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Digital learning

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Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and the places to which we travel for work.

We also acknowledge the Traditional Custodians' continuing connection to land, water and community. We pay our respects to Elders, past and present.

Artwork: James Baban

A cabin safety bulletin is an advisory document that alerts, educates and makes recommendations about cabin safety matters. Recommendations in this bulletin are not mandatory.

Revision history

Amendments/revisions of this protocol are recorded below in order of most recent first.

Table 1.   Revision history table

Version No.	Date	Parts/Sections	Details
1.1	July 2025	All	Content moved to new template. Additional information added to section 6.
1.0	March 2021	All	First release

Contents

1. Purpose

The purpose of this bulletin is to provide training and checking systems with guidance on digital learning and its role in augmenting cabin crew safety training.

The bulletin provides information relating to building digital learning programs, the instructional design process, instructional design models, training delivery methods, learning management systems and content quality management programming.

2. Who does this bulletin apply to?

The bulletin is aimed at operator training and checking areas; extracts of which have been taken from International Civil Aviation Organisation (ICAO) Doc 10002 Cabin Safety Training Manual Second Edition 2020 and ICAO Advisory Circular 356 Guidelines on Digital Learning for Cabin Crew Training 2020.

3. Definition and use

Digital learning is any mode of delivery that uses technology. For example, virtual and augmented reality, or gamification, to strengthen a learner's knowledge and skills. This emphasises instruction and provides access to content and feedback through formative assessments. Digital learning should support classroom training and hands-on exercises with new technologies. Digital learning should not replace classroom training, hands-on exercises, or traditional simulated exercises in their entirety. Based on the technological methods used, digital learning can recreate a realistic environment that best simulates line operations. This level of realism in training reinforces the development and use of competencies normally trained in a classroom setting or through hands-on exercises. Digital learning should be selected as a training media when it is deemed suitable to attain the learning outcomes and its use results in an equivalent or increased level of competence for the learner.

Digital learning can be used as the primary source of training for certain topics (e.g. knowledge-based items) or as supplementary learning to complement the primary training for certain topics (e.g. reinforcing certain steps of a procedure to support a hands-on exercise). An effectively implemented digital learning program complements the dynamic aviation training environment by providing positive learning and training enhancements.

The aviation industry is continually evolving and managing new challenges, diverse cultures, different generations of learners and new regulatory requirements. These matters raise the question of how to make training more effective and sustainable. Operators should focus what technology is available to augment training. Digital learning creates an opportunity to improve and vary the way training content is recalled.

4. Considerations

Various points of consideration when selecting digital learning include, but not limited to:

- training participants are self-motivated for digital learning or self-directed modes of learning

- training participants are easily able to access the required software and hardware

- regulatory approval required as related to the content of training

- operator training environment (e.g. hardware, software, training facilities)

- learning objectives to be met (e.g. knowledge-based items, skills)

- benefits are gained from either a learning environment that is instructor-led training or a blended learning approach

- competence be achieved through digital learning

- technological methods suitable to achieve the specific learning outcomes are available (e.g. recreating operational constraints – for example, the forces required to open a jammed door)

- other training opportunities are accessible to support the learning (e.g. blended learning, hands-on exercises, classroom training.

4.1   Other considerations

Commensurate with the type of training media and instructional aids used, learners should have access to an instructor to resolve questions throughout the training programme. Operators should consider the availability of instructors when evaluating the competence attained by a learner through the digital learning. This provides learners with the opportunity to resolve questions that may arise as a result of the digital learning material.

Operators should consider instructor follow-up with learners after the completion of the digital learning portion of the training. This may be accomplished when learners arrive at a central training location and prior to hands-on and simulated exercises (e.g. scenario-based training such as an aircraft evacuation). Digital learning and new technology in training should fit the purpose. The content and the learning objectives should be evaluated and modified, as needed.

> Digital learning can improve the effectiveness of knowledge retention and skills and should not be used to reduce costs.

5.   Benefits

Digital learning technology can help operators as it:

- enables improved methods of increasing competencies for a large remote workforce, for example cabin crew

- provides access to real-time tracking of participant performance and feedback, and can be used to assess the level of training required

- enables expanded learning opportunities through an engaging learning

- offers effective training delivery methods, for example:

    – practising with associated feedback

    – combining collaborative activities with self-directed learning

    – personalising learning paths based on participant needs

    – standardising content delivery and using simulation and games.

Additional benefits from digital learning technology for operators may include:

- circulation of critical and non-critical updates in a minimal amount of time and to check receipt of message

- learning analytics—more data is immediately available, with greater context around that data. The operator can use this data to adapt and update the training content and methods to help the participant and the instructor

- enhanced face-to-face engagement. Training is more focused on face-to-face and hands-on exercises, as the theoretical elements can be learned before instructor-led classroom training.

- virtual reality (VR) training allows for participant performance to be monitored in real time and reviewed by the instructor at any time

- flexibility of learning; participants can easily access the content through self-directed learning

- exceptional situations (e.g. obfuscation by smoke or noisy environments) can be trained through virtual training

- exercises can be repeated as often as required, with or without a change of factors or complexity

- cooperative scenarios (e.g. firefighting) can be trained with virtual multi-user training scenarios

- in-situation hints (text, audio, photo, video) can be shown on demand, integrated into the learning process

- virtual facilities can be used without damage to facilities. For example, an exercise that uses cabin doors which are damaged.

Training participants may benefit from using digital learning technologies through:
- easily linking theory and application

- quickly and fully understanding concepts

- facilitating the widespread sharing of knowledge by providing continuous access to training materials

- access to current information at all times

- tailored training — the learning environment reflects individual preferences (knowledge, learning styles, self-paced)

- participant engagement based on the interactivity with the training modules

- opportunities to practice competencies and tasks with technology and the ability to replicate real-life events in a safe training environment

- theoretical elements covered using digital learning may allow extra time for participants to practice hands-on exercises.

6. Blended approach

A blended learning approach combines training delivery methods adapted to the content. When developing or revising a training program, operators should use several training delivery methods (classroom, computer-based training, hands-on and simulated exercises) relative to the subject matter.

A balance should be made between independent learning (e.g. distance learning) and instructor-led training to achieve the learning outcome. A blended learning approach combines traditional classroom training with digital learning technology to address a specific topic during training (e.g. first aid). It has multiple possibilities, adaptable to the operator and participant needs. Listed below (and illustrated in Figure 1) is an example of technological and organisational methods used as part of a blended learning approach.
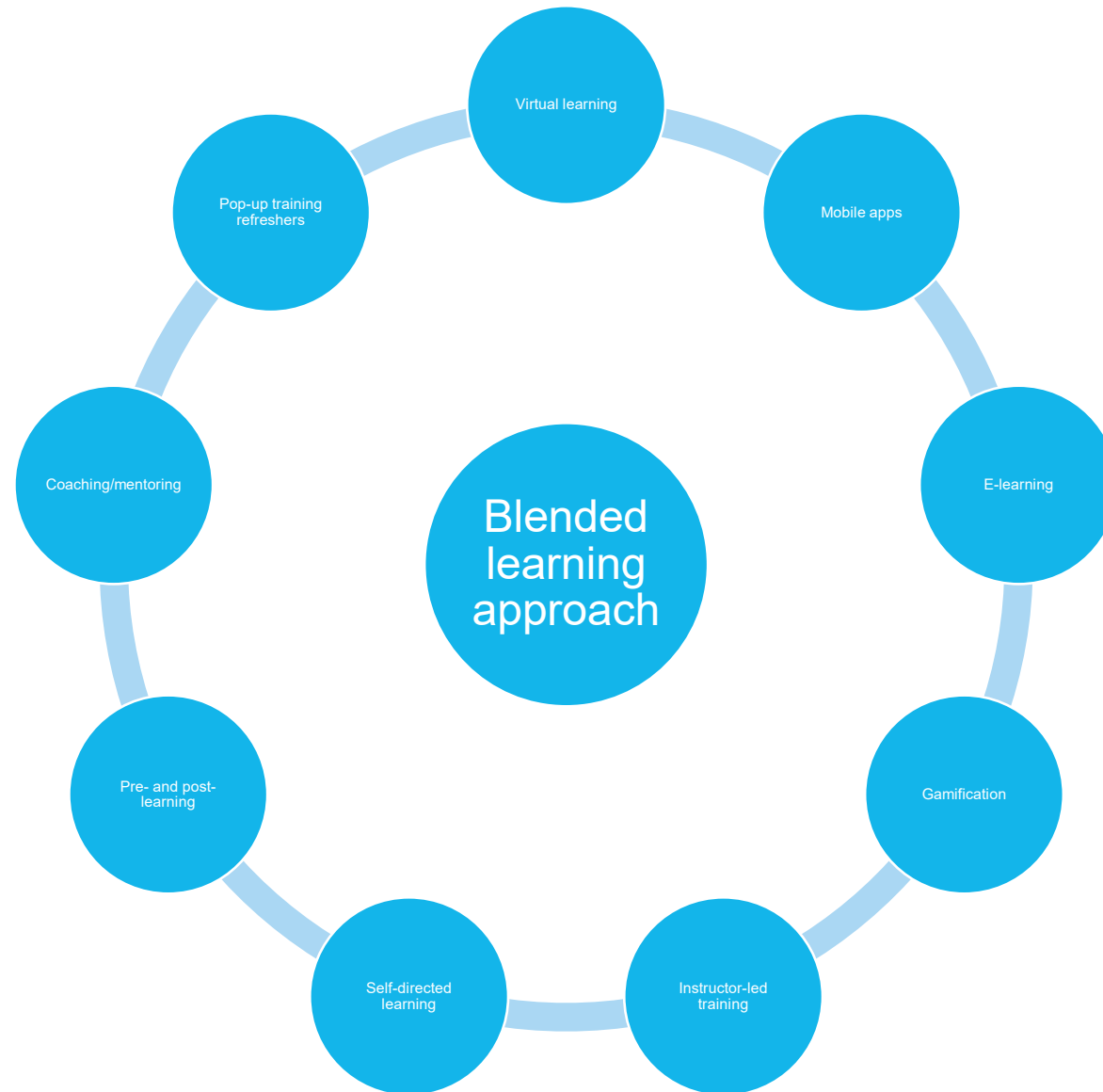
6.1 Technological

- Virtual learning—this allows participants to connect, interact and learn individually or in a group outside the classroom using realistic virtual environments.

- Mobile applications (apps)—these are learning applications that are accessible through portable electronic devices (e.g. smart phones, tablets, and e-readers).

- E-learning—this is the delivery of a learning, training or educational program by electronic means.

- Gamification—this is an educational approach to motivate participants to learn by using video game style design and game elements in a learning environment.

6.2 Organisational

- Instructor-led training (ILT)—classroom training facilitated by an instructor.

- Self-paced learning— a learning method without direct supervision or attendance in a classroom.

- Pre and post-learning—takes place before and after the ILT classroom training. Participants can learn certain topics, definitions and theory before the training so that are able to focus more on the practical aspects of the training.

- Coaching/mentoring—assists with organising the participants' learning experience by providing support, encouragement, information and guidance. Coaching can be done in the training department, for example with e-tutors.

- Pop up training refreshers—mini courses of short duration that are distributed to participants through a digital method (e.g. reinforcing a new procedure) and should capture the attention of the intended audience.

Figure 1: Methods used for a blended learning approach

Figure 1: Methods used for a blended learning approach. Central node: Blended learning approach. Surrounding nodes: Virtual learning, Mobile apps, E-learning, Gamification, Instructor-led training, Self-directed learning, Pre- and post-learning, Coaching/mentoring, Pop-up training refreshers.

6.3   Interactivity levels

In digital learning, there are different levels of user interactivity. The level of interactivity depends on the content, participants, objectives, time and technology.

All levels (including level 5) could be conducted as a mobile or stationary solution. Mobile solutions support 'anywhere, anytime', whereas a stationary solution may support blended learning in an environment such as a training centre.

Table 2.   Interactivity levels

Level	Digital learning interactivity	User interactivity	Learning methods/tools
1 – Passive	No interaction	Participants are not required to interact with digital learning resources and the digital learning process is strictly linear	Simple images and graphics, simple video and audio, test questions
2 – Limited	Limited participation	Participants may have some control over their digital learning experience as required with simple interactions with the digital learning material	Animations, clickable menus, drag and drop interactions, and multimedia
3 – Moderate	Moderate interaction	Participants gain more control over the more customised and complex digital learning experience	Animated video, customized audio, complex drag and drop interactions, simulations, stories and branching scenarios, and multimedia
4 – Full	Full immersion	Participants have great control over their digital learning experience and can give feedback	Interactive games, simulated job performance exercises, customised audio or videos, avatars, stories and scenarios, including multimedia
5 – Full Virtual Reality (VR)	Full immersion into a stereoscopic VR environment	Participants have great control over their digital learning experience and can give feedback	This encompasses Level 4 in with a head-mounted display and enhanced interactivity (gesture and speech recognition)

7. Digital Learning

7.1 Operator digital learning limitations

Operators should consider the following limitations as they relate to the implementation of digital learning:

- technological infrastructure and support required for digital learning

- online cyber security standards, data protection and data restrictions

- how digital learning may impact with regulatory compliance and agreements, for example rest time requirements)

- conducting a risk assessment before introducing new hardware and software to support digital learning

- identification of the knowledge and skills that need to be addressed in training and determining if digital learning is the most appropriate means to deliver a specific portion of the training program

- this type of learning can be used to practice or reinforce certain procedures and support hands-on and simulated exercises but must not be used for formal assessments

- participants may experience some disorientation due to simulation sickness using virtual reality equipment such as a headset and will be unable to experience the weight of equipment during operation.

7.2 Building digital learning programs

- Before building a digital learning program, operators should define the objectives of the training and choose the preferred learning method and technology to achieve those objectives. The design of a digital learning program begins with identifying applicable training content that is suitable, considering possible limitations.

- Operators should find methods that will be used to deliver the training content. Consideration should be given to the level of competence required when selecting the delivery method. Digital learning may be a part of a blended learning approach. Digital learning may be a component of a blended learning approach. Therefore, digital learning may be an effective tool for prequalification of participants prior to attending training so that they begin the training programme having already acquired a basic level of knowledge.

- Operators should consider the potential gap between different generations of cabin crew that it employs. Some crew members may not have the same level of computer literacy as others.

- Operators should also consider access to technology by its cabin crew members and whether they will need to issue a smart phone or tablet device.

- Operators should consider the time allocated to complete digital learning courses, to not impact minimum crew rest periods or encroach on rostered days off.

- Structure design and planning, while crucial for every type of training program, is even more important for digital learning programs. Consideration should be given to the framework, for example: rostering of crew members (if required), mandatory versus self-development training, timeline and lifecycle of the content and participant access to the technology.

7.3 Instructional design process

Instructional design should focus on factors that influence learning outcomes, including, but not limited to:

- the level of knowledge of the content and the technology utilised that participants need for accomplishing the objectives

- the appropriateness of instructional strategies regarding objectives and participant characteristics

- definition and implementing the support needed for successful learning

- periodic revisions or any change in operational documents that are needed to make sure the program meets the expected outcomes.

In determining the instructional design, consider the following characteristics:

- hardware and software (for example, the training platform)
- audience (for example skills, knowledge level)
- participant and instructor objectives
- training content and structure
- assessment criteria
- evaluation process (of content and results).

7.4 Instructional design model

Operators may use different instructional models that can help in developing digital learning. For example:

- situated cognition theory
- sociocultural learning theory
- the analysis, design, development, implementation and evaluation (ADDIE) Model
- Merrill's principles of instruction
- individualised instruction
- Bloom's taxonomy of learning objectives.

One of the most common instructional design models used is **ADDIE** (analyse, design, develop, implement, evaluate).

Analyse

- Participant characteristics and knowledge (ensuring participants have adequate knowledge and training to effectively use digital tools and applications)
- Other participant characteristics that are critical to achieving specific learning objectives (generation of participants - technological proficiency; language; framework - how and when participants complete training; accessibility to technology; learning styles - preferred ways of learning)
- Resources required - content, technology, facilities, subject matter experts for content and design, hosting platform, e-tutor)
- Learning objectives - operators should identify the requirements and meet learning outcomes.

Design

- Identifying learning objectives and how the material will be created and designed - e.g. it may include describing content areas to be covered, and a storyboard outlining what will be covered in text, audio and video and in which order, and deciding on the selection and use of technology such as a hosting platform, video or social media.
- Learning objectives - specific measurable actions should be defined enabling participants to fulfil learning objectives.
- Instructional strategies - clear links should be established between training content and learning objectives. Content and learning activities should be introduced in a logical sequence that supports the participant's construction of knowledge and skills. Consideration should be given to, at least, repetition, review and mnemonics; questions, examples and paraphrasing; analysing, categorising, creation of diagrams and interrelation of new ideas to existing ones; realistic interactivity (the virtual system behaves like the real one); self-paced exploration ("what happens if I do this…"); assistance on demand (text, audio, photo, video); gamification (e.g. scoring for increased motivation)
- Testing strategies - feedback should be provided on the participant's progress in meeting the defined learning objectives.

- Task analysist - a task analysis is a critical part of instructional design. It should include a detailed description of theoretical components and practical activities. Consideration should be given to at least, task durations; frequency; complexity; whether the task if mandatory or for self-development; single-person task or multiple users; skills needed to complete the task; environmental conditions (real and/or virtual); necessary equipment and people.

Develop

In this phase, training should be built and tested. Feedback and observations collected offer insight into final adjustments that should be made before implementing the learning solution. Several means may be used to gather feedback and observations such as small group trials.

Implement

This phase begins with a notification (of the introduction of new training) and enrolment, followed by pre-training communication and interaction with the newly developed learning resources. Operators transitioning from traditional classroom training should invest enough time to introduce and explain the new training method. An appropriate timeframe should be selected for the roll-out (e.g. consideration should be given to operational factors). The operator should also ensure the availability of support functions (e.g. information technology, course content expertise).

Evaluate

Various evaluation methods exist that can determine the effectiveness of an operator's digital learning program. They should be appropriate to the required application of knowledge and skills. Consideration should be given to the:

- level of acquired competence of the individual (did the participant obtain the knowledge and skills set out in the learning objectives and meet the learning outcomes)

- level of application of new competence by measuring how the new skills and knowledge are applied on the job (this may include observation and analysis of the participant's behaviour)

- level of achievement of the learning outcomes of the training content by assessing the learning outcomes and the degree to which learning objectives have been achieved

- level of participant satisfaction should be measured (did the participant like the training; did the participant find it meaningful and relevant; did the participant experience difficulties with usability of the digital learning method)

An operator should have a process in place to maintain, modify and update the digital learning program. Digital learning should be adapted and amended when needed or when evaluation confirms that training objectives are not met.

8. Training delivery methods

The use of existing and emerging technologies is only limited by creativity and availability of technology of the time. Operators may consider using the following delivery methods.

8.1 Audio/video

Converting theoretical content into audio-visual content is an effective way to involve participants using practical examples. It is an easy way to standardise, for example, a certain procedure.

8.2 Application (App)

An App is a software program that can often be found on handheld, portable electronic devices. There are web or online Apps that need data connectivity and other Apps that work independently on the device. The degree of complexity varies from a simple source of information to extensive user interaction incorporating artificial intelligence.

8.3   Virtual classroom

A virtual classroom is an online learning environment where participants can interact through discussion and use multiple sources of media. Operators should conduct a safety risk assessment on the constraints of replacing live classroom instruction with a virtual classroom for safety-related topics addressed as part of cabin crew training.

8.4   Gamification

Gamification is a game-based approach to instruction and provides an effective approach to improve learning. Operators can present educational content to participants in a way that is engaging, visually compelling, and personalised. Gamification is often delivered to a participant's computer, tablet or smart phone, which can be completed remotely.

Gamification applies gaming designs and concepts to learning or training scenarios to make them more engaging and entertaining for the user. In game-based learning events, participants compete against one or more individuals or individually in an interactive experience that rewards learning.

When participants get content on a daily or weekly basis and are quizzed on that content with some game elements, it affects long-term retention and knowledge application. When considering whether to integrate gamification into learning, operators should make sure it consists of a structure and framework. The training should not just something that is new and fun to play. Participants must be able to understand learning outcomes of the training session.

8.5   Virtual reality (VR)

VR is an interactive computer-generated experience which takes place in a simulated environment. It incorporates auditory and visual feedback but may also allow other types of sensory feedback. This immersive environment can be like the real world or it can be fictional.

VR technology uses VR headsets or multi-projected environments, to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual or imaginary environment.

A person using VR equipment can 'look around' the artificial world, move around in it, and interact with virtual features or items in complete safety.

8.6   Augmented reality (AR)

AR enhances the real-world, where live direct or indirect views of physical real-world environments are augmented with multiple sensory cues, including visual, auditory, haptic, somatosensory, and olfactory, over a user's view of the real-world, enhancing the user's perception. One example of AR could be mixed interactive reality for example a hologram, a three-dimensional image, created with photographic projection.

8.7   Computer-based training

Computer-based training is an individual interactive process. The participant interacts with different types of learning materials through a computer. Computer-based training courses can be multimedia-enhanced textbooks, tutorials, practice drills or even virtual simulations. The learning material comes in computer-based training software packages.

8.8   Web-based training

Web-based training is an internet or intranet-based training that can be accessed online. Two main models of web-based instruction are instructor-facilitated or self-directed.

8.9   Evaluation methods

Evaluating learning activities is crucial for both self-directed and facilitated digital learning methods. Operators can check learner progress, the quality and effectiveness of the training, the methods used, and improve future learning activities and outcomes.

Operators should consider using the following evaluation methods:

- tracking participant progress

- surveys (pre- and post-training)

- participant achievement of the learning objectives (for example the ability to remember and apply the competencies developed during the digital learning program)

- safety performance indicators (for example number of safety reports submitted by cabin crew members, increase or decrease in the number of cabin-related occurrences)

- participant and instructor feedback

- assessment results

- system reliability and user challenges (information technology support requests).

Data collated in the evaluation process should be analysed and corrective actions addressing any identified deficiencies should be implemented in a timely manner.

9.   User training

Operators should have a procedure in place to make sure all users are provided with the proper level of system training. This should include specific training for different user groups for example:

- managers

- instructors

- participants

- administrative staff.

10. Media characteristics definitions

Operators should consider different media characteristics to make the training efficient and help participant use. The following are media characteristics operators should consider evaluating when selecting training media:

- navigational interaction—the amount of control participants have to move about in a lesson and find their own learning path

- instructional interaction—the amount of interaction participants have in the training content, also called interactivity

- graphics—graphical items in the lesson content, for example control panels and instructions for equipment use, which are directly related to the training content and are not part of the training program interface

- interface—the learning device, component, or environment

- tracking and security—the level of tracking available from in the content and reporting to some type of logging system (flat file, learning management system, database)

- familiarisation—how the user (instructor and participant) is introduced to the system and whether there is a support system (help desk) in case of difficulties

- integrated user help—integrated help for both navigational interaction (for example tutorial) and instructional interaction (on-demand hints during a training session)

- completeness—how much of the overall curriculum is covered by digital media and whether all relevant aspects of featured training procedure are covered

- detail/abstraction —the level of detail chosen to convey information (e.g. graphics, sound, text, speech out, charts).

11. Management systems

11.1 Content management system

A content management system (CMS) manages the creation and modification of digital content. It typically supports multiple users in a collaborative environment. Most CMS include web-based publishing, format management, history editing, and version control. CMS supports separating of content and presentation and provides the following features:

- search engine optimisation

- integrated and online documents

- modularity and extensibility

- user and group functionality

- template support for changing designs

- installation and upgrade wizards

- integrated audit logs

- compliance with different accessibility frameworks and standards

- tracking

- unified user experience

- version control

- edit permission.

11.2 Learning management system

A learning management system (LMS) is a type of software for the administration, document storage, tracking, and reporting of digital learning.

The benefit of the LMS is its ability to provide, manage and store data for each participant and content. The information stored in an LMS should include:

- participant information

- course duration

- time devoted to lesson completion

- start date of the course activation and date of finishing the course (hour, minute, second that the participant completes of the course)

- number of attempts made

- the percent of progress of the course

- assessment of each try (display questions, responses marked, and which should be answered by the result)

- proof of completion

- participant course feedback

- result of the course (pass or fail for a mandatory assessment)

- system reliability/functionality
- validity and expiry of regulatory content (revision service).

Based on the type of digital learning, an LMS or a CMS may not be required, and operators may decide the best way to store relevant training material and records.

12. Quality management process

To make sure content quality is delivered consistently and maintained, operators should have an auditing and quality management process.

The content of digital learning should be in line with the objectives set out by the operator's training and checking area and should have the ability to make potential changes without deviating or affecting the original syllabus.

To keep the highest level of quality, the following aspects should be considered:

- process monitoring to ensure compliance
- cyber security measures to avoid unauthorised access (for example user identification, password, multi-device use)
- notifications received about technical problems
- system ability to update and replace contents of the course to ensure regulatory compliance, participant needs and operator requirements
- the system flexibility to upload and update the content of the course.

Digital learning platforms can provide data and feedback to measure instructor effectiveness, participant competence and program quality. The platform should include:

- exam results, competency-based assessments
- feedback loop to discuss personalisation of learning path, remediation, acceleration, improvement progress and response to intervention
- tracking of participant qualification relating to participant competence
- quality of the content (for example usability, engagement)
- instructor performance.

Operators should have a contingency plan to monitor the digital learning platform to make sure that participants can finish the set course in the allotted time if the system fails.

13. References

Table 3. References

Document	Title
International Civil Aviation Organisation (ICAO) Doc 10002	Cabin Safety Training Manual Second Edition 2020
ICAO Advisory Circular 356	Guidelines on Digital Learning for Cabin Crew Training 2020

14. More information

If you have an inquiry, please phone 131 757 and ask to speak with a cabin safety inspector.

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