JEM

Using Experiential Learning Theory to design emergency preparedness training curricula

Ralph Renger, PhD, MEP
Shandiin Wood, MPH
Brenda Granillo, MS

ABSTRACT

The goal of training is to improve the capability to better prepare, respond, and recover from an emergency. Much training is ineffective in transferring learning from the classroom to the field. One reason for this is that training tends to be cognitive or memory based, as opposed to experientially based. The purpose of this article is to show how Experiential Learning Theory (ELT) was applied to develop an emergency preparedness training curricula. After discussing the basic principles of ELT, the application of these principles is illustrated by way of a case example. Although the application of ELT is illustrated in the context of a public health emergency response curriculum, the steps in translating theory to practice are sufficiently robust to apply to the development of any emergency training curricula.

Key words: training, preparedness, learning theory, experential

The Department of Homeland Security (DHS) has an annual budget of about $50 billion.[1] A significant portion of this budget is allocated to training emergency responders to better mitigate, prepare, respond, and recover from all hazards. Because of the high costs associated with operations-based training, the DHS developed the Homeland Security Exercise and Evaluation Program (HSEEP), which is a building-block approach, beginning with discussion-based seminars and ending with full-scale operations-based exercises.[2] The building-block approach is based on the premise that less resource-intensive discussion-based trainings and exercises are useful in remedying obvious gaps in emergency operating plans, standard operating procedures, and responders' competency. Identifying and addressing as many issues as possible through discussion will maximize the benefit of costly operations-based exercises.

The challenge with the building-block approach is in the transition from discussion-based to operations-based exercises.[3] Information acquired during discussion-based exercises and trainings does not always translate into demonstrated field capability. One reason for this is discussion-based exercises and classroom training tend to be cognitive (ie, memorization based) as opposed to experiential (ie, applied knowledge that comes from doing).[4]

The Centers of Disease Control (CDC) is one of many federal agencies making significant investments in developing training curricula. In 2000, the CDC created the Centers of Public Health Preparedness (CPHP) to train public health professionals (PHPs) to better prepare, respond, and recover from all hazards. Although CPHPs were mandated to develop competency-based training curricula, the CDC provided little guidance how to design curricula to increase knowledge transfer to an operations setting. An evaluation of the CPHP led to several recommendations which the CDC used to develop the guidance for a new genesis of training centers called the Preparedness and Emergency Response Learning Centers (PERLCs). One key difference in the new guidance was the requirement for the integration of a learning theory in the training curricula.[5] As center funding was contingent on identifying a learning theory, each PERLC is now challenged with how to translate the learning theory they identified into practice.

DOI:10.5055/jem.2011.0000

The authors are employed with one of the CDC centers, the Mountain West Preparedness and Emergency Response Learning Center (MWPERLC). The MWPERLC is focused on developing training curricula for Tier II PHPs with an emphasis on Native American public health workers. The purpose of this article is to twofold. The first is to describe the key elements of the Experiential Learning Theory (ELT) used by MWPERLC in designing its emergency preparedness training curricula. The second is to demonstrate how ELT principles were applied to develop the emergency preparedness training curricula. Although the application of ELT is illustrated in the context of PHPs' emergency response curricula, the reader will recognize that the steps in translating theory to practice are sufficiently robust to be applied to the development of any emergency preparedness training curricula.

CHOOSING AN ADULT LEARNING THEORY: EXPERIENTIAL LEARNING THEORY

After conducting an extensive review of the adult learning literature, the MWPERLC curriculum design team decided to base the development of its emergency preparedness curricula on ELT. There were three primary reasons why the design team selected ELT. First, ELT is robust. Kolb et al.[6] reported that ELT has been used in the fields of education, management, computer science, psychology, medicine, nursing, accounting, and law. It seems reasonable to posit ELT principles could also be applied to the field of emergency preparedness. In fact, there is some evidence ELT principles are already being incorporated in developing just-in-time training approaches (JITT). For example, Cress et al.[7] noted the importance of considering cognitive, behavioral, and affective learning dimensions in designing JITT. These principles are consistent with ELT. However, the potential of ELT in designing emergency preparedness training remains largely untapped and is primarily tacit.

The second reason for selecting ELT is that it has withstood the test of time and continues to be used in curriculum design.[8-12] Part of the appeal of ELT is the pragmatic nature of combining experience with learning, a concept evidenced by way of apprenticeships, internships, work study, and service learning programs in all levels of education.[13] Essentially, ELT describes learning as a process in which concepts are created from and continuously adapted and tailored by the related experience.[13]

The third reason for selecting ELT was because its principles are consistent with the design of operations-based exercises. One basic tenet of ELT is learning is best achieved through experiencing, which is consistent with the philosophy of operations-based exercises. The advantage of using ELT is its principles can help to guide how to translate the learning process into practice (this will be shown later).

PRINCIPLES OF ELT

The most prominent ELT theorists include Carl Rogers,[4] David Kolb, John Dewey, Kurt Lewin, and Jean Piaget.[13] Each theorist has slight variation on the application of ELT principles. It is beyond the scope of this article to review each of these theorists. Instead, we offer a summary of what we believe to be three common principles across all ELTs.

- The learner must be an active participant in the learning process and have control over the direction of the learning.[6] The learner must be engaged in the learning process and not simply a passive recipient of knowledge.[4]

- The learning experience must be based on direct confrontation with practical, social, personal, or research problems. Herz and Merz[14] and other ELT proponents refer to this as a concrete experience. A concrete experience increases the relevance of the learning material.

- The learner must be able to evaluate his or her own progress, also referred to as active experimentation.[14] The ability to reflect on progress allows the learner to analyze his or her responses and to better continue on the direction of learning.

By applying these three principles, a learning environment is created, in which the learner must engage, analyze, and reflect, thereby increasing the likelihood the learning material will be internalized resulting in better transfer to the field.

APPLYING ELT TO THE DESIGN OF EMERGENCY PREPAREDNESS TRAINING CURRICULA

The MWERLC emergency preparedness training curricula targets Native American Tier II PHPs. A Tier II PHP is defined as someone with 10 years of experience or a master's degree plus 5 years of experience. How we applied each of the three ELT principles in designing our emergency preparedness training curricula is now discussed.

- The learner must be an active participant in the learning process and have control over the direction of the learning.

By Roger's[4] definition, the curricula developed under the CPHP umbrella were primarily cognitive.[15] A PHP taking CPHP training courses would best be described as a passive participant. For example, CPHP training courses discussing Points of Dispensing (POD) describe the key steps to establish a POD, such as directing clients through the POD, deciding which medications to dispense, dispensing medication, and disseminating information about the medications.[16] The learner simply reads this information and then his or her memory recognition is tested using a multiple choice test.

In seeking how to make the PHP active in the learning process and control the learning direction, we drew on our experience in planning, conducting, and evaluating HSEEP exercises. Functional and full-scale exercises use the concept of the Master Scenario Events List (MSEL) to present exercise players with an evolving scenario. The MSEL describes the timing of injects and expected actions in an evolving scenario: it is essentially a storyboard.[17] Injects continually force the player to remain as an active participant in the learning process. After each inject, a player's response is compared with the expected action. This comparison is done by either a simcell (a simulation center with a group of subject matter experts [SMEs]) or by an exercise controller. If the response is correct, then the player is provided the next inject. If the response does not match the expected action, then the simcell or controller provides another inject to help redirect the player to the correct action.[3] The idea of the player being directed based on his or her response is consistent with the ELT principle of the learner having control over the direction of the learning. Thus, it is the player's response to an inject that determines the direction of the next inject.[3]

We applied the concept of the MSEL and injects to our emergency preparedness training curricula by converting a MSEL into a decision-based algorithm (Figure 1). Correct inject responses take the PHP down one path, whereas incorrect responses take the PHP down a different path. In this way, the PHP directs his or her learning through the decision he or she makes, an important concept of ELT.

From Figure 1 it can be seen the learning objective is to develop a message explaining the location and hours of operation for PODs. Four critical steps were identified to develop and release the POD message. The correct answers take the PHP down path A. Incorrect answers take learners down path B or path C, which attempt to redirect the learner back to path A. Each learning path includes a reflective exercise. Reflective exercises are intended to keep the PHP active and engaged. For example, one reflective exercise asks the PHP to write down the consequences of choosing to wait to release information about POD locations. Once the PHP completes this exercise, he or she is able to click on a button enabling them to compare his or her responses to those of SMEs. The comparative nature of the exercise forces the PHP to analyze the situation, another principle of ELT. AQ: 1

In another reflective exercise, the PHP is asked to actually engage in using a variety of social media communication options. The PHP cannot proceed until he or she has successfully posted messages to a Facebook and Twitter account. It is important to note the deliberate manner in which the algorithm is structured regarding the learning path the PHP must follow. PHPs who answer incorrectly are forced to become more engaged through additional reflective

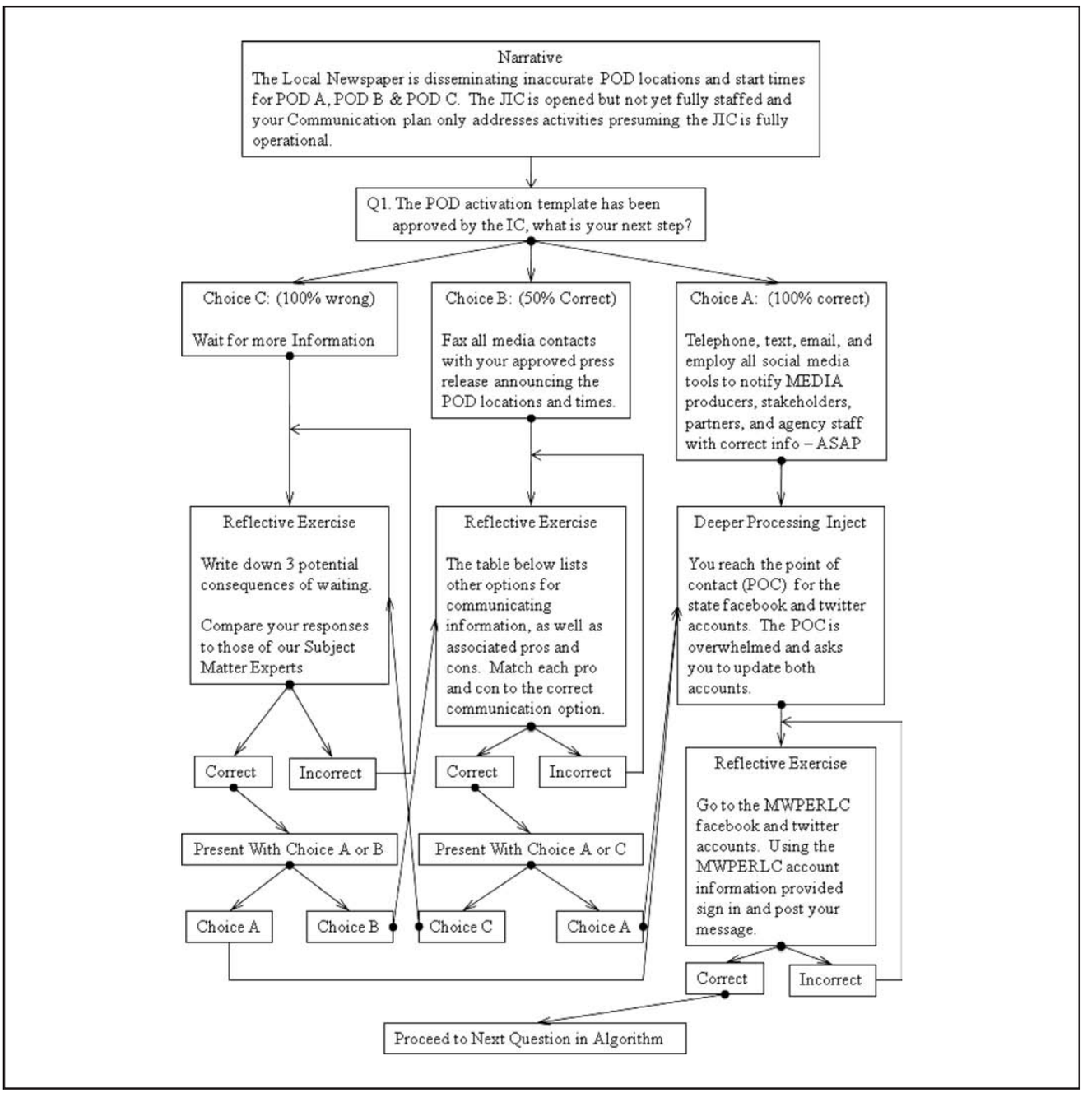

Figure 1. A sample decision algorithm.

exercises, serving to further reinforce the experiential component.

In addition to the decision-making format engaging and allowing the PHP to control the direction of their learning, the algorithm is advantageous because the choice of format mirrors the concepts of the MSEL and injects used in operations-based exercises. Being introduced to these concepts during training should improve performance in operations-based exercises because the player can devote attention to critical

scenario data needed for decision making, as opposed to being distracted by the logistics of the exercise process such as how a simcell works.[3]

The one notable difference between the training curricula adaptation and the operations-based exercises is the number of possible response alternatives and learning paths of the training curricula are finite. Thus, the technology does not currently exist to take idiosyncratic learner responses in written or verbal form and tailor a unique response. Therefore, a number of fixed alternatives had to be defined. To do this, we consulted with SMEs a priori to define the logical steps to meet the learning objective and the expected actions for each inject.

- The learning experience must be based on direct confrontation with practical, social, personal, or research problems.

The concept of basing our algorithm on the MSEL and injects forces the learner into confrontation. However, the challenge in meeting this principle was to identify problems relevant to the PHP. We adopted a multipronged approach to meet this challenge. First, we began by basing our emergency preparedness training curricula content on target capabilities (TCLs). Target capabilities are preferred because they contain critical tasks that the PHP must master: they represent a true, tangible, and practical problem. As our target audience was Tier II PHPs, we chose as potential content only those target capabilities supported by emergency support function (ESF) #8, public health.

After identifying the target capabilities supported by public health, we further narrowed the content by reviewing After-Action Reports (AARs). Because the MWPERLC target population is Native American PHPs, we specifically requested AARs from exercises conducted by our Native American partners. We specifically examined the corrective actions from these AARs looking for an intersection with the ESF 8 target capabilities. Building on our illustrative example, MWPERLC partner requests were made for Native American AARs focusing on Mass Prophylaxis (one of the TCLs for Public Health). This was deliberately chosen because of the recent history in preparing, responding, and recovering from the H1N1 pandemic. Such an exercise was completed by the Navajo Nation. The AAR noted problems in developing a message to disseminate information about the PODS. This served to define our learning objective.

We used this information to write a narrative that had real-world application. Larkey and Hecht[18] referred to this as a grounded narrative and noted learners are more apt to listen and apply information if it has cultural relevance to them. To increase the likelihood of the narrative adhered to the ELT principles of being concrete and relevant, the MWPERLC hired a Native American curriculum developer and asked the advisory board consisting of numerous Native American partners for feedback.

- The learner must be able to evaluate his or her own progress.

An algorithm with multiple decision points provides the PHP with immediate feedback during the training. When a PHP gives a correct response, they are informed that they are correct and then challenged with another inject designed to force even deeper level processing. For example, from Figure 1, when the PHP answers he or she should use all approved social media outlets, he or she is presented with another inject that challenges the PHP to consider what to do if the normal operating procedures cannot be followed.

It is also important to note that incorporating ELT impacts the evaluation strategy. Traditional approaches used in evaluating training curricula ask the participant to first complete a baseline assessment. After the training, a post-test is administered to determine whether any significant advances in training occurred. Under this traditional evaluation model, feedback is only provided after the training session, making it impossible for the PHP to apply what is learned.

Using the algorithm, the PHP is provided feedback at each decision point. The PHP is provided an opportunity to reflect on each answer. This is especially important if the PHP selects an incorrect answer. Without reflection, the PHP would presumably simply "guess" which of the remaining paths is correct.

However, the opportunity to reflect and obtain feedback about an incorrect answer will hopefully result in the PHP understanding why the answer he or she chose was incorrect and lead them to select the correct path sooner and more often than would be expected by chance alone. Thus, the evaluation of the training is not necessarily whether there is some pre-post test change, rather how many correct decisions are being made and how long it takes the PHP when making an error to use feedback to return to the correct path. This measure is more consistent with what is expected in the real-world setting.

SUMMARY

Training is an ongoing and critical component for ensuring all PHPs are better prepared to respond and recover from an emergency. Tight budgets and the high cost of operations-based exercises make emergency preparedness training even more imperative. The challenge is that often trainings are purely didactic, emphasizing knowledge and awareness, do not engage the PHP, and result in a poor transfer of knowledge to the field setting.

Using a decision-making algorithm to mimic the MSEL increases the extent to which the PHP is engaged with the learning material and directs his or her own learning. Drawing on AARs and TCL relevant to PHPs, scenario-based curriculum content was developed based on real and practical problems. The AARs on which to base the narrative were drawn from exercise conducted by Native American tribes. Other curriculum designers should draw on exercises conducted by their respective stake-holders. Finally, at each decision point, the PHP receives feedback allowing him or her to continually evaluate his or her progress. These elements create an experiential learning experience that mimics the operations-based exercises and increases the likelihood of internalizing information for better transfer to the field.

ELT is sufficiently robust that it can be applied to the development of any emergency training curricula. The application of the theory is easy to adapt to any training curricula. The concept of the decision-based algorithm can be used regardless of the learning objective, content, and target audience. The key is to ensure appropriate SMEs are used to determine the expected actions, incorrect responses, and corrective paths. Choosing the appropriate ESF will of course depend on the target audience for the training curricula. Selecting the appropriate TCL is easy because the ESF relevant to each is defined.[19] The evaluation of on-line training curricula designed this way differs slightly, providing ongoing feedback.

Evaluation of the training curricula is essential to draw conclusions about how to improve the delivery and/or arrive at conclusions regarding its effectiveness. Clearly, the case study provided is focused on key issues in curricula deign, and therefore, it is premature to draw any conclusions about the effectiveness of the approach until the curricula is implemented and evaluated.

The true test of the effectiveness of the emergency preparedness training will be to compare the performance in the training with the performance in operations-based exercises and/or real-world events. We are in the process of implementing mechanisms such as a priori human subjects' approval to be able to gather evaluation data from those completing the on-line training to be able to follow-up and assess real-world performance. AQ: 2

In summary, it is difficult to continue to justify expenditures on trainings that are purely cognitive. Using ELT principles in emergency training curriculum design is one way of ensuring a higher quality product that will meet its goal of knowledge transfer to the field setting.

Ralph Renger, PhD, MEP, Mountain West Preparedness and Emergency Response Learning Center, University of Arizona, Tucson, Arizona.

Shandiin Wood, MPH, Mountain West Preparedness and Emergency Response Learning Center, University of Arizona, Tucson, Arizona.

Brenda Granillo, MS, Mountain West Preparedness and Emergency Response Learning Center, University of Arizona, Tucson, Arizona.

REFERENCES

1. Pena C: How much homeland security? *Washington Post*, March 17, 2008.
2. HSEEP: *Homeland Security Exercise and Evaluation Program (HSEEP)*. Vol. 1: *HSEEP Overview and Exercise Program Management*. Washington, DC: U.S. Department of Homeland Security, 2007.

3. Renger R, Wakelee J, Bradshaw J: The hybrid exercise: Transitioning from discussion-based to operations-based exercises. *J Emerg Manage*. 2009; 7(4): 51-56.
4. Rogers CR: *Freedom to Learn*. Columbus, OH: Merrill Publishing, 1969.
5. CDC: Centers for Disease Control and Prevention Funding Opportunity Announcement (CDC-FOA). U.S. Department of Health & Human Service, Funding Opportunity Number: CDC-RFA-TP10-1001. Atlanta, GA: CDC, 2010.
6. Kolb DA, Boyatzis RE, Mainemelis C: Experiential learning theory: Previous research and new directions. In Sternberg RJ, Zhang L (eds.): *Perspectives on Thinking: Learning and Cognitive Styles*. London: Lawrence Erlbaum Associates, 2001: 227-247.
7. Cress C, Spitzer J, Stephens A, et al.: Enhancing training during public health emergencies: An inclusive just-in-time training (JITT) approach (Technical Report). Multnomah County Health Department. Portland, OR: Graduate School of Education, Portland State University, 2010.
8. Black PE, Plowright D: A multi-dimensional model of reflective learning for professional development. *Reflective Pract*. 2010; 11(2): 245-258.
9. West A, Saunders SG: A humanistic approach to accounting education in South Africa. *S Afr J Higher Educ*. 2006; 20(5): 718-732.
10. Nadan M: Service learning partnerships between university and school students: Experiential learning inspired through community research. *J Coll Teach Learn*. 2010; 7(7): 25-36.
11. Zhang W, Brundrett M: School leaders' perspective on leadership learning: The case for informal and experiential learning. *Manage Educ*. 2010; 24(4): 154-158.
12. Kolb A, Kolb DA: The learning way: Meta-cognitive aspects of experiential learning. *Simulation Gaming*. 2009; 40(3): 297-328.
13. Kolb DA: *Experiential Learning*. Englewood Cliffs, NJ: Prentice-Hall, 1984.
14. Herz B, Merz W: Experiential learning and the effectiveness of economic simulation games. *Simulation Gaming*. 1998; 29: 238-250.
15. ASPH: Association of Schools of Public Health (ASPH) Resource Center; 2010. Available at *http://preparedness.asph.org/perlc/resourcereports.cfm*. Accessed May 6, 2011.
16. Centers for Disease Control: Point of Dispensing Standards (PODS); 2008. Available at *http://www.cdc.gov/phpr/capabilities/capability8.pdf.* Accessed May 6, 2011.
17. EMI: Operations-Based Exercise Design and Evaluation, E133. Emmitsburg, MD: Emergency Management Institute, FEMA, 2010.
18. Larkey LK, Hecht ML: A model of effects of narrative as culture-centric health promotion. *J Health Commun*. 2010; 15(2): 114-135.
19. United States Department of Homeland Security: *Targeted Capabilities List: A Companion to the National Preparedness Guidelines*. Washington, DC: United States Department of Homeland Security, 2007.

Author Queries

AQ1: Please clarify whether “PODS” (at 2 instances) should be changed to “POD” throughout the article.
AQ2: Please note that per AMA and Webster, “a priori” is a two-word term. Hence, it is retained as two words OK?

PROOF COPY ONLY DO NOT DISTRIBUTE