Federal Aviation Administration
Flight Standards Service

Air Carrier Training Aviation Rulemaking Committee (ACT ARC)

ACT ARC Recommendation 20-12
Outreach & Information Sharing

I. Submission

The recommendations below were submitted by the Effectiveness of Knowledge Training Workgroup (EKT WG) for consideration by the Air Carrier Training Aviation Rulemaking Committee (ACT ARC) Steering Committee at its November 18, 2020, meeting. The ACT ARC Steering Committee adopted the recommendations, and they are submitted to the Federal Aviation Administration (FAA) as ACT ARC Recommendation 20-12.

II. Statement of the Issue

Non-instructor-led training delivered through electronic means is one component of electronic learning (eLearning) as it is currently used in aviation, specifically in operations under Title 14 Code of Federal Regulations (14 CFR) parts 121, 135, and 142. Technology and instructional methods used in eLearning are advancing rapidly and present unique challenges. The aviation industry and the FAA have a vested interest in ensuring that training curricula which employ eLearning are effective.

These challenges make it crucial for the commercial aviation industry and the FAA to encourage and facilitate crosstalk, use of best practices, and ongoing dialogue to the greatest extent possible in an effort to continuously improve both the quality of non-instructor-led electronic training products and the analysis of their effectiveness.

III. Recommendations

The ACT ARC recommends the FAA consider the following actions to promote industry communication and collaboration to support the advancement and effectiveness of non-instructor-led training delivered through electronic means:

a. Take steps to promote and support an ongoing industry “roundtable” or similar forum, convened at regular intervals, to improve crosstalk, use of best practices, and continuous dialogue in an effort to continuously improve the development, delivery, and analysis of non-instructor-led electronic training, and to support awareness and understanding of such training methods by FAA inspectors. The ACT ARC also recommends the FAA advocate for, support, and promote programs that enable regular interaction between FAA and industry to likewise foster awareness and understanding of new developments in training, technology, and the need to update FAA documents to reflect these changes. Examples[1] of such interaction could include—

[1] ACT ARC Recommendation 20-12 a. and the list of examples it contains are not exhaustive of all possible outreach interaction between the FAA and industry, nor must the FAA necessarily pursue all of these efforts to achieve the desired effect. It should also be noted that some of what is recommended is currently being done in an *ad hoc*

- Resumption of the Visions of Safety conferences (particularly the training track);
- Renewal of Advanced Qualification Program (AQP) conferences;
- Resumption/reinvigoration of Part 142 Roundtables;
- Expanded participation in Aviation Safety InfoShare (InfoShare) by stakeholders involved in air carrier training, to include direct participation by part 142 training centers;
- Development of an InfoShare-like program focused on training;
- Continued FAA participation in the World Airline Training Symposium, (WATS);
- Collaboration with the FAA Safety Team (FAASTeam) to foster awareness of new training technologies, strategies, and techniques, and communicates best practices and success stories, through expansion of the scope of the FAA Safety Briefing publication to include training topics;

b. Take steps to promote and support participation in the forums described in a, above, by FAA inspectors and other personnel whose roles and responsibilities include substantive interaction with the training community, and to encourage application of the knowledge gained from such participation when evaluating certificate holders' training programs.
c. Take steps to promote and support direct contact between commercial aviation and the broader training industry, including military aviation training, and avail itself of the tremendous resources these organizations offer. These external training organizations fund research, white papers, and studies on topics in the broader learning industry that are critical to the success of commercial aviation training, including the effectiveness of non-instructor led knowledge training.
d. Take steps to promote and support en7gagement and collaboration, in a formal, structured way, between commercial aviation and other high-consequence/safety-sensitive economic sectors (medical, railroad, shipping, fossil fuels, nuclear power, military, space exploration, *etc.*). This collaboration will facilitate identification of new strategies or best practices.
e. Encourage the creation of an online repository or repositories of information related to training and eLearning.

IV. Rationale and Discussion

As noted above, technology and instructional methods used in eLearning are advancing rapidly. Improvements in areas such as connectivity, courseware production values, and virtual reality (VR), and augmented reality (AR) increasingly support an immersive, more realistic training environment. Additionally, advances in educational techniques and tools such as adaptive learning hold the promise for enhancing the effectiveness and efficiency of non-instructor-led eLearning. Outreach and engagement by the FAA will be key to maximizing the inclusion of new technologies and methods across the industry and facilitating the sharing of lessons-learned and best practices among industry participants.

Outreach and engagement by the FAA would also support the professional development of FAA inspectors and other personnel engaging with the training community. Exposure to the

fashion by industry stakeholders, but could be dramatically improved through greater coordination and organization.

knowledge and lessons learned presented at industry roundtables and forums provides the inspector workforce with awareness and understanding of new training methods and technologies, and insight into how best to measure effectiveness and outcomes of proposed training programs using novel or innovative methods. The FAA can leverage attendance by individual personnel by encouraging post-attendance dissemination of new concepts and developments within attendees' organizations.

In formulating a plan for outreach and engagement, the approach used to facilitate collaboration between the FAA and industry with respect to Extended Envelope Training (EET) may be a valuable model. Keys to the success of EET included industry collaboration and cooperation surrounding its rollout, as well as the FAA's willingness to allow industry access to training and simulator resources at its facilities in Oklahoma City. This unprecedented level of collaboration allowed participating training organizations to develop the most effective courseware for mitigating the risk of loss of control in flight while meeting the regulatory requirements for Upset Prevention and Recovery Training. The ACT ARC believes application of the EET model to electronic knowledge training will greatly help to ensure the overall effectiveness of eLearning technology and instructional methods.

Prior to 2012, the FAA and the air carrier industry maintained a much higher level of organized collaboration. The FAA hosted and organized the "Visions of Safety" conference in even calendar years. Visions of Safety focused on the programs managed through the Flight Standards Service (AFX), Voluntary Safety Programs Branch (AFS–230), such as Flight Operational Quality Assurance (FOQA), the Aviation Safety Action Program (ASAP), and the Advanced Qualification Program (AQP). When these programs were relatively new, this collaboration helped with air carrier understanding and adoption.

After the FAA-sponsored AQP Conference was suspended, the AQP Conference evolved from efforts of the Air Transport Association of America (now Airlines for America, or A4A) AQP Working Group. In odd calendar years, an air carrier would host the AQP Conference and fund much of the event. The FAA provided project planning and event support, such as soliciting papers and presenters and managing registration.

Both Visions of Safety and the AQP Conference were discontinued primarily as a result of funding cuts. Neither the 2012 Visions of Safety conference nor the 2013 AQP Conference took place. In 2014 and 2016, several major air carriers hosted and funded AQP conferences that were widely attended. The FAA attended as well, with the Air Carrier Training Systems & Voluntary Safety Programs Branch (AFS-280) actively participating. The demonstrated benefits of these programs warrant a renewal of support.

The Part 142 Roundtable started over a decade ago is an example of part 142 certificate holders responding to the FAA's request to connect and collaborate with respect to training and regulatory compliance issues. The Part 142 Roundtable has convened sporadically in recent years, but when the meetings did take place the attendees reported that they benefited greatly.

Aviation Safety InfoShare (InfoShare) is another example of a regulator/operator event where the industry meets to engage on safety issues and share lessons learned and best practices. While safety teams are well represented at InfoShare, training departments and providers are not. The training community would be well served by participation in InfoShare or a training-specific forum similar to it.

The Worldwide Aviation Training Symposium (WATS) is one of the largest air carrier training and simulation conference in the world. The FAA's participation in such conferences is consistently well-received by certificate holders and others.

Whether funded and organized by the FAA, or grassroots events organized by industry participants, the FAA and aviation training organizations have shown a strong desire to connect and collaborate. These events benef all participants.

In addition to outreach events and forums, the ACT ARC recommends expanding the scope of the FAASTeam's FAA Safety Briefing publication to include training. The FAA Safety Briefing currently covers safety topics of interest to the non-commercial general aviation community. The proposed changes to this publication would support a continuous dialog with respect to training issues.

Beyond the aviation training community, there are many active professional training industry organizations whose research and collaboration would greatly benefit commercial aviation stakeholders. These organizations are often fertile breeding grounds for innovative methods and new technologies in adult learning. The FAA should consider guidance and initiatives to foster greater awareness and access to these organizations. Examples of these organizations are:

- Federal agencies, led by the Department of Defense, have chartered the Advanced Distributed Learning (ADL) initiative in the 1990s, whose mission it is to bridge "across Defense and other Federal agencies to encourage collaboration, facilitate interoperability, and promote best practices for using distributed learning to provide the highest-quality education, training, informal learning, and just-in-time support; tailored to individual needs and delivered cost-effectively, anytime and anywhere, to increase readiness, save resources, and facilitate interorganizational collaboration" (ADL, About the ADL Initiative; see also History)
- Association for Talent Development (ATD): The largest training industry association in the world. ATD is a tremendous resource for all facets of training. The organization's ICE Conference is the largest training industry conference in the world with over 10,000 attendees every year for dozens of countries. ATD has professional certification programs where people involved with aspects of training can get discipline-specific training
- International Society for Performance Improvement (ISPI): This organization focuses on the discipline of Human Performance Improvement (HPI) or Human Performance Technology (HPT). This broader process-based discipline examines how and why people perform the way they do, usually in the work environment. ISPI has a national conference and local chapters throughout the country and oversees the Certified Performance Technologist (CPT) certification program.
- Training Magazine: Training Magazine has been in existence for 50 years. The publication also hosts worthwhile conferences, and manages the Training Top 125 industry awards.
- Training Industry is an online magazine that hosts the Training Industry Conference & Expo (TICE). The organization has a certification program focusing on the management of training organizations.
- Chief Learning Officer (CLO) hosts two symposia each year and Breakfast Clubs around the country. CLO manages the Learning Elite Awards program.

In addition to the broader training industry, lessons and worthwhile practices can be identified through engagement with other high-consequence/safety sensitive industries and economic sectors. Safety culture and Safety Management Systems are examples of domains in which aviation has greatly benefited from developments in other industries and domains. In particular, the concept and term “safety culture”, which underlies the systems embodied in FAA Advisory Circular 120–92B, Safety Management Systems, had its origin in studies of corporate culture of the early 1950s and onward, especially as they were later applied to the nuclear power industry, after the 1986 Chernobyl accident (Cooper, 2000; Wiegmann, Zhang, von Thaden, Sharma, & Gibbons, 2004). The following are examples of non-aviation related organizations with the potential to provide novel insight into the training challenges facing air carriers and training centers:

- The Defense Advance Distributed Learning (ADL) Advisory Committee (DADLAC) acts as an advisory body to support distributed learning policy stewardship, resource and information exchange, and monitoring of emerging distributed learning technologies and techniques across the Defense community.

- The International Atomic Energy Agency publishes a guidebook that incorporates the experience gained since the introduction of the Systematic Approach to Training (SAT) for nuclear power plant personnel and emphasizes a broader concept of competence which includes not only technical knowledge and skills but also knowledge, skills and attitudes related to human factors. In addition to the training of operating personnel, the Guidebook deals with the role and responsibilities of management, the training of management and maintenance personnel, organizations involved in training, and more effective and efficient methods of SAT analysis.

- The American Nuclear Society (ANS) conducts conferences on training. Example of topics include “Innovations and Experience in Distance Learning for Nuclear Workers”.

- A summary review of medical industry practice and research in electronic learning reveals a much more extensive body of work than found in aviation. One example alone is the article *The Impact of E-Learning in Medical Education,* by Ruiz, Jorge G., MD; Mintzer, Michael J., MD; Leipzig, and Rosanne M., MD, published in Academic Medicine in March, 2006. An abstract of the research states:

  > E-learning technologies offer learners control over content, learning sequence, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives. In diverse medical education contexts, e-learning appears to be at least as effective as traditional instructor-led methods such as lectures. Students do not see e-learning as replacing traditional instructor-led training but as a complement to it, forming part of a blended-learning strategy. A developing infrastructure to support e-learning within medical education includes repositories, or digital libraries, to manage access to e-learning materials, consensus on technical standardization, and methods for peer review of these resources.

A digital library or repository of information and resources related to training and eLearning would be of great assistance to certificate holders developing content and FAA inspectors evaluating such content. Extensive material from government, academic, and other resources exists that could prove useful in such efforts. Unfortunately, this material is currently (a) not

readily accessible in one place, (b) is not curated or integrated in a way that allows the easy determination of what will likely be effective under each circumstance, and (c) is not continually kept up-to-date.[2]

Another suggestion to address the fragmented nature of guidance for effective training and eLearning, therefore, would be the creation of a unified repository of material with training and eLearning guidance and supporting material. The repository could be created as a government/industry/academia partnership in a way that would be easily accessible by the aviation industry (*i.e.*, housed on-line), would be curated by experts from government, industry, and academia, and updated over an extended period of time (*e.g.*, 5-10 years). This repository, although particularly useful for smaller operators, could assist the entire aviation industry.

V. Background Information

EKT WG Scope of Work:

3. Develop recommendations to update current FAA guidance on the design, development, deployment, approval, and effectiveness assessment of electronic learning.
4. Develop recommendations to promote information sharing, continuous improvement, and innovation of electronic learning.

ACT ARC Initiatives:

Initiative #44: Recommend guidance for the development and approval of knowledge training with a focus on maximizing training effectiveness.

References:

- Cooper, M.D. (2000). Towards a model of safety culture. Safety Science, 36(2), 111-136.

- Wiegmann, D.A., Zhang, H., von Thaden, T.L., Sharma, G., & Gibbons, A.M. (2004). Safety Culture: An Integrative Review. International Journal of Aviation Psychology, 14(2), 117-134.

[2] Web links to external organizations' material, even those included in current FAA guidance material such as advisory circulars, usually do not have permanence. As a result, they are often broken and thus make it difficult to access reference material