Army Learning Model for Professional Military Education

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ABSTRACT

As the Army moves forward with implementing the Army Force Generation (ARFORGEN) Model, the US Army Training and Doctrine Command (TRADOC) must respond to the changing requirements of the operational force for trained Soldiers and leaders. To better position TRADOC to meet the requirement for trained and adaptive leaders, GEN Wallace, Commanding General (CG) TRADOC, directed his staff to look at how TRADOC could take advantage of the latest developments in proven adult learning strategies and training technology to shorten the time leaders spend in TRADOC schools. As a result, TRADOC is in the process of piloting a learning model that has the following components: (1) an increased use of technology-based instruction; (2) Saturday training; (3) fast tracking, and (4) use of Guided Experiential Learning (GEL) as the instructional design and delivery strategy. Use of technology, Saturday training, and fast tracking provide greater efficiency in training, while GEL ensures training will be at least as effective as existing instruction despite a reduction in training time. In addition, CG TRADOC directed his staff to ensure the model incorporates strategies that make students more powerful learners. TRADOC is now identifying learning-how-to-learn strategies for integration into the learning model's pilot courses. TRADOC is piloting the new learning model within two Captains Career Courses in fiscal years 07-08, with the TRADOC Analysis Center serving as its independent evaluator.

ABOUT THE AUTHORS

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Dr. Millie Abell is Chief of Learning Strategies within the Headquarters, US Army TRADOC at Fort Monroe, VA. Her mission is to identify evidence-based learning and instructional strategies for integration into training and education programs within TRADOC's 33 schools. In addition, she oversees the Secretary of the Army's Distributed Learning/Training Technology Subcommittee, comprised of experts from academia and industry who provide the Army with guidance on how best to integrate the latest learning and instructional strategies into military courseware. She works extensively with academia to provide Army trainers with Immersive Training Workshops, a vehicle for integrating scenario-based instruction into Army training and education.

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INTRODUCTION

Background

As the Army moves ever forward with the implementation of the Army Force Generation (ARFORGEN) Model, the Training and Doctrine Command (TRADOC) must anticipate and respond to the changing requirements of the operational force for trained Soldiers and leaders. To better position TRADOC to meet the requirement for trained, agile and adaptive leaders, GEN Wallace, Commanding General (CG) TRADOC, directed his staff to look at how TRADOC could take advantage of the latest developments in proven adult learning strategies and training technology (referred to as distributed learning (dL) in this paper) to shorten the time leaders spend in TRADOC schools while preserving or improving the effectiveness of the instruction. The CG TRADOC's vision was to create a new learning model that would allow TRADOC to better posture itself to meet the relatively short period available to Soldiers in active duty Brigade Combat Teams in the Reset phase of the ARFORGEN cycle for individual leader training. Initially, GEN Wallace asked the staff to look at Professional Military Education (PME) rather than Initial Military Training in general, and the Captains Career Courses in particular, as the first opportunity for piloting a new Army Learning Model (ALM). Subsequent guidance expanded the model's application to the Basic and Advanced Non-Commissioned Officers Courses as well as the Battle Staff Non-Commissioned Officers Course, the First Sergeant's Course, and Warrant Officer Advanced Courses. While pressures to support ARFORGEN impact the total force, the focus of a new model for PME is directed at Active Duty courses taught within TRADOC schools. The Reserve Components, through The Army School System training battalions, have an established model for how to complete the courses they teach and are therefore not included in this effort.

The Need for a New ALM for PME

The most pressing requirement for a new learning model is TRADOC's need to better posture itself as the generating force to support ARFORGEN Reset timelines. While current plans show the reset phase as lasting one year, the time available to go to TRADOC schools is considerably less than that one year. Return and recovery from recent deployments is a leader-intensive process lasting two to three months and generally makes leaders unavailable for PME. The requirements associated with preparing a unit to enter ARFORGEN's Train Phase are also leader-intensive and could last from two to three months. With different brigade sized units entering the ARFORGEN cycle on an almost rolling basis, there is little time left to constitute a course of PME as we knew it only a few years ago. While the objective of the new learning model is to posture TRADOC to better support the ARFORGEN cycle requirements, the realities of today's deployment cycle reduce even further the time available for leaders to attend PME.

FOUR COMPONENTS OF THE NEW ALM

Given this background, TRADOC crafted a learning model that contains the following four components: (1) an increased use of dL or technology-based instruction; (2) Saturday training, (3) fast tracking, and (4) use of Guided Experiential Learning (GEL) as the instructional design and delivery strategy. Use of dL, Saturday training, and fast tracking provide greater efficiency in training, while GEL ensures training will be at least as effective as existing instruction despite a reduction in training time. The following describes each of the four elements in more detail.

Increasing the use of dL

Rationale for increasing the use of dL

Well designed dL has a powerful potential to approximate the 1:1 instructor: student ratio of the tutoring environment. Fletcher examines research comparing individual tutoring (one instructor, one student) with traditional classroom instruction (one instructor, 30 students), and evaluates Benjamin Bloom's research from the University of Chicago. Fletcher concludes:

> Such a difference in instructional presentation might be expected to favor one-on-one teaching. What is surprising is how much it matters. Across these studies, the difference in student achievement amounted to two standard deviations. This difference is roughly equivalent to raising achievement of 50th percentile students to the 98th level of achievement (Fletcher, 2003, 82).

Bloom's (1984) research not only found that learners taught through conventional instruction performed two standard deviations below those who were tutored, but learners spent more time on task when tutored -- over ninety percent of instructional time was spent on task during tutoring, while only sixty-five percent of instructional time was spent on task during conventional classroom instruction. Moreover, students who were tutored held more positive attitudes than those taught conventionally. Through tutoring, Bloom feels more students can achieve higher levels of performance, and he refers to the search for instructional methods that are as effective as face-to-face tutoring as "the 2 Sigma Problem" (Bloom, 1994, 4).

Fletcher also considers Graesser and Person's research comparing tutoring to traditional classroom practice for college undergraduates studying research methods and junior high students learning algebra, and found questioning behavior to be significant. While instructors asked an average of three questions and students asked .1 questions per hour of conventional instruction, the table below presents the more robust levels of questioning realized during one-on-one tutoring.

Table 1. Questions Asked and Answered During One Hour of Tutoring

	Algebra (Junior High Students)	Research Methods (College Undergrads)
Asked by Learner/ Answered by Tutor	32.2	21.1
Asked by Tutor/ Answered by Learner	146.4	117.2

(Fletcher, 2003, 83)

In reviewing *meta-analyses* by Kulik, Fletcher (2003) found learner performance can move from the 50th percentile up to the 64th percentile using technology and he goes on to discuss the impact that different forms of technology has on learners. For example, based on a meta-analysis of 233 studies that involved use of technology which incorporated text, graphics, some animation, and some individualized interaction, researchers found learner performance was raised from the 50th to the 65th percentile. In analyzing 47 studies of multimedia instruction, which used video as well as more animation, more audio and more elaborate interactions, learner performance went from the 50th to the 69th percentile. Going beyond multimedia and looking into 11 studies of intelligent tutoring systems that tried to duplicate a one-on-one learner-tutor dialogue, Fletcher found learner performance went from the 50th to the 80th percentile, with more recent studies (N=5) indicating that performance can move from the 50th to the 85th percentile.

In terms of learner performance, Fletcher claims classroom instruction cannot compete with individualized interactive computer courseware, but one reason why computer-based tutorials are not more widespread is affordability. Fletcher contends that computers can help close this gap cost effectively, in part because technology saves time when learners do not cover content they have already mastered. The following table from Fletcher's chapter summarizes research findings of time saved using technology-based instruction.

Table 2. Time Savings Using TBI

Studies	No. of Findings	Average Time Savings
Orlansky & String (1977) (Military Training)	13	54%
Fletcher (1991) (Higher Education)	6	31%
Kulik (1994) (Higher Education)	17	34%
Kulik (1994) (Adult Education)	15	24%

(Fletcher, 2003, 88)

In line with this data, Corbett's 2001 report of research from Carnegie Mellon University, which was accomplished under a National Science Foundation grant, supports the advantages of cognitive computer tutors, finding that learners using technology completed instruction in one-third the time of those who were not tutored, while surpassing Bloom's two-Sigma, or standard deviations goal that had been realized by students interacting with human tutors. Yet on the one hand, much technology-based instruction has been criticized for being a page-turner, and on the other hand as being nothing more than entertainment. Fletcher cautions educators that it is not technology *per se* that impacts learner performance. Rather, it is the quality of instructional design that makes a difference in how much learning occurs. For example, a multimedia instructional program incorporating video capabilities should use the video for placing learners in problem-solving scenarios rather than for delivering recorded lectures.

Strategy for Identifying dL Content
The medium for delivery of instructional material is characterized as being either via dL technologies or traditional face-to-face classroom instruction. To determine which subject matter must be delivered in a traditional face-to-face or environment, Clark, Bewley, and O'Neil (2006) propose that trainers ask three questions while designing a lesson.

1. Are students required to use senses other than sight and sound? If taste, touch, or smell are involved, then the instruction must be done in a face-to-face environment. In these circumstances dL technologies are not suitable for the desired instruction.

2. Is the learning environment complex and not amenable to the application of information technology? If so, then the instruction must again be in a traditional face-to-face environment. Examples of complex environments include field training exercises and training requiring use of mock-ups. Again, dL technologies are not suitable for the desired instruction and required leader performance.

3. Is synchronous instructor feedback required during demonstration or practice of the lesson in order to ensure that the student has learned the material? If so, then instruction must again be conducted in a face-to-face environment.

If the answer to all three questions above is *no*, then the material is suitable for instruction via dL technologies. For any given lesson or learning objective it is possible that some of the material may be suitable for delivery through dL while other material requires a face-to-face/classroom environment. While the three questions above discern between dL and face- to-face instruction based on pedagogy, two practical considerations argue against the use dL delivery. First, if subject matter changes often, then it may not be effective to develop the material in a dL format. Secondly, if converting material to dL results in more instructor contact or more support requirements than if the material remained in a face-to-face environment, then it is also not cost effective to

use dL and should only be done when the additional cost can be justified.

Increased Training Efficiency through Fast Tracking

Motivated by a desire to produce graduates to meet ARFORGEN timelines, TRADOC will develop tests for the purpose of creating ability groups. The concept of creating ability groups is often referred to as "fast tracking." Fast tracking allows for staggered completion dates from a course and might permit TRADOC to graduate students from the course at a rate that better meets ARFORGEN cycle requirements. Conceptually these ability groups would be created based on the degree of prior knowledge that the student has in the subject matter, where students with greater prior knowledge would be allowed to move through the course at a faster pace than their peers.

Increasing Training Efficiency through Saturday Instruction

In scheduling an eight hour training day for a 20 week Captains Career Course, it is possible to graduate Soldiers and leaders approximately three weeks earlier just by including Saturday instruction. While TRADOC envisions maximizing the amount of dL delivered on Saturday in order to minimize the amount of time instructors must spend in Saturday training, it will be instructional design considerations that will ultimately determine the content, the medium, and the delivery schedule for the course, including Saturday instruction.

Maintaining Training Effectiveness through GEL

GEL is founded on Cognitive Load Theory, which Clark, Nguyen, and Sweller (2006) consider relevant to all content, all instructional media, and all learners. The goal of instruction based on Cognitive Load Theory is to acquire knowledge and skills more efficiently by not overloading the learner's working memory. The TRADOC staff selected GEL as the strategy for designing and delivering instruction under the ALM. While there are a number of competing instructional philosophies, some that enjoy popular support and some that may even sound like GEL, few are backed by solid independent research to indicate that they are effective. There is a significant body of research, however,

indicating that the five elements of GEL are effective for teaching. To use GEL effectively, all of its elements must be properly used in the correct sequence. What follows is a brief description of those elements of GEL, taken from analyses of research by Richard Clark (2005) and David Merrill (2002).

Job Relevant Tasks

The first element of GEL is to ensure that the subject matter to be taught is relevant to the soldier's/ leader's job in that it presents a realistic and authentic situation or problem that the student can be expected to see in his/her next assignment. TRADOC will ensure this by using a procedure called "Cognitive Task Analysis" (CTA) to capture knowledge and skills of multiple subject matter experts who have been recently performing the tasks under varying conditions. Through the CTA's iterative and focused interview process, experts go beyond identifying what steps to take when performing a task, and are more able to describe how to perform a task and what decisions must be made as conditions of task performance vary. The CTA also captures examples and stories that become the basis for exercises during the instructional design process.

Activation of Prior Knowledge

The second element of instruction designed using GEL is to activate prior knowledge. Understanding what students already know about the subject is important to establishing where to begin instruction. Instructors (or dL products) activate prior knowledge through use of examples, analogies, relevant stories, and probing questions. This helps to correct students' existing schemas, or frames of reference, and to build upon correct schemas.

Demonstration, then Practice

The third and forth elements of instruction designed using the principles of GEL are demonstration and practice. For novice learners the instructor demonstrates all the elements of the task to be learned, i.e., the instructor (or dL product) presents what "right looks like" before students are given the opportunity to practice. For complex subjects the instructor might have to first demonstrate what is required of the students in smaller, digestible chunks or subtasks. The instructor then demonstrates the task again, this time leaving a potion for the students to complete. Based on the students' prior knowledge the instructor may demonstrate the

material several times, each time demonstrating less and leaving more for the students to practice. The more expert the knowledge of the students, the less demonstration they require before attempting to practice the entire task or solve the entire problem.

Provision for Learning Transfer

The final element of the model is known as transfer for adaptive thinking. Transfer, which is the ability of the students to solve problems in novel situations, is the goal of all education. Transfer is greatly aided when the scenarios, conditions, or circumstances are altered during the demonstration and practice phases of GEL instruction. By varying the scenarios, circumstances, or conditions under which students becomes proficient in the subject matter, the students are able to expand their framework for applying what has been learned to new situations or problems. TRADOC is investigating ways to foster what is known as "far transfer" through strategies such as analogical thinking, multiple perspectives, scenario-based instruction, and deep questioning.

LEARNING HOW TO LEARN

CG TRADOC directed his staff to ensure the ALM incorporates strategies that enable students to be more powerful learners. Regarding instruction in study skills, Shunk and Zimmerman (1998) identify a fundamental issue -- whether to integrate learning skills within existing subject matter or whether to design an adjunct course for teaching students learning strategies. Two reasons are often cited for using an adjunct study skills course in colleges. First, instructors have limited time to spend with students, and so the adjunct course would allow teachers to focus exclusively on discipline-specific content rather than on learning how to learn. Secondly, while instructors may be experts at teaching their subject matter, they may lack expertise in teaching learning skills. The major drawback of an adjunct course, however, is the lack of learning transfer that might be realized if study skills were integrated into course subject matter. Shunk and Zimmerman claim the integrated approach seems more likely to foster learning transfer because students have the opportunity to apply study skills immediately and within context.

In agreement with this, academicians from the University of Southern California and the University of Central Florida who attended the Army Research Institute's Science of Learning Workshop (2006) recommended that learning strategies not be presented in an introductory learning-how-to-learn module or adjunct course; rather, schools should integrate proven study skills within existing course content. TRADOC is now identifying learning-how-to-learn strategies for integration into the ALM's pilot courses. For example, TRADOC is examining meta-analyses of research on learning that have shown some of the most effective student achievement strategies to include the following: identifying similarities and differences; summarizing and note taking; reinforcing effort; practice, and nonlinguistic representations (Marzano, Pickering, and Pollock, 2005).

PHASES OF THE NEW ALM FOR PME

The Basic Model

Given the four elements discussed above, the TRADOC developed a three phase approach to delivering PME. Again, the intent of the model is to better support the operational Army in general and the ARFORGEN cycle reset timelines for active duty Brigade Combat Teams by reducing overall course length while preserving learning. Under the ALM, Soldiers can go to their required PME and return to their units sooner than is currently possible without compromising the quality of instruction or a reduction in learning. The model has three phases: (1) individual learning preparation; (2) collective learning synergy, and (3) course completion and learning reinforcement.

Phase I: Individual Learning Preparation

Adult learners tend to have a higher level of motivation when they are offered choice, such as a choice of learning environment. In the case of PME, this translates into having the choice between starting a course at home or home-station instead of at a TRADOC school. Phase I can be thought of as offering students the opportunity to work on dL while at the TRADOC school. Taking some liberty with the idea of dL, the intent for Phase I is that most leaders will report to the TRADOC school and after in-processing, begin taking the course via dL technologies for a period of one to three weeks. By reporting to the TRADOC school, the

Solider/leader is able to achieve a clean break from the operational unit and focus on the important academic requirements of the course. Designed this way, the implementation of Phase I overcomes many of the problems associated with student attrition in "dL courses." Phase I should consist primarily of Common Core course material as well as a period of diagnostic testing. The Common Core material is taken in a dL format and is a graduation requirement rather than a prerequisite to beginning Phase II.
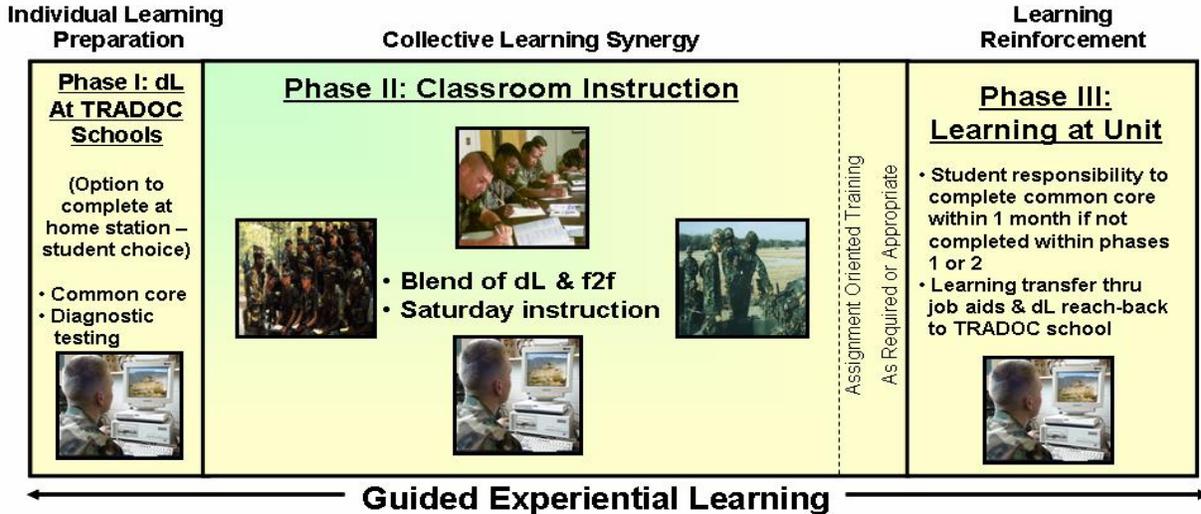

Figure 1. The Army Learning Model for Professional Military Education

Diagnostic testing in Phase I must be completed before beginning Phase II since the purpose of the testing is to assess those students with a higher degree of prior knowledge. Those students with similar level of high prior knowledge would be grouped together so that they could proceed through the course at a faster rate than other groups in the course (known as fast-tracking). Each course director will determine what subjects can be assessed for fast tracking students and how to logically group students who demonstrate high prior knowledge in those subjects.

In circumstances where the student and his chain of command feel that the student will have adequate time to complete the Phase I material at the unit, the student will be given the opportunity to complete Phase I at the home station before reporting to the TRADOC School to begin Phase II of the course.

Phase II: Collective Learning Synergy
Like Phase I, Phase II includes a six-day training week. In Phase II there are planned periods of dL instruction of at least one day per week, as well as periods of dL spread out throughout the training week as appropriate. While much of the dL instruction in Phase I is of an individual learning nature, Phase II dL will incorporate courseware for individual and group learning using computer based collaborative tools which can be synchronous and/or asynchronous. Use of dL during Phase II can be helpful in reducing the number of instructor contact hours in a given week which will otherwise go up with the adoption of a six-day training week. In selecting subject matter to convert to a dL format, instructional designers will use the strategies for identifying dL content described earlier in this paper.

To the extent that ability groups are identified as a result of diagnostic testing in during Phase I, the ability groups move through Phase II at a faster pace. Ultimately, TRADOC envisions the model accommodating several fast tracks and staggered completion dates.

Where appropriate to the specific military specialty, PME courses should train/educate for what is needed for next assignment, a concept called *Assignment Oriented Training*. Phase II of the model also includes the opportunity for

Assignment Oriented Training. When courses focus on what the leader needs to know to do the job he or she is about to enter, TRADOC saves time on instructing unnecessary topics. From an educational design standpoint there is little value in teaching students skills they will not use in the near future. For example, Pike (1994) cites research to suggest that within as little as 30 days the benefits of the instruction will be lost if the knowledge is not applied.

Phase III: Course Completion/Learning Reinforcement
Course Completion
Phase III allows students time to complete any dL content that was not prerequisite for departure from the TRADOC School. Research by Wlodkowski, Mauldin, and Gahn (August, 2001) indicates that adult learners who work full time often find it difficult to persist in a course, and attrition results. In *E-learning and the Science of Instruction*, for example, Clark and Mayer (2003) cite dropout rates estimated at upwards of 35 percent. For this reason, Soldiers/leaders that reach the end of Phase II and have not completed Phase I material will have a time limit of one month after leaving the TRADOC School to complete the dL and be declared a graduate.

Learning Reinforcement
During Phase III the Soldiers/leaders will have access to job aids and instructional material *via* reach back to dL products which the schools produce. Phase III materials allow graduates to access the latest doctrine as well as tactics, techniques and procedures. These dL products provide refresher training for course graduates who, for operational reasons, have not had the opportunity to practice what they where previously taught in the school.

PILOT PROGRAMS

TRADOC will pilot the learning model within two Captain's Career Course beginning in late fiscal year (FY) 07 and continuing into FY 08. One class iteration at the Signal Captains Career Course will be used for the pilot in FY 07 and one iteration of the Field Artillery Captains Career Course will be used in FY 08. Additional pilot sites are being considered for FY 08. An independent evaluator, the TRADOC Analysis Center (TRAC), will assess the effectiveness of the pilot programs and will make recommendation on whether to continue with converting additional courses in late FYs 08 and beyond. If TRAC recommends continuing with more course conversions to the new learning model, then TRAC will also make recommendations on how to improve implementation of the model.

SUMMARY

While the implementation of the ARFOGEN Model is targeted at operating force brigade sized units, the generating force must change the way it does business to better support the entire generating force. As part of the generating force, HQ TRADOC is examining how to best leverage the latest developments in proven instruction technologies and designs to produce well trained, agile and adaptive leaders. Toward that end, TRADOC has developed a new Army Learning Model for PME. The learning model has four principal components: increasing the use of distributed learning, Saturday training, fast tracking, and the use of Guided Experiential Learning as the instructional design and delivery strategy.

This new learning model promises to facilitate the education of Army leaders in less time without a loss in learning so as to better meet the demanding timelines for trained leaders called for by the ARFOGEN cycle and our current operating tempo. Piloting for the Army Learning Model is ongoing at the Signal and Field Artillery Captains Career Courses. Results from the independent evaluator of this pilot course are expected soon and will inform the future conversion of other courses of PME to the new learning model.

REFERENCES

Army Research Institute's Science of Learning Workshop. (1-3 Aug 06). Hampton, VA.

Bloom, B. (1984, June/July). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher*, 4-16.

Clark, R. (1 Mar 05). *Guided experiential learning: Training design and evaluation.* Fort Eustis, VA. Presentation to TRADOC trainers from the Center for Cognitive

Technology, Rossier School of Education, University of Southern California.

Clark, R.C., and Mayer, R.E. (2003). E-*learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. San Francisco: John Wiley & Sons.

Clark, R.C., Nguyen, F., and Sweller. (2006). *Efficiency in learning: Evidence-based guidelines to manage cognitive load*. San Francisco: Pfeiffer.

Clark, R., Bewley, W., and O'Neil, H. (2006). Heuristics for selecting distance or classroom settings for courses. In O'Neil, H., and Perez, R. (Eds.). *Web-based learning: Theory, research, and practice*. (pp. 133-142). Mahwah New Jersey: Lawrence Erlbaum Associates, 133-142.

Corbett, A. (2001). Cognitive computer tutors: Solving the two-sigma problem. In M. Bauer, P. Gmytrasiewicz, and J. Vassileva (Eds.). *User Modeling 2001: Proceedings of the 8th International Conference, UM2001*, pp. 137-146. New York: Springer.

Fletcher, J. (2003). Evidence for Learning from Technology-Assisted Instruction. In H. O'Neil and R. Perez, R. (Eds.) *Technology applications in education: A learning view* (pp. 79-99). Mahwah, NJ: Lawrence Erlbaum Associates.

Marzano, R., Pickering, D., & Pollock, J. (2005). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Upper Saddle River, NJ: Pearson Education.

Merrill, D. (2002). First Principles of Instruction. *Educational Technology Research & Development*, 50 (3), 43- 59.

Pike, R. (1994). (Second edition). *Creative training techniques handbook: Tips, tactics and how-to's for delivering effective training*. Minneapolis: Lakewood Publications.

Shunk, D., and Zimmerman, B. (1998). Self-Regulated Learning: From Teaching to Self-Reflective Practice. In B. Hofer, S. Yu, and P. Pintrich. Teaching college students to be self-regulated learners (57-85). New York: The Guilford Press.

Wlodkowski, R., Mauldin, J. and Gahn, S. (August 2001). *Learning in the Fast Lane: Adult Learners' Persistence and Success in Accelerated College Programs*. The Center for the Study of Accelerated Learning, School for Professional Studies, Regis University, 4 (1).