ITEC 2018 Conference, May 15-17, Stuttgart, Germany
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# Do we really need high fidelity training? A pragmatic solution to optimising fidelity

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High end simulation is often appointed as the required simulator fidelity for aviation training. Other types of training are also employed, such as Computer Based Training (CBT) or e-learning, but this is mainly done as part of the academic training elements. However, there are more practical training devices that can be used in order to complement and ensure optimal use of the high end simulation. Unfortunately, the use of these devices and technologies has not been fully explored and therefore these technologies are used to their full potential as of yet. Selecting different learning solutions and use them for what they are best at is an effective, efficient and future proof strategy. It provides pilots with different opportunities to practice and respond to a wide range of events, which increases the resilience. To support this strategy we will explore a blended solution perception on training. Also we will discuss a justified manner to analyse training tasks and define an optimized blend of training solutions.

Several decades of research in the area of training media have shown their efficacy in training delivery. From an educational design point of view, a variety of training solutions can and should be used in support of each other to achieve the desired training objectives. However, to maximize the effectiveness of the training programs, a structured approach to select a blend of training solutions is required. To come to such structured approach it is helpful to discuss two perspectives on training, that is: different types of learning and different types of training. Based on these two perspectives, this paper describes a manner on how to select training solutions.

## Training perspectives

There are *different types of learning.* Learning can be classified in different ways. In this document we use the classification ‘reproductive learning’ and ‘productive learning’.

Reproductive learning is focused on reproducing, “drilling” knowledge, procedures, or skills in standard or repetitive situations. And productive learning, or problem solving, is focused on the integration and creative application of knowledge in new situations. Both types of learning demand different requirements to training solutions. Certain solutions mainly support reproductive learning (e.g. procedure trainer) while other tools are better suited for productive learning (e.g. problem based scenario trainer). Therefore, the selection and application of the most appropriate mix of instructional media (blended learning) should be based on the task analysis rather than on availability of training devices such as currently is common practice.

Regarding *different kinds of training* distinction can be made between ‘whole task training’ and ‘part task training’. Whole task training focuses on the whole task from the start (initially simplified). And part task training, focusses on the execution of isolated skills (e.g. programming FMS) or competency (e.g. decision making).

In support of an optimized blend of training solutions, the whole task training concept is applied. This means that whole task training is the starting point and part task training is only used in support of the whole task to reduce the cognitive load. In this manner the pilot is always aware of the context and complexity of the whole task which assures an optimal integration of (part task) trained competencies. However, when a pilot or mechanic is already familiar with the whole task, like in recurrent training, often only part task practice is used to assure competence. Nevertheless, the integration of competencies needs to be assessed regularly by means of meaningful scenarios with unexpected situations to assure good performance.

## Selecting training solutions

When selecting training solutions, the user requirements that belong to the training task need to be defined. To do so, the training task needs to be analysed and questions regarding training characteristics need to be answered. To get an optimized blend of training solutions, analysing questions should be answered for whole task. After the whole task analysis, supporting part tasks need to be defined and analysed.

- What is it that the pilot needs to learn?
- What are the specific competencies or skills that are essential in this task?

- Is this a reproductive or productive task?
- Is this an individual or co-operative task?
- Does the task need a real crew or can it also be a virtual crew?
- Does the task need synchronous or asynchronous communication?
- Does the task need realistic flight controls (artificial, realistic)?
- Does the task need realistic aircraft behaviour?
- Is it necessary to adapt the scenario during the training?'
- etc.

These user requirements can be matched to the characteristics of training solutions, ensuring appropriate and transparent selection of devices. Moreover, because the user requirements are specified per training task, the analysis might bring new insights on how to utilize and optimize (emerging) technologies and come with solutions that do not exist as of today. This makes the process future proof.

When selecting training solutions, it is important to understand that success of training is not based on the training media itself. Training media are tools to support the training; their efficacy depends on the way that the media are used (e.g. quality of the instructor, training design, instructional feedback). Therefore, the selection of training media cannot be seen as an isolated process.

A valuable result from a suite of training solutions is that *informal learning* or *self-training* become more accessible**.** Within aviation informal training is not provoked. A potential issue is that practical learning activities that can be self-trained is not commonly accepted as of yet, although the technical capabilities are enhancing. There are tools that are capable of registering, monitoring and coaching learning activities. These tools can be used for formal self-training but additionally, these tools can also be used for informal training that enables organisations to position informal learning initiatives as optional add-ons or preparations to formal training.

## Conclusion

Effective integration of technology, software and hardware combinations would allow an operator to create an optimized blend of multiple future proof training solutions. This range of solutions can give the pilot multiple opportunities to practice and respond to a wide

range and variety of normal and abnormal scenarios. Provided that the training solutions are properly integrated in the training design and used in an appropriate manner, the pilot will be able to transfer these skills to situations that have never encountered before. They are trained for the unexpected!