E-learning in the Aviation Industry

A Webanywhere White Paper

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This paper presents just a few of the possibilities that e-learning can deliver to the aviation industry. In particular, the flexibility and low cost of ownership of open source learning technologies (that can be easily integrated with legacy training and back office systems) suggests that e-learning will be an important value-add for aviation training for many years to come.

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Airlines around the world are looking to replace their existing training management systems with a centralised e-learning solution.

The business drivers for this are usually twofold;

1. To meet regulatory obligations
2. To improve learning and development for its staff, who may be employed in roles as diverse as engineering, maintenance and front-of-house customer service.

E-learning can help companies in the aviation industry to achieve these goals while cutting training costs and increasing their operational efficiencies.

Aviation - Fast Facts

The aviation industry is one of the world's largest and most influential business sectors, providing around 8% of global Gross Domestic Product (GDP)* and benefiting almost every other industry around the globe.

- Over 56 million people are employed worldwide in aviation activities and related tourism.
- Of these, around 8.36 million work directly within the aviation industry.
- There are over 2,092 airlines worldwide, with a total fleet of nearly 23,000 aircraft.
- Aviation now transports over 2.8 billion passengers annually.
- 40% of international tourists now travel by air.
- Airlines serve some 3,754 airports through a route network of several million kilometres managed by around 160 air navigation service providers.

- Air transport pays over US$40 billion annually to use its infrastructure - airport and air navigation services - through specific landing, passenger and air traffic control fees.
- Air transport pays substantial taxes to local, provincial and national authorities via passenger duties, value-added tax (VAT), and custom or immigration levies which differ country by country.

Naturally, an industry of this scale faces significant challenges when developing and implementing training and development for its diversified workplaces. This usually requires a substantial budget as well as a wide range of learning and development initiatives and approaches. These approaches often include an e-learning component.

For those not familiar with the term, e-learning refers to the computer and network-enabled transfer of skills and knowledge through processes such as Web-based learning, virtual education opportunities and digital collaboration. E-learning has become increasingly popular in recent years as the most appropriate medium for training and development in many industries.

One particular advocate is Suzanne K. Kearns, author of “E-Learning in Aviation” (2010). Kearns explores the benefits of e-learning in the airline industry as well as how it could be improved in terms of quality. In a 2011 article in CAT (Civil Aviation Training) magazine, she discusses how the industry needs to rethink its current method of delivering its training. She also explains how this could be achieved using e-learning to harness the potential of customised learning, which:

> *“...Enables trainees to develop at their own pace, without wasting time on skills they have already mastered. Providing it is properly organized, e-learning can deliver such customized training. Moreover, when done properly, significant training budget savings can be made and without compromising quality.”*

Aviation – Regulatory Issues

Every major economy has its own regulatory body for companies in the aviation industry. In the United Kingdom, this function is performed by the Civil Aviation Authority (CAA), a public corporation established by Parliament in 1972 as an independent specialist aviation regulator and provider of air traffic services. As a result, it provides a comprehensive, consistent framework on which to base review and development for all staff, in addition to other services.

The CAA regulates (approximately):

- 50,000 active professional and private pilots
- 12,400 Licensed aircraft engineers
- 2,350 air traffic controllers
- 206 airlines
- 141 licensed aerodromes
- 950 organisations involved in the design, production and maintenance of aircraft
- 2,400 ATOL holders
- 19,000 aircraft registered in the UK

The primary objectives of the CAA are:

- Enhancing aviation safety performance by pursuing targeted and continuous improvements in systems, culture, processes and capability.
- Improving choice and value for aviation consumers now and in the future by promoting competitive markets, contributing to consumers' ability to make informed decisions and protecting them where appropriate.
- Improving environmental performance through more efficient use of airspace and making an efficient contribution to reducing the aviation industry's environmental impacts.

- Ensuring that the CAA is an efficient and effective organisation which meets Better Regulation principles and gives value for money.

Training in the aviation industry

Traditional training programs are designed primarily to sort learners using standardised instruction, which provides a valid and simple method of comparing students' capability with one another. Learners' performance was categorised using letter grades (A, B, C) or pass-fail. This method of evaluation was more focused on following procedure than on decision-making or problem-solving skills, which made it ideal during the industrial age.

However, since then new industry challenges have emerged. Airspace congestion is increasing, cockpit technology is becoming more advanced and there is an influx of low-time pilots into the airspace sector. As a result, the learning and development needs of the industry have advanced and in order to produce better trained staff more quickly, airlines must radically rethink the way in which training is delivered (and must ultimately train more efficiently).

This is particularly evident with pilot training. It's clear that merely possessing a mastery of standard operating procedures (SOPs) is not sufficient preparation for every situation. Anomalies will occur and pilots require the necessary critical thinking skills to solve even the most complex or unforeseen problems. As a result, training pilots in the same manner as assembly-line workers is inadequate. Pilot training must therefore shift from a sorting method of choosing between adequate / inadequate, towards a learning method that maximises the performance of each individual.

With the emergence of new learning technologies, this has already begun to change. Recent years have seen the rise of many innovative new resources for aviation companies to utilise in the training of their staff. These include, but are not restricted to:

- Flight Simulators
- Simulation Training Programs
- Learning Management Systems (LMS)

The LMS is particularly important, as it is currently the primary method of implementing e-learning that is used within the industry. Most major airlines currently use an LMS as an essential element of their staff training. The specifics and benefits of using an LMS will be dealt with later in this paper, but there are some aspects of these systems that can be addressed here, namely what many companies and airlines expect from their LMS.

Businesses that decide to incorporate an LMS usually require the following as a part of the functionality:

- ✓ Interface - customisable interface, custom home page for each user, multiple languages available, different looks for different departments etc.

- ✓ Content - interoperability with 3rd party content, ability to support simulations and demos with video, sound and interactive content, ability to run web-based content developed by internal staff, links to other training sites and resources, ability to disable a course without removing it from the LMS, AICC and SCORM-compliant, ability to offer accredited airline compliance and degree programs etc.

- ✓ Hosting and support - 24/7 technical support and link available via phone, email and fax across multiple time zones

- ✓ Financing - ability to track costs per student, course development costs, costs per unit, track to cost centres, must show class fee structures etc.

- ✓ E-commerce - integrated e-commerce ability, payment reporting features, support for credit card transactions, payment tracking system, support for other currencies, security services and support etc.

- ✓ Communication and collaboration - electronic discussion and bulletin boards, forums, chats, course announcements, live webcasting and virtual meeting capabilities, web-based calendar and scheduling devices, live text chat, internal and global broadcast messaging etc.

- ✓ Administrative functions
  - Web access to administrative features
  - Ability to activate/deactivate users from system
  - Student self-registration
  - Tracking of live and web-based instructor led training
  - Enroll and cancel registration
  - Automated system for forgotten passwords etc.
  - Searchable course catalogue
  - Ability to group courses by curriculum or topic
  - Rate and comment on courses
  - Built-in content authoring
  - Test and survey creation with auto grading
  - Custom tests, surveys and polls
  - Ability to reserve classrooms, equipment and resources
  - Ability to create learning plans, employee and class reports via browser
  - Assign classes, deadlines, groups and departments

- ✓ Live classroom management - schedule, register and tracking for live classroom training, faculty, equipment and resource management, waiting list, automated resolution of scheduling conflicts, management of physical inventory of training materials etc.

- ✓ LMS reporting - web-based reporting interface, ability to export report data, access to printable reports, integration of other systems, ability to import user data from other systems, encrypted records, certifications of particular aircraft/system, alerts if certain skills are over/underrepresented etc.

- ✓ Competency management

- Tracking of users activity and attendance at outside seminars/ training
- Storage of training history/ progress
- Management of class rosters
- Ability to develop and modify learning paths and track progress along them
- Ability to manage a blended learning environment
- Ability to set deadlines for both individual tasks and entire learning paths
- Learning content that can be created on HTML, Adobe PDF, Macromedia Flash and Java that include high quality visuals and interactivity
- Customisable courses, randomisation and dynamic branching for different question types.

✓ Resources - includes glossary of terms, FAQs and online contextual help.

✓ Partnerships - ability to interface with external course vendors and for managers, heads and directors to request undeployed courses.

IT innovation in the aviation industry

Just as IT has revolutionised the business world, it has also had a transformational impact on aviation. The airline industry has always relied upon new computer technologies for its operational and strategic management. As a result, airlines have benefited immensely from the many IT innovations that have occurred over the last few decades, particularly since the emergence of the Internet in the mid-1990s.

The 9/11 terrorist attacks on the United States caused security at airports to be significantly reinforced, which led to a new set of challenges; to improve both the convenience of passengers and security measures, while at the same time enhancing on-time performance in the most economical manner.

Additionally, a large number of no-frills airlines have emerged in Europe and the US in recent years with a total focus on lowering costs throughout their operations. IT solutions play a large role in the success of these airlines' operating models, leading to innovations such as electronic/ paperless tickets, single fare tickets without restrictions and powerful Customer Relationship Management Systems.

Let us look at some examples of how IT innovation is meeting the changing needs of passengers, airlines and airport authorities:-

- Passengers can now browse travel agents online using either their PC, smartphone or other mobile device from any location with ease. They can then use the same device to contact the travel agent and purchase an electronic ticket over the internet. Once this has been done, all the passenger would need to do is arrive at the airport and check in their bags. Passengers can store all the necessary information on their mobile, meaning that they only need to pass the phone through designated scanners to proceed.

- Passengers can now buy gifts from one of the airport's virtual shops, purchase the item they want there and simply pick it at the airport on the day of departure.

- Baggage deliveries can be managed by third parties by checking in the traveller's flight number and e-ticket through a mobile phone using a portable identity (ID) terminal. This places the traveller's baggage into the airline's system and is transferred on to the aircraft upon its arrival at the airport.

- The increasing need for accurate and efficient verification of passenger identity has been met using technologies that allow for stronger access control and strengthened document integrity for security purposes:

- Some airlines use trusted passenger programs to accelerate the process of screening individuals, allowing security personnel to focus on other passengers.
- In May 2003, the use of contactless technology was endorsed as the next generation of data storage for passports by the Air Transport Committee of the ICAO Council. There has been a steady increase in the testing of biometrics in recent years. Biometrics are characteristics or traits that are unique to each individual that can be used to verify their identity, including fingerprints, facial recognition and eye iris scans.

These applications demonstrate how technology continues to drive innovation and efficiency throughout the aviation industry. This best practice is also being applied to workplace training and development using e-learning systems.

E-learning and the aviation industry

Round-the-clock operations, a dispersed workforce and diverse range of job roles require a flexible approach to training and development. E-learning has been widely adopted throughout the industry as a means of achieving the necessary control over training costs and accessibility.

E-learning is typically deployed within these complex organisations using a core learning platform, or Learning Management System (LMS). Erwin Bratengeyer and Christian Albrecht defined the aviation LMS in their joint article, *Deployment of e-Learning in the Airline Industry*:

> *"In a nutshell, an LMS is a software system that automates the administration of training events and supports the management of learning in an organization. It provides the infrastructure centralising two sets of components associated with training. Firstly, Management / Administration: training programme, enrolment, certification, reporting and*

secondly, Learning/Teaching: learning activity, content delivery, communication, collaboration, and assessment."

Most airlines have implemented an LMS within their IT infrastructure, allowing them to deliver online learning to their employees 24/7 anywhere in the world. The training content is usually a combination of generic, customised and bespoke learning and covers a wide range of subjects. A large number of external providers of airline e-learning content have emerged to meet this demand for course creation and curation.

E-learning solutions are also often integrated with legacy systems (for HR, Finance, CRM, email/social networks etc) to create new efficiencies and knowledge creation throughout the value chain.

Strategic benefits of e-learning

- Improved return on investment
- Learning available anytime, anywhere
- Ensure more equitable access to training opportunities
- Assured quality and quantity of learning supply
- Reduced duplication and costs - increased efficiency
- Improved information flow to assist planning
- Standardisation of educational materials across industry
- Customisation of study routes and qualifications
- Stimulation of communities of learning
- Ease of sharing materials across industry

Organisational benefits of e-learning

- Improved performance (through linking learning design to performance monitoring criteria)

- Reduced training costs - lower trainer costs, accommodation, venues, replication costs etc.
- Less total time spent training
- Improved return on training investment
- Improved knowledge of what is available
- Improved knowledge management
- Improved timeliness of supply of learning - learning on demand is now a reality
- Improved quality of learning
- Improved efficiency of learning supply
- Ease of maintenance

Benefits of e-learning to learners

E-learning offers the most convenient delivery mechanism for those who are working within the aviation industry:

- Improved access to learning - e-learning uses a ‘just here, just now, just enough’ model
- Programmes can be tailored to individual roles, eliminating unnecessary time spent training
- Flexible for use by remote workers and part-time staff
- Eliminates time spent travelling to training venues
- Improved access to research and learning communities via e-tools
- Self-paced - accommodates different levels of literacy, English as a second language, etc.
- Can be suited to different learning styles
- High accessibility for users with disabilities
- Improved quality of learning and support
- Facilitates multi-professional learning
- Allows for transfer of study routes and qualifications
- Links to online portfolios reduce administration and eliminate duplication

Challenges to e-learning

If it's clear that e-learning delivers numerous benefits it's important to consider that there are considerations that need to be borne in mind when planning an e-learning project:-

1. **Course costs can outstrip projected savings**
   Ironically, an e-learning course created to save on training costs can become very expensive when factoring in course design, development and implementation, as well as the possibility of training inefficiency. If the course or service is poorly designed, as many unfortunately are, this can often result in e-learning costing far more than it is worth. Airlines need to be fully aware of what makes this type of training effective and make sure that the services they use are up to standard to ensure that their e-learning solutions are cost-effective

2. **Requires PC skills and internet accessibility**
   The success of e-learning programs is dependent on the learner's ability to use a computer. This can cause problems if an employee has limited IT skills. Secondly, accessibility - the interactive nature of much e-learning content (e.g. video) must be considered when making e-learning available to countries that can provide only limited internet bandwidth.

3. **Motivation and self-direction**
   We've already established that e-learning gives companies and staff the freedom to provision and pursue a training plan anytime, anywhere. However, this also means that a higher level of motivation and self-direction is required, as learners need to take responsibility for planning and self-directing their learning.

4. **Ensuring the learner's attention**
   Another challenge for e-learning is that it can be difficult for instructors to know whether or not learners have fully absorbed the course content.

Managers may have no way of determining whether students are keeping pace with the material or are hopelessly lost until they encounter a quiz or a final exam. This can understandably undermine the whole process! Learning platforms (such as **TotaraLMS**) enable instructors to assess and keep track of performance on a more frequent basis and allow them to intervene should a learner's progress be less than expected.

5. **Cultural acceptance**
   E-learning should not be viewed as a 'big bang' replacement for existing classroom instruction, but rather as another tool that an instructor or organisation can blend with traditional training to maximise the learning effectiveness of their programs. After all, when flight simulation was introduced, it did not render in-aircraft training obsolete!

6. **No direct contact with instructors**
   While e-learning can be used without supervision it does mean that learners don't always have constant direct contact with their instructor. This can make it difficult for managers to track progress and the learner does not benefit from nonverbal cues such as body language and voice inflection. Trainers should use technologies to rethink how they train.

7. **A new teaching approach is required**
   Finally, a common mistake is to take an existing classroom course and create an identical, computer-based version (e.g. converting PowerPoint slides into a web-based training program). At best, the students will finish this course with the same level of skill and knowledge as they would have gained from the class-based course. More often than not they will learn less because the learning materials weren't designed with computer-based delivery in mind, leading to frustration or even rejection of the learning approach.

The future of e-learning in the aviation industry

The use of online technology to deliver learning and training is here to stay. The latest Learning and Development survey by the Chartered Institute of Personnel and Development (CIPD) reveals that around 82% of public sector businesses now use e-learning in some shape or form, and time spent on e-learning within these organisations is set to double over the next 3 years.

Accord to CIPD, this reflects the government's endorsement of e-learning, as recommended by the Leitch Report. A wider market update carried out by Ambient Insight back in 2009 suggested that the e-learning market will see a compound annual growth of 16.3% between 2008 and 2013, despite the fact that training budgets will plateau, and in some cases even contract during that period.

Of course, the reason that e-learning has become so popular is due to a number of generic benefits that it provides, i.e.

- It is more cost-effective than most other methods of training.
- E-learning ensures that information is current.
- It offers geographical flexibility, as the course can be taken in any location.
- It also offers temporal flexibility, as training is available 24/7.
- It creates a culture of learning and encourages users to seek information as needed, and to seek local mentoring support.
- Content standardisation is promoted between instructors across entire organisations and businesses.
- It provides interactive exercises, as well as resources that can potentially be shared with others.
- E-learning encourages compatibility as software must become standardized, so practically any computer can run training in an identical fashion.

- It enables immediate learner feedback, tailored specifically to exhibited performance.
- It allows managers and instructors to automatically track learner performance within a company-wide database.

E-learning has established a strong footing within the airline industry. Some of the applications that can be developed as part of an integrated e-learning program include:

- **Flight simulation training for pilots and flight crew -** can be made more efficient and cost-effective by incorporating e-learning into training programs. For example, a pilot could learn about the cockpit, its functions and standard procedure by undertaking an e-learning course before using the actual simulator to put that knowledge into practice.

- **Scenario-based Training** which can be used to assess an individual's ability to perform in simulated real-life situations, such as emergencies, Managers and instructors can use this data to judge whether or not the individual requires additional training interventions.

- **Training for Safety Management Systems (SMS)** which allow learners to keep up to date with health and safety regulations, and make safety checks and decisions a part of everyday operations rather than waiting for a regulator to raise an issue.