Research Supported Approaches to Digital Learning Conversion Strategies for Flight Crews

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Abstract

Converting traditional classroom instruction to digital learning modules for online or computer delivery requires strategies to transform the material. Courseware for pilot training will be used to demonstrate how theories for adult learning are used to evaluate choices in the conversion process. The evaluation shows how the research benefits the determination of content strategies to improve the learner experience.

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Pilot training requires the development in three areas including (a) functional data skills to understand the cause and effect of the buttons and operations, (b) muscle memory and spatial skills to navigate the controls, and (c) tactical skills to determine priorities and communication. Updating traditional learning materials for digital delivery on computer or online requires evaluation to determine the best strategies for the content conversion. The question used to determine strategies for the transformation is how will each digital module best enhance the learner experience?

The characteristics of the pilot training usually include students that are younger adults with instructors that have seasoned experience. Erik Erikson's studies regarding developmental stages compared personality traits among age ranges and showed influences of childhood impacted adult learning (Harder, 2002). The implication here is that younger pilots with ideals will have the opportunity to come in contact with instructors that can share their real world experience throughout the training. A challenge will be to transfer the experience of the seasoned instructor into digital modules in addition to classroom interaction. Videos and podcasts with pictures are options for enriched lecture resources and for self directed learning content. Scenario based content in simulators and in interactive modules will provide the opportunity to learn, practice and test choices and gain new perspectives through feedback.

The ability to gain new perspectives is a developmental progression supported by Kegan's (1982) work which showed an evolving self which achieved balance through successive stages of advancement from subjective to objective views.

Functional Data and Operational Skills

Learning functional data responses for cockpit buttons and understanding the operational systems of an aircraft are less tied to a developmental shift from subjective to objective views. The gaining of a competent understanding through practice and immediate application has ties to Malcolm Knowles's (1975) theory of andragogy which showed that adult learners were motivated by immediate use of the learning while being self-directed in their approach.

In this section, the focus is on skill development such as learning systems and functions. The experiential and transformational work of self-directed learning theory and pedagogy concepts of immediate applied use of the learning supports the learner objectives.

Creating digital modules that allow students to practice cause-and-effect responses to buttons and systems will provide a personal learning environment that students can advance at a self directed pace to gain familiarity with the functional needs of the aircraft. Economics of lower cost learning, practicing and testing modules will allow students to gain skills in advance of higher cost use of simulators and interactions with flight crew members. Mechanisms for student progress through a learning management system and coaching by instructors through asynchronous communication or real time feedback can provide added perspective with this portion of the subject matter.

Content layouts for the digital learning modules benefited from strategies to chunk portions of content in ways that helped the brain recall it for future use (Merriam, Caffarella, & Baumgartner, 2007, p 395). Chris Atherton demonstrated that brain encoding processes favored presentation slides with reduced content and a single focus for recall (Mitchell, 2008). Encouragement to the viewer to work with visually stimulating content also helped to engage the brain in organizing and storing the information for later use compared to data filled text slides.

Muscle Memory and Spatial Skills

Gaining familiarity with the tactile feel of the actual buttons in the cockpit, the physical space and the spatial relationship of the button panels requires using the actual plane, a simulator or an emulator. Beyond these expensive options are digital computer modules to help familiarize the student with the layout of the plane and the clusters of button panels and functions.

Using video tutorials for digital tours and demonstrations along with virtual preflight checklists to navigate in and around the aircraft are effective ways to help students see a model of the environment and steps that they will perform while having the option to review the content to support the self directed motivations of adult learners (Knowles, Holton, & Swanson, 1998). The ability to learn, practice or test out the content areas through provided frameworks of participation ahead of the more immersive environments of the simulators reflects Downes's (2010) research which supported active participation versus passive retention.

Tactical Skills and Critical Thinking

Building on the use of motor skills and familiarity with the plane systems are flight scenarios and interactions with crew personnel to apply higher order thinking. Providing an

opportunity for the students to construct learning through live interaction, student and instructor critiques and reflective discourse contributes to understanding the context of the learning to make sense of their experience (Merriam, Caffarella, & Baumgartner, 2007, p. 290). Providing an opportunity for students to consider other approaches fits with Kegan's (1982) progressive stages of the self which advanced to interpersonal views and institutional understanding.

Digital components can include progressive scenarios that provide stop and start points for reflecting on what has happened and what should occur next based on the known data. These rehearsal modules can include cause and effect selections to advance through key sequence updates on a computer interface with feedback based on correct or incorrect selections.

The eventual development of skills for flight missions requires use of implicit memory and understanding from the acquisition and application of abstract rules to demonstrate competence (Merriam, Caffarella, & Baumgartner, 2007, p. 394). The digital tools provide a common groundwork to prepare for complex interactions in emulators and simulators.

Transformation to Enhance the Learner Experience

The question used to determine strategies for the transformation of traditional classroom content for pilots is how will each digital module best enhance the learner experience?

In the case of the need to increase cognitive understanding of operational skills, button functions, muscle memory and spatial skills, the choice of digital learning options which provide experiential, practical and transformational opportunities have a priority.

In the case of the tactical skills and critical thinking, the choice of digital learning options are focused on developmental opportunities to gain new perspectives on the subject matter.

While many of these types of experiences are provided through scenario based practice with flight crew members working as a team in emulators and simulators, some digital learning, practice, and testing elements can be provided for self directed preparation and rehearsal.

Creating digital course components based on learning and developmental research allows for the adult learners to use multiple self directed options to prepare for higher order thinking applied in immersive team environments of emulators and simulators.

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