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Adult learning and nuclear security: the important role of adult learning educational practices for impactful cross-disciplinary nuclear security training

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Summary:

The human elements of nuclear security sustainability rely on the integration of the principles of adult learning into nuclear security training and exercises. Nuclear security is fundamentally cross-disciplinary with the intersecting roles of technical experts and researchers of multiple disciplines, non-technical security personnel, professional crisis communicators, and emergency responders. These communities need to be presented with training environments that expose them to essential nuclear security topics while allowing participants to learn from each other and contribute their experiences and unique situational problem sets to course instruction. Adult learning principles encourage trainers and facilitators to recognize the perspectives and traits of adult learners, draw on their diverse experiences, give learners a stake in the learning process, and provide the space for self-driven learning. Drawing from a variety of experiences in nuclear security training supported by the Department of Energy, National Nuclear Security Administration, Office of Nuclear Incident Policy and Cooperation (NIPC), this paper explores how adult learning principles can enhance both learning outcomes and the sustainability of nuclear security training.

Applying adult learning practices to nuclear security training and sustainability
Principles of Adult Learning

• Unique context of adult learning: In contrast to the traditional schools of thought for non-adult learning, the principles governing the effective education of adults are unique because they are informed by the traits that make adults different from young learners –namely experience. The particular learning context of adult education and training leans heavily on one's experience, learning readiness, ownership of the learning process, future applications, and reason for learning. Understanding and accommodating the differing principles and practices of education for adult versus young learning audiences is an important step in crafting impactful nuclear security training.

• Experience: This paper considers two modes of integrating experience into the adult's learning process: reflective practice and situated cognition. Designing training modules to draw upon the experiences of course participants encourages reflective practice and allows participants to situate new information in their own knowledge framework created by past professional experience and training. Engaging practical activities use situated cognition to create new experiences that help to contextualize training materials and add to their existing knowledge framework.

• Process: Adult learners will typically have the experience to be engaged participants in their own learning cycle with input and influence over motivation, orientation, involvement, activity, reflection, and adaptation. Taking advantage of the opportunity for a collaborative rather than prescriptive leaning process is an important element of adult learning.

• Self-Driven Learning: adult learning is typically not considered subject-centered but problem-centered. In the case of nuclear security training, we find that participants are less likely to be specifically interested in learning, for example, about the fundamentals of radiation and radiation health effects, and more interested in the operational or clinical challenges unique to a radiological environment that an understanding of those fundamentals will allow them to address. Focusing on the operational context and implications of radiation principles increases learner engagement, interest, and retention.

Nuclear Security Applications

Case Study: NIPC supports a variety of training and exercise programs that rely on adult learning principles to create productive learning environments for diverse groups of participants, both within the United States and for international partners. Examples and lessons learned from NIPC experiences will illustrate the impact the adult learning frame of reference can have on nuclear security training programs.

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