument that avoids, as far as possible, subjective influences. As the need to deal with different scenarios which have to be designed on the basis of experience has become evident, the

learner/candidate's ability to complete more humane processes becomes a major objective. If we do not take into much greater consideration the personal attitude of the learner/candidate towards flying by considering the non-technical competencies measurable according to the various indicators of the CRM analysis, the CBTA process cannot be effective by returning to the concept of completing a mere check list. As we do not want to have a well-trained chimpanzee in the cockpit but pilots capable of thinking, the integration of the theoretical part in the practical training becomes absolutely necessary so that the student/candidate is facilitated to find the best solution to an unexpected event in an autonomous way.

Knowledge: the theoretical part

The easy way to determine the level of theoretical knowledge is undoubtedly the written assessment test with questions in which the correct answer has to be identified among different answers. It is a simple and easy to correct system (a template is sufficient) but it has proved ineffective over the years. There are students capable of memorising thousands of questions and their answers, a market for buying and selling questions and training banks has been generated, but in the end it is still a mnemonic effort that de facto castrates the capacity for critical thinking. What is more important: knowing the applicable regulations by heart or knowing beforehand that certain regulations must be applied, why they must be applicable and where to find them?
No doubt there will be memory items that must be remembered by heart, such as pre-flight or emergency checks, but it is not credible that a pilot, for example, clearly remembers the fuel consumption of his aircraft in all possible conditions! The theoretical knowledge competence must also be measurable and the following scheme may help us:

Competence	Description of competence	Behavioural indicators
Theoretical knowledge	Demonstrates knowledge, understanding of relevant information, knowledge of operating instructions, the equipment systems used and the conditions and procedures of the surrounding environment.	- Demonstrates practical demonstration and application of knowledge of system boundaries and their interaction. - Demonstrates the minimum required knowledge of published operational instructions. - Demonstrates knowledge of the physical environment in which he/she operates, air traffic rules, route definition and tasks (in the sense of sailplanes), rules and movement within an aerodrome/airport, and the operationality within them. - Demonstrates sufficient knowledge of applicable legislation - retrieves information from appropriate sources, knows where to find documentation - Demonstrates a positive interest in acquiring knowledge and researches - Correctly and appropriately applies the knowledge available to him/her.

As can be seen, it is evident that the behaviours associated with knowledge are not all measurable through a test and that this kind of evaluation is much completer and more adaptable to any scenario. The importance of the pre-flight briefing is decisive in assessing the above. Naturally, the way in which a pre-flight briefing is carried out changes as it implies the need to have more time to carry it out. On the other hand, structured training in which the theoretical implications applicable to a given scenario are already defined provides a guide and a reminder for both the FI and the student.

The study cases

For the construction of a CBTA, in addition to following the guidelines established by the regulations in terms of flight exercises and the theoretical part, it is appropriate to carry out a study of the accidents/incidents that affect us in the field of gliding. A good basis for this study, which must be

personalised a posteriori with both personal experience and that of the organisation, can be the statistics presented by organisations and federations.
On the basis of these data, it will be easier to perform a TEM analysis and to implement in the training the study of a number of scenarios which, as a general rule, are quite common.
The following table shows a series of summary data obtained from the reports published by AESA (NAA Spain) over the last 30 years and affecting gliding:

	Mid-air collision	**Out landing**	**During final approach**	**In-flight**	**Take-off**	**total**
Dead	2	2	1	6	2	13
Injured		3	8		4	15
Aircraft destroyed	3	2	9	7	3	24
Serious damage		5	14		8	27
Minor damage	5	1	2			8
Total	10	13	34	13	17	87

Another example is the reports published by the British BGA, whose information is updated and very complete with the issuing of newsletters of great interest to our field, an example of which is presented below:

Accident area	Principal Cause	Actions for fewer accident		Accident area	Principal Cause	Actions for fewer accident
Winch launch	1 stall spin 2 Cartwheel	1 Follow a guidance in leaflets for safe launch profile and actions following a launch failure, reliable equipment 2 Correct set up, release BEFORE a wing touches the ground		Collision	Inadequate look out	Better look out anti-collision devices (Flarm)
				Integrity	Rigging incomplete	Rig without distractions interruptions
				Tug upset	Poor technique	Better training
				Landing (home airfield)	Poor technique	Better training
Stal/spin excluding winch launch	Overload distraction	FLY the Glider, whatever the workload and distractions		Field landing	Field picked too late	Pick a field in good time
				Are you aware of these potential accidents? Do you need to re-train or change your behaviour to remain safe? Please consider and act accordingly		

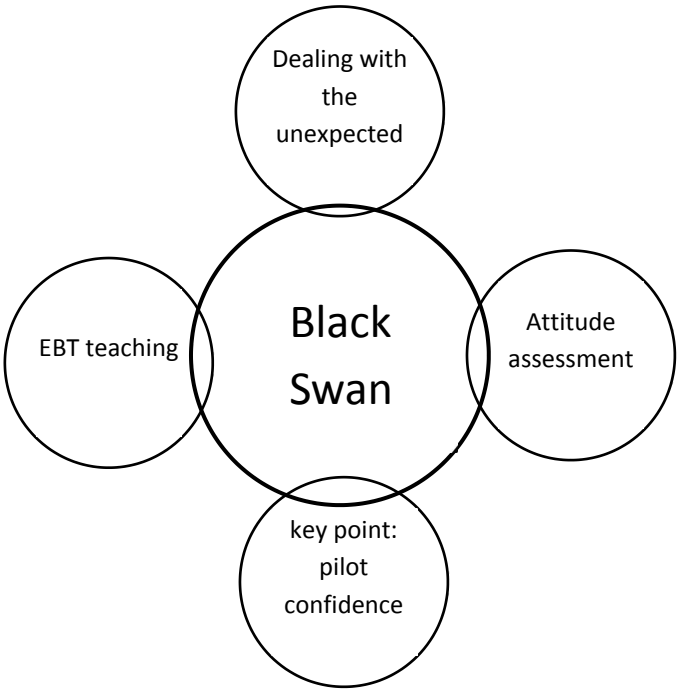
It can be seen that what is indicated in these summaries are very general guidelines and must be taken into consideration for a more in-depth study of the scenarios. To give an example: the accidents related

to off-field shots do not indicate how many of them have been carried out by sailplanes with an incorporated engine, whether self-launching or sustained, this implies different considerations that have little to do with the ability to fly, but a lot to do with other competences: decision making, situation awareness, etc.

In any case, what is important to understand is that an analysis is necessary prior to the construction of a CBTA programme in which certain critical scenarios are taken into account. Let's consider that on the basis of statistical studies such as those originated by the CAA in the period from 2010 to 2011, the main cause of more than 50% of accidents are caused by flight crews. From these analyses it is concluded that only 14% of these accidents are related to aircraft handling while non-technical skills involved account for more than 32%. It is therefore appropriate to understand that increasing safety requires a revision of the training programmes, giving more space to non-technical skills and moving from a classic programme to one based on competencies as the best way forward.

The role of the trainer therefore takes on a greater form and importance as they will be involved and must be responsible for the continuous implementation of improvements in the programme.

By establishing competencies, scenarios and training the trainees in them, it will be possible to mitigate complex situations to a greater extent, as well as those that could not be simulated during training because they are unfamiliar or because of the risk involved in putting them into practice. The assessment cannot therefore be limited to the mere technical part of aircraft handling, but the attitude of the student must always be questioned and evaluated so that, in his or her career as a pilot, he or she is capable of resolving any unknown situation safely.



For this, the FI must be prepared and master the TEM analysis and therefore, during his training, this part must assume great importance. The critical analysis will be the main instrument to establish a set of training improvements and their corresponding measurement and control systems for the topics to be implemented. On the basis of the above, the involvement of a trainer in the security policy acquires a consistent value. As mentioned above, the scenario is no longer black and white, so the necessary flexibility for evaluation and control must be applied on the basis of the study. We must not forget that the main objective of the training, beyond achieving aircraft handling, must be oriented towards increasing the level of resilience of the pilot to be trained in order to mitigate as far as possible the surprise and difficulties they may encounter in unknown or previously unrehearsed situations. To this end, the exposure of the student to dynamic situations in continuous variation will help him/her to develop a superior competence to face unknown or unpredictable situations (black swan).

Characteristics of competence-based training

The result of using the CBTA methodology focuses on the quality of the outcome rather than on the quantity of hours spent to achieve it. The quantity criterion is transformed into an assessment

methodology based on competence criteria on the basis of easily observable pre-defined elements. The above has important implications since both administrations and training programme designers face the training programme from the position of a profound specialisation and as far as the trainer is concerned a very great adaptability to the context and the learner, so that the concept of learning facilitation becomes very important.

There is a big difference between the previously adopted system and what is proposed with the CBTA. Resilience can be assessed if the programme design can ensure that the learner/candidate has the desired core competencies so that he/she is able to cope with the flight mission safely, responsibly and efficiently. In contrast, the previous system was designed to ensure that the trainee/candidate demonstrated the minimum proficiency in the execution of a given exercise. Take, for example, the landing circuit scenario. It is usual to teach the student by requiring the downwind entry to be performed at a certain minimum height. A base section at a previously established height and a final section starting at another minimum height, and all of this referenced with points on the ground. When the student was able to replicate the circuit, it was considered good. It is true that considerations about wind and so on were presented, but the usual thing was to present a start of the circuit at 300 m, a base at about 200 m and a final entry at about 100 m. Obviously this is extremely reductive, but in exchange it is an easy and simple task for the student to evaluate and carry out. Are we really representing the reality of a landing of a glider? Can we be sure that we have worked on the student's skills to face an unfamiliar situation such as an off-field landing? If we base ourselves on the above, it will be necessary to modify the presentation of the session by offering the student continuously variable conditions, increasing their critical sense and decision-making capacity.

On the assumption of the CBTA method we will be working on resilience whereas if we do not apply it, we are actually working on qualification-based training. I think it is safe to say that nobody wants the latter when they have the opportunity to use a powerful instrument like CBTA. It is not only a tool to facilitate the delivery of a class/session and its evaluation, it is the tool for safety improvement.

Definition of Core Competences

Unlike in other sectors, in the aviation sector, core competencies are already defined and have been built on the basis of operational requirements describing how a modern aircraft should be operated safely, effectively and efficiently. These competencies describe how the aircraft should act and perform in all phases of flight operations and what it should look like. They include the title of the competency, its definition and a number of observable elements of behaviour. In the ICAO document the core competencies defined in Annex 1 of DOC 9995 will apply to all phases and operations of flight:

Defined in ICAO	**Relevant for gliding flight**
1) TEM, principles of application	Risk analysis
2) Ground operations	Procedures, take-off conditions
3) Take-off	Procedures, take-off conditions
4) climbing	Launch systems/self-launch/ TMG
5) cruise	Free flight, navigation
6) descent	Final glide, flight management
7) Circuit	Different circuit depending of the field
8) landing	On airfield, out-landing
9) post flight operations	Parking, derigging, administrative

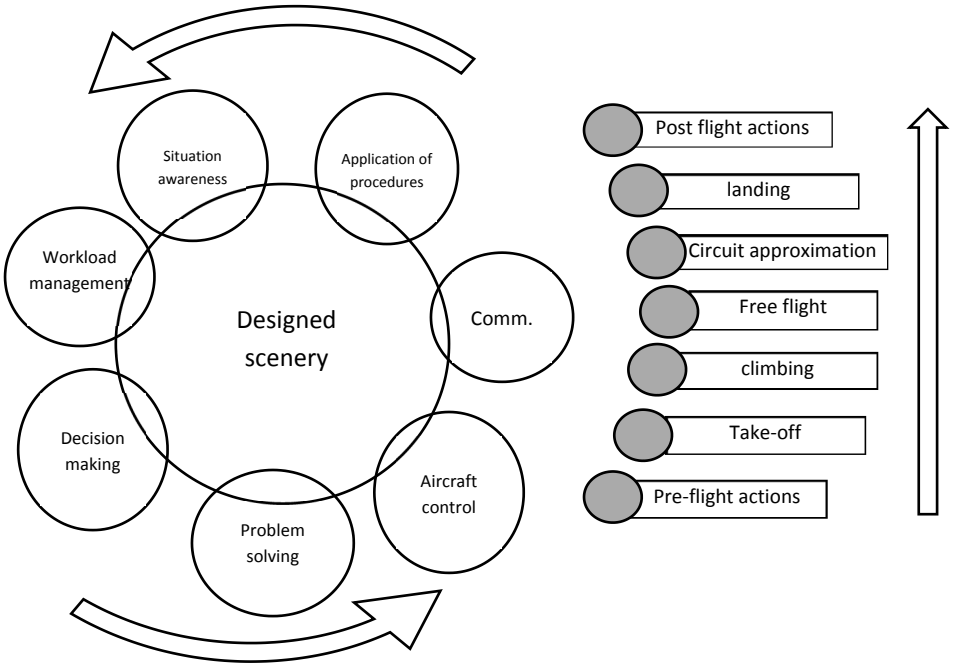
If we take the flight test form as a reference, we will find exactly all these points, so it makes sense to apply already defined competence criteria to our field by adapting it appropriately to our field.

Model input-output

The individual performance of the pilot or crew is measurable. The input concept refers to and answers the question of "how" a certain result (output) can be achieved and ensured or the reasons why a pilot is able to manage the flight (why). Contrary to the traditional way of measuring flight parameters based on a criterion of minimum parameters, the focus should be on "how effective" the pilot is in the application of core competencies. Through this criterion it is assumed that the effective and efficient application of core competencies (input) results in a safe and satisfactory management of the flight in all its phases (output). If we refer to the training process, this implies that both the events and scenarios presented during the course are the vehicle for the development of a safe, efficient and effective application of the core competencies and not the ultimate goal of training. The above implies the assessment of theoretical knowledge and attitude (Knowledge, attitude) in relation to the KSA100 area. The method also offers the opportunity to measure the result, since the expected standard of performance has to be defined and therefore answers the question of what is to be achieved (what), resulting in a measurable assessment of safe performance criteria in all phases of flight, including management in special cases and emergencies (external observation procedures, off-field shots, launch emergencies, etc.), where the elements of expected standard and skills of the KSA 100 area (expected standard, skills) are involved. In the field of gliding, we could approach it from the scheme proposed by IFALPA in the following way:

INPUT	**OUTPUT**
Core competencies	Skills, expected standard

Application



In this way it is possible to establish a standard level of competence, which we can define as NORMAL, and it is possible to carry out an adequate evaluation and follow-up of the training and its results.