Sgt. Dariusz Krzywonos works on a structured self-development course in September 2012.

NCO 2020

A Concept for Self-Paced Learning in the Noncommissioned Officer Education System

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For Army noncommissioned officers (NCOs), attendance at each level of professional military education (PME) is a training requirement for career progression. Essentially, NCOs are required to attend schools and demonstrate professional acumen and mastery of a broad set of military skills to achieve promotion to the next higher grade. Historically, the Army has trained enlisted soldiers using an instructor-centric, group-paced instructional approach, where soldiers are assessed on their ability to master tasks under specific conditions using explicit standards of performance.

Noncommissioned Officer Education System (NCOES) training centers and academies continue to offer training in what is, for the most part, a lock-step fashion, where the level of rigor and challenge is not tailored to the individual. Lock-step training can be beneficial for certain situations, but not all. For this reason, there is a need for innovation in the NCOES; it needs to change its approach to education. In spite of advances in educational technology, NCOES courses continue to train NCOs by relying too much on lock-step, instructor-led training, which is a dated approach to adult education.[1]

Self-Paced Instruction in Army Courses

The Army has from time to time used and conducted research on the effectiveness of self-paced instruction, more commonly known as self-paced learning (SPL), for certain courses, but self-paced approaches have not been applied broadly in the NCOES. Unfortunately, much of the research is over 30 years old. One early study, by the Army Research Institute in 1975, was published as *Analysis of a Self-Paced Instructional Program in the Clerical Field.*[2] This study found that the use of self-paced instruction to train clerical personnel increased learner motivation and satisfaction among trainees. The study cited reductions in training time and required instructional support as benefits of self-paced instruction. Another Army Research Institute study, *The Acquisition and Retention of Visual Aircraft Recognition Skills,* published in 1976, concluded that self-pacing in training resulted in better trainee outcomes for higher aptitude trainees.[3]

If SPL was found to reduce overall training time while contributing to better training management in

military schools in the 1970s, could this approach also work well in the distributed learning environment of the 21st century? Recent civilian and military studies of SPL suggest that self-paced NCOES courses could accelerate learning, provide tailored content to meet the needs of soldiers, and lower overall training costs.[4] Innovative courses and instructional approaches could lead to improved learner satisfaction and value for the training received.[5]

The differences between SPL and group-paced instruction are well known and understood. In SPL, individuals have a degree of control over how quickly they move through the instructional material. In group-paced instruction, the instructor controls how fast trainees moves through instruction. The two approaches need not be mutually exclusive. An NCOES course that combined aspects of both approaches could retain some instructor-led portions while also allowing students to quickly move through content on concepts they had already mastered.

Design of Learning

For either approach to learning—self-paced or group-paced—it is important to consider factors that affect overall effectiveness with regard to how well a course meets the needs of learners.[6] Designers of both SPL and group-paced courses should consider the following:

- Relevance of course content to the job requirements
- Motivation of trainees to learn
- Opportunities to practice the skills or tasks taught
- Supervisory support back on the job or at home station.
- Instructor skills to facilitate learning
- Evaluation and revision of the course as necessary to achieve objectives

The design of SPL courses should feature concept-oriented, scenario-driven, and project-based learning that supports increased levels of learner interest and engagement. In the NCOES, self-paced content development should focus on *constructivist* design features, where students are required to address real-world problems and situations.[7] The term constructivist is used here to describe a learning experience characterized by an engaging

learner-centric focus in which students have the opportunity to apply their knowledge to solve problems, rather than mainly sit through lectures.[8]

While not all instruction within NCOES classes should be minimally instructor guided, self-pacing some course content is beneficial, especially where learners have some prior knowledge of the subject area or concept being studied. Additionally, SPL should be used to augment and enhance case studies, group discussions, role playing, and other instructional strategies in the classroom.
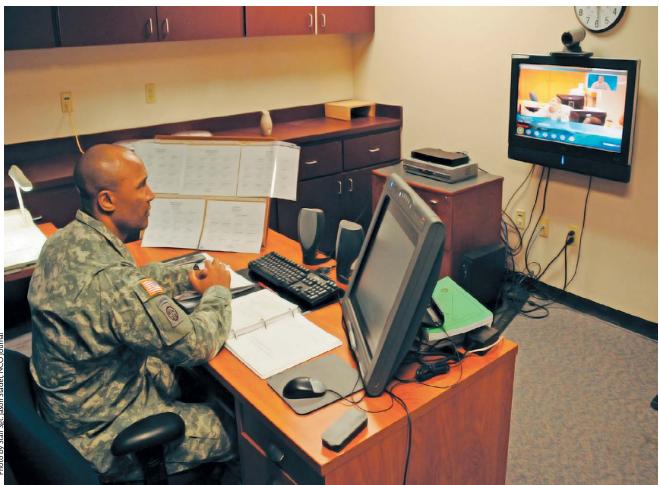
Another design consideration is that learners in NCOES courses now tend to be digital natives (persons who have used technology from an early age) or gamers who expect computers to provide applications, or *apps*, for quick learning and problem solving. Conceptually, apps, along with self-assessments, streaming media, and chunked instructional content, would be used within the framework of self-paced NCOES courses to supplement classroom instruction.

Incorporating an Adaptive Training Model into NCO Professional Military Education

The Army's new concept of learning, contained in *The U.S. Army Learning Concept for 2015*, is based on a goal of creating a continuous adaptive learning model based on learner-centric principles.[9] Learner-centric instruction in adult education also places the focus on learner outcomes associated with opportunities for individual reflection, problem-centered instruction, and self-assessments of progress.[10]

Within NCOES, SPL is just one of several training strategies that can be incorporated to promote the learner-centric instructional environment described in the Army's learning concept. Other approaches could include the use of games and simulations, intelligent

Photo by Staff Sgt. Jason Stadel, NCO Journal

From the U.S. Army Sergeants Major Academy, Master Sgt. David Foulkes teaches Battle Staff Noncommissioned Officers Course students via video tele-training, November 2012.

(digital) tutors, or even personal response systems (clickers). Additionally, to effectuate its learning concept, the Army will require a cultural shift that moves it away from heavy emphasis on the use of traditional classrooms.[11]

Within a new learning framework, a truly adaptive model ideally would provide personalized content, learning paths based on pre-assessment, and resources suitable for the individual student.[12] The main goals associated with adaptive systems are to maximize learner satisfaction, learning speed (efficiency), and educational effectiveness.[13] In the very near future, intelligent tutoring systems and adaptive content presentation platforms will allow training institutions to tailor course content based on the use of pretests or personal assessments. It is possible that future NCOES courses might be able to leverage these kinds of educational technologies. This matters because soldiers are more likely to be engaged and focused on learning when they are not bored by the learning design, when they see the training as relevant to their job duties, and when the course content is at the appropriate level of challenge. Moreover, soldiers typically are not interested in repeating coursework on skills or concepts they have already mastered or used on the job before attending a course.

In addition, instructional design should avoid pitfalls such as *the expertise reversal effect* (an avoidable cognitive overload), which can occur when instructional content is not geared to the level of the learner.[14] For example, a soldier attending the Advanced Leader Course within NCOES may already possess more operational experience or more of certain technical skills than a peer enrolled in the same course. Retraining that soldier on skills already mastered or used extensively in operations is not the best way to train or extend knowledge within NCOES and may interfere with additional learning. A pre-assessment of prior learning could support tiered instruction or allow for individually tailored content that either extends current knowledge or supports application of previously learned concepts within the framework of live or virtual scenario-based assessments.

Combining Self-Paced Instruction and Adaptive Learning in NCOES

As as an instructional framework, SPL could be introduced into NCO PME using a purposive model of instruction that would allow learners to enter the course with tailored content and instructional activities based on pre-assessment of skills or knowledge. Pretests and assessments should measure soldiers' understanding of technical or operational concepts within their career field, or of general military topics. Data taken from pre-assessments could be used in different ways to adjust the course content. One approach might be to use mean scores from stratified samples of soldiers across military components or career management fields to shape overall decisions on curriculum and the sequencing of topics taught to all soldiers attending a given course. Another way that pretest assessment results could be used is by having a cut-off score on the test that would serve as a screening mechanism or entry ticket to attend an NCOES PME course that focuses on applying skills. A more routine use of pre-assessment information is to identify gaps in learner understanding at the outset of training, as well as to gather evidence of learners' readiness, interests, or learning profiles.[15]

Once enrolled in a course, learners would access materials on a secure learning management system (LMS) that would also track student progress. Many colleges and universities today are using such transformative approaches to enrich student learning experiences. Students attending a course would be issued a tablet or laptop to access and review course content in the form of apps, lectures, self-assessments, wikis, podcasts, videos, and other streaming content. By using a flipped classroom approach, the NCOES course should allow for SPL time during which learners review class lectures and other lesson materials.[16]

Within a technology-enhanced adaptive LMS, desirable features include instructor dashboards, learning object repositories, and the system's ability to intelligently navigate the learner through the material.[17] Ideally, as learners proceed at their own pace through course content, the instructor dashboard tracks their progress (including completion of tests or other learning assessments) in relation to timelines for course completion.[18]

A Growing Role for Learner Analytics

There is quite a bit of new research in civilian higher education regarding the use of learner analytics to track student activity within an LMS. Learner analytics is of great interest today because virtual

learning environments (referring to LMSs such as Desire2Learn, eCollege, Jenzabar, Blackboard, and Moodle) can capture transactional data on student behaviors related to a learner's personal patterns, usage, and browsing time within the LMS.[19] One example is the Social Networks Adapting Pedagogical Practice (SNAPP), which combines content analysis and a social network analysis tool within a course learning environment.[20] The LMS known as Blackboard has developed an analytics solution called Blackboard Analytics for Blackboard Learn that monitors learner usage patterns and progress through courses and assesses online learning tools.

The goal of using such analytic tools is to provide information on students' interactions with learning objects and on their virtual interaction with other students in a course. For self-paced NCOES courses, learner analytics could support continuous improvement of the instruction by providing real-time information on the overall effectiveness of the course structure, the instructional content within it, and student accomplishment of learning objectives.[21] Finally, evaluation of learning can also be enhanced by using other forms of data to improve the SPL. This may include data from commanders regarding graduates' performance on the job following graduation and interviews or focus groups with students or faculty to gather feedback about the overall learning experience.[22]
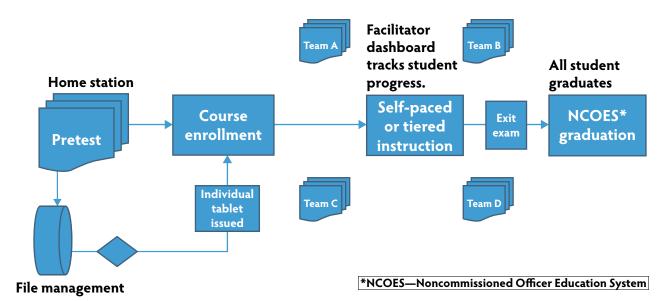
A Proposed NCOES Self-Paced Learning Model

Learners enrolled in an NCOES SPL course could continue to meet daily with their learning peers and course facilitators to participate in group discussions, problem-centered exercises, or targeted feedback sessions, or to attend guest lectures.[23] Flexible grouping should be used throughout an SPL course to have students with varying levels of experience and skills socially sharing knowledge and exchanging understanding.

Many of today's LMSs can support a combination of discussion boards, journals, or social media during a

Staff Sgt. Chantel Duhart of the 1st Stryker Brigade Combat Team, 1st Armored Division, reviews course work during a resident Battle Staff NCO Course at the U.S. Army Sergeants Major Academy at Fort Bliss, Texas, .

NCOES Self-Paced Learning Model

course. Group learning and interaction, live or virtual, remain key features within SPL courses because social learning still has tremendous power to impart both explicit and tacit knowledge through interactions among learners.

More important, learning is, fundamentally, a human endeavor, so course design remains an important role for the course facilitator, who guides the learners' experiences through positive and constructive feedback.

Finally, all learners should take an exit exam or participate in a capstone activity at the end of a course as a summative assessment of learning and skill development before attending a completion ceremony. The figure above provides a rudimentary conceptual illustration of the flow of activities within a self-paced NCOES course.

Conclusion

In NCOES, SPL is an effective way to apply the learner-centric and adaptive learning principles associated with the Army Learning Concept 2015. As the Army looks to better manage training resources, SPL can provide some cost efficiencies, streamline courses, and ensure higher-quality educational experiences for all NCOs.

Courses using SPL can tailor and adapt instruction to fit the needs of students while making better use of classroom time for meaningful discussion, exercises, and peer-to-peer interactions based on course objectives and learning goals. In addition, SPL can yield higher levels of satisfaction among NCOs by providing the appropriate level of challenge and dynamism that are characteristic of a learner-centric educational environment. ■
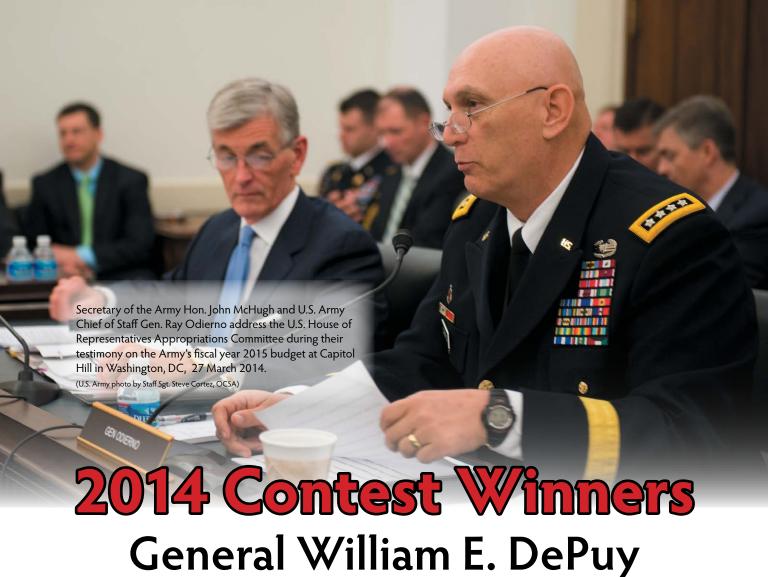
NOTES

1. Blaise Cornell-d'Echert, "Beyond Training: New Ideas for Military Forces Operating Beyond War," *New Directions for Adult & Continuing Education,* 2012(136)(Winter 2012), 17-27. The author argues that the military training (and education) system of the last 60 years did little to promote enhanced thinking skills.

2. Milton H. Maier and C. Dennis Fink, Army Research Institute research memorandum, *Analysis of a Self-Paced Instructional Program in the Clerical Field*, March 1975, http://www.dtic.mil/dtic/tr/fulltext/u2/a076780.pdf.

3. Robert D. Baldwin, Robert E. Cliborn, and Robert J. Foskett, U.S. Army Research Institute technical report, *The Acquisition of Aircraft Visual Recognition Skills*, 1976, http://www.dtic.mil/dtic/tr/fulltext/u2/a035863.pdf. Lower aptitude men learned more under lock-step training, while higher aptitude trainees learned more with self-paced instruction on training tasks.

4. Neil Carey, David Reese, and Robert Shuford, "Navy Self-Paced Computer-Based Courses: Practical Implications of Saving Time Under Instruction," *Military Psychology*, 22(4)(October 2010): 474-89. A study of Navy self-paced computer-based courses showed reduced instructional time.

5. B. Charles Tatum and Julia C. Lenel, "A Comparison of Self-Paced and Lecture/Discussion Methods in an Accelerated Learning Format," *Journal of Research in Innovative Teaching, 5*(1)(March 2012): 139-156. College students in self-paced classes tended to value instruction more than students in lecture-discussion classes.

6. Martin E. Smith, "Self-Paced or Leader Led Instruction?" *Training & Development Journal, 34*(2)(February 1980), 14-18.

7. Learning occurs as students engage in problem solving and social negotiation within a real world context.

8. Manuel London and M.J. Hall, "Unlocking the Value of Web 2.0 Technologies for Training and Development: The Shift from Instructor-Controlled, Adaptive Learning to Learner-Driven, Generative Learning," *Human Resource Management*, 50(6) (November-December 2011): 757-775. The authors suggest that within constructivist environments learners construe meaning based on peer collaboration, learner–learner discussions, and group assignments.

9. U.S. Army Training and Doctrine Command Pamphlet 525-8-2, *The U.S. Army Learning Concept for 2015* (Washington, DC: U.S. Government Printing Office [GPO], 6 June 2011), http://www.tradoc.army.mil/tpubs/pams/tp525-8-2_CH1.pdf.

10. Committee on Academic Programs and Teaching (CAPT) Learner-Centric Task Force 2005-2006, "Learner-Centered Teaching and Education at USC: A Resource for Faculty," University of Southern California website, http://cet.usc.edu/resources/teaching_learning/docs/LearnerCentered_Resource_final.pdf.

11. Raymond A. Kimball and Joseph M. Byerly, "To Make Army PME Distance Learning Work, Make It Social," *Military Review*, 93(3) (May-June 2013): 30-38. This article looked at the need to incorporate aspects of social learning into PME. The Army's distance learning courses are often focused on more on content delivery than on true learning experiences.

12. Tzu-Chi Yang, Gwo-Jen Hwang, and Jen-Hwa Yang, "Development of an Adaptive Learning System with Multiple Perspectives based on Students' Learning Styles," *Journal of Educational Technology & Society, 16*(4)(2013): 185-200.

13. Georgios Tsoulouhas, Dimitrios Georgiou, and Alexandros Karakos, "Adaptive Content Presentation in Asynchronous Learning Environments," *International Journal of Emerging Technologies in Learning, 7*(2)(2012): 43-49.

14. Richard E. Clark and David F. Feldon, "Ten Common But Questionable Principles of Multimedia Learning," *The Cambridge Handbook of Multimedia Learning* (New York: Cambridge University Press, 2005), 151-173. Authors cite an expertise reversal effect—an extra cognitive load that interferes with learning.

15. Jessica A. Hockett and Kristina J. Doubet, "Turning on the Lights: What Pre-Assessments Can Do," *Educational Leadership, 71*(4) (December 2013/January 2014): 50. Pre-assessment strategies can serve as a means to support some differentiation of instruction for a wide variety of student needs in increasingly diverse classrooms.

16. A flipped classroom is a technique where traditional classroom instruction and homework are flipped, or reversed. Students view lectures on their own time and conduct practical exercises during class, allowing for more interaction between the students and teacher, and each other, during hands-on learning.

17. In adaptive educational hypermedia systems we expect that the learning content presentation should be appropriately retrieved from learning object repositories and dynamically tailored to each learner's needs.

18. Candace Thille and Joel Smith, "Cold Rolled Steel and Knowledge: What Can Higher Education Learn About Productivity?" *Change: The Magazine of Higher Learning* (March/April 2011). Dashboards may provide additional detailed information, such as the class's learning of sub-objectives, the learning of individual students, and the types of tasks students struggle with the most.

19. Simon Buckingham Shum and Rebecca Ferguson, "Social Learning Analytics," *Journal of Educational Technology & Society, 15*(3)(July 2012): 3-26. Most major LMSs now include at least rudimentary analytics dashboards.

20. Laurie P. Dringus, "Learning Analytics Considered Harmful," *Journal of Asynchronous Learning Networks, 16*(3)(June 2012): 87-100. Visualization and log data capabilities are limited in many of today's LMSs. SNAPP supports Blackboard, WebCT and Moodle and is compatible with Internet Explorer, Firefox and Safari on Windows and Macintosh platforms.

21. Stephanie J. Jones, "Technology Review: The Possibilities of Learning Analytics to Improve Learner-Centered Decision-Making," *Community College Enterprise, 18*(1)(Spring 2012): 89-92. As more organizations engage in research on the use of learning analytics, it will be possible to use this type of information to make improved learner-centered decisions.

22. Susan G. Straus, Michael G. Shanely, Maria C. Lytell, James C. Crowley, Sarah H. Bana, Megan Clifford, and Kristin J. Leuschner, *Enhancing Critical Thinking Skills for Army Leaders Using Blended-Learning Methods* (Santa Monica, CA: RAND Corporation, 2012).

23. Jackie Dobrovolny, "How Adults Learn from Self-Paced, Technology-Based Corporate Training: New Focus for Learners, New Focus for Designers," *Distance Education, 27*(2)(August 2006): 155-170.

Secretary of the Army Hon. John McHugh and U.S. Army Chief of Staff Gen. Ray Odierno address the U.S. House of Representatives Appropriations Committee during their testimony on the Army's fiscal year 2015 budget at Capitol Hill in Washington, DC, 27 March 2014.
(U.S. Army photo by Staff Sgt. Steve Cortez, OCSA)

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