A Comprehensive Program to Deliver On-The-Job Training (OJT)

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Common among Army personnel is their concern about the quality and consistency of OJT delivery. There are thousands of OJT providers in today's Army, but they receive little guidance about training others. this is a lost opportunity that costs money. OJT providers are already in place, as are trainees. Yet, training is often inefficient, resulting in lengthened learning time. In the private sector, OJT is also a highly leverageable resource. An estimated 60% of all training occurs through OJT yet few businesses train their OJT providers, resulting in millions of dollars of unrealized profits because of poor trainee performance and high turnover. Where train-the-trainer support exists, it is overly proceduralized and doesn't address cognitive aspects of training. This report documents development of (1) a cognitive model of OJT based on an extensive literature review and research with OJT providers in the Army and three varied civilian workplaces; (2) a methodology with high inter-rater reliability for assessing reported OJT provider performance, and (3) train-the-trainer workshops for OJT providers in the Army and the civilian workforce. The report also discusses (4) workshop evaluations; (5) recommendations for institutionalizing training for OJT providers in the Army; (6) successful Phase III commercialization of this project.

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EXECUTIVE SUMMARY

Research Requirement:

There is a need to better understand what constitutes good on-the-job-training (OJT) and how to train OJT providers in those skills. Few theories and models have been published, and there are virtually no train-the-trainer programs for OJT providers that are based on the cognitive as well as the behavioral elements of the OJT provider's job.

In the Army, most of the skill development for junior soldiers comes from OJT. This is the training that occurs outside the classroom, in the field, or in other training situations involving real equipment and personnel. There are thousands of OJT providers in today's Army, but they end up serving that role by virtue of their position, rank, and leadership potential, not their skill as OJT providers. And, they are given little coursework or guidance about how to train others.

Future personnel cuts in Training and Doctrine Command (TRADOC) will have the effect of increasing the number of critical skills which will be trained through OJT. The Army Research Institute anticipated this change by funding Klein Associates to conduct research to understand the skills and knowledge required by OJT providers, and to develop a prototype training program to demonstrate how to upgrade OJT providers' skills.

Additionally, OJT as a training vehicle has a major impact in the private sector. It is estimated that 60% of training in business and industry happens through OJT. Yet little training or guidance is available to the average OJT provider in how to train others, leading to haphazard and often ineffective training of fellow workers. Consequences make their way to the bottom line through factors like high turnover and depressed sales.

Both the Army and the private sector lack adequate OJT delivery systems. The need for OJT research and training development in these two environments links well with the dual-use requirement of this project: that products and design concepts developed through this Phase II SBIR project be useable in both military and private sectors.

Procedure:

Our procedures were aimed at supporting (1) an intensive investigation about OJT and (2) the development of a prototype training program for OJT providers in the Army. We collected large amounts of information about the behavioral and cognitive elements of the OJT providers' job from experienced trainers in the Army and in varied commercial work settings. Most of these data were collected through in-depth interviews; some accrued from abbreviated interviews, and some from participants of our training workshops for OJT providers. We also observed all phases of training in an armor battalion. Another information source was a review and synthesis of the literature about OJT and related topics.

Our data analysis methods were largely qualitative. Their aim was to identify key elements, or functions, of the OJT provider's job and to understand the relationships among these functions so that we could produce a cognitive model of OJT. We also evaluated OJT providers on a variety of measures including their awareness and reported performance of these OJT functions to determine if (a) these functions can be used to reliably code interview data; (b) there are domain differences in OJT providers' levels of awareness and reported performance of these functions. Finally, we identified specific training practices that OJT providers reported using.

Our procedure for developing the prototype training program included the design and execution of pilot programs for OJT providers in a commercial setting and the transfer and redesign of relevant program elements into the prototype program for the Army. Prototype program design also included substantial input from members of the intended user group. User-centered evaluation was conducted on both the pilot and the prototype programs.

Findings:

Findings from the literature review were reported in Zsambok, Crandall, and Militello (1994); we found no comprehensive cognitive model of OJT that is empirically based or that is generally accepted by practitioners or researchers. Nor did any models depict the value added by OJT providers passing on their expertise about how to do the job. This is odd, since the OJT format and setting are poised precisely for taking advantage of this job-related knowledge and skill transfer.

We developed a cognitive model of OJT based in large part on qualitative analyses of our interview data. The model posits a superordinate function of learning management and six subordinate functions of the OJT provider: setting/clarifying goals; providing instruction; assessing trainee proficiency and diagnosing barriers to progress; sharing expertise; setting a climate conducive to learning; promoting ownership of the learning process and performance in the trainee. Coders were able to reliably rate interview data

about OJT providers' awareness and reported performance levels on these functions. We found evidence in three varied work settings for the relevance of these functions to the OJT providers' role. Additional descriptive analyses revealed interesting differences across domains in OJT providers' mean reported ability levels on these functions. Differences were also found in the particular OJT practices that were used in these varied domains.

Findings from our pilot and prototype training workshops are: (1) this format can be used to expand and upgrade experienced OJT providers' knowledge and skills; (2) the model of OJT is useful for designing the content of OJT training; (3) participants find the model's framework useful for understanding their role and for generating useable training plans; (4) participants report continued use of concepts and skills several months after the training.

Our general conclusion both from the literature and from our own research is that in order to improve abilities of OJT providers, training must be based on the cognitive as well as the behavioral elements of the OJT provider's job. Focusing only on the behavioral elements often leads to an overly proceduralized checklist approach which can result in brittle performance of OJT providers and to generating counter-productive results with their trainees. In addition, OJT providers need to understand the cognitive elements of their task. We also concluded that training given to OJT providers should mirror the practices they are being taught to use with their trainees. Examples include using an interactive mode and incorporating OJT cases from participants' experience base.

Utilization of Findings:

These findings are applicable to both military and civilian organizations that depend upon OJT to train their workforce, or that need to add an OJT component to their training structure. Our prototype training program can be used to expand and upgrade the training ability of OJT providers who are acting in that role, but who are not functioning at full potential. Coupled with follow-on skill practice, this is expected to result in more effective and more efficient training. In addition, our interview method and data coding tool can be used by researchers to evaluate the reported performance of OJT providers in a given domain.

In the Army, we recommend that to conserve training resources, OJT training should be incorporated into other training events, and that it should occur in the unit. Using armor as an example, this means Non-Comissioned Officers should teach tank commanders how to improve their OJT skills. Our prototype workshop demonstrates how this training can begin. Platoon Sergeants and Master Gunners could acquire these "train-the-trainer" skills at the Armor Center in the Master Gunner's course or one of the

Advanced NCO courses. These recommendations will require command support to make them a reality.

We have already demonstrated the usefulness of this research in the commercial sector. Even before the completion of the Phase II contract, we began several commercial applications of the OJT workshop approach. The cost effectiveness, and training value, of OJT training is expected to have a direct and significant impact in a variety of domains.

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SECTION 1: INTRODUCTION

Background

If you tell me I will forget
If you show me I will remember
If you involve me I will understand
....ancient Chinese proverb

Such is the promise of on-the-job training (OJT). Both the *setting*—in the task environment, not in a classroom—and the *format*—hands-on, real-time guidance, not indirect instruction—afford ideal circumstances for achieving task proficiency and the understanding that lies behind it. Yet the driver for success, the OJT provider, has been virtually forgotten by the thousands of civilian and military organizations that depend on OJT to train their workforce.

By and large, it is assumed in organizations that if someone knows how to perform a job or task, this person can teach it to someone else. Both common sense and research tell us this is not true. There is a difference in the skill set that is related to performing a job and the skill set that is related to training someone else how to do it and understand it. Yet, rarely are OJT providers given support in how to teach or train someone else. In more advanced organizations, OJT providers may have a manual or checklist of tasks to be taught, but in very few settings are they given even minimal training or practice in *how* to do the training. They are not offered help in skills such as: how to diagnose the reason why a trainee just isn't getting it, how to use a variety of training techniques, how to set reasonable learning goals, how to notice and change a poor learning climate, how to promote a sense of ownership in the trainee, how to pass on one's own expertise, or how to be a manager of someone else's learning.

The Army bases most of its training on formal task analysis, and has extensive documentation of these analyses in their training manuals. But, many of the Army's OJT providers do not know *how* to train, and this remains a serious problem for the Army. One reason for this problem is that OJT providers attain that role by virtue of position, rank, and leadership potential, not by demonstrated teaching or training ability. For example, Tank Commanders (TCs) are expected to train their crew in the other crew stations—stations for which they themselves have achieved proficiency in order to become a TC. Promotion to TC has everything to do with proficiency on the three other tank crew stations and leadership potential, and little to do with teaching ability. A second reason for this problem is that TCs have not attained high enough position or rank to qualify for advanced courses that attempt to teach certain aspects of the training function.

Further, in some cases, TCs aren't even proficient at the jobs they are expected to ensure that others learn. For example, Tank Platoon Leaders serve not only as leaders of the platoon but also as TCs of their own crew. But, as commissioned officers, Platoon Leaders don't progress through all the duty stations in the tank. Therefore, they don't possess the technical skills which others have developed with years of practice. Frequently, they must rely on the gunner in their crew to provide the technical expertise and training. This means the Platoon Leader must know how to recognize whether good OJT is being offered and how to improve it if necessary. Yet, they do not receive training in how to detect or correct poor OJT practices.

The problem, then, is with the point person—the OJT provider. Although the setting and format of OJT afford an excellent training and learning opportunity, and although OJT is ubiquitous within the Army, the point person—the OJT provider—frequently lacks even minimal training in the teaching function. This problem can be expected to have an increasingly large impact in the Army as cuts in Training Doctrine and Command (TRADOC) require that more and more skills be learned on the job. But, even without these cuts, improving the way OJT is provided would result in more effective expenditure of limited training resources. Through this project, we have found ways to begin tackling this problem.

Goals and Objectives for this Phase II Project

There were four major outcomes, or goals for this Phase II project:

- develop training for OJT providers in Armor units
- produce a cognitive model of OJT
- produce dual-use OJT training design concepts and products
- initiate positioning that will lead to follow-on OJT training applications

The ultimate goal was to produce a training program that would help targeted OJT providers in the Armor community improve their OJT skills, and be suitable as a prototype for further development in other branches of the Army or other military services. Another goal was to develop a cognitive model of OJT, in contrast to a procedure-based or task-based model of OJT. The third goal was to meet the dual-use requirement of Phase II SBIR projects by producing design concepts and products that would be applicable within both the military and the civilian sectors. Our final goal was to take steps to increase our probability of securing follow-on (Phase III) work in the private sector.

The outcomes we targeted can be summarized clearly without need for much explanation or elaboration. But, the methods, or objectives, require more discussion, to which we now turn. Our objectives were to:

- review the literature on OJT
- learn how OJT is performed in varied domains
- learn about differences between individual and collective OJT
- learn whether effective OJT skills can be taught and, if so, how.

From the first objective, we had hoped to develop a cognitive model of OJT. Instead, because the literature contains so little information about how real OJT providers operate, our review (Zsambok, Crandall, & Militello, 1994) ended up serving two other functions. One function is as a contribution to the literature. Our review draws together diverse strands of research related to OJT and offers a more comprehensive perspective about OJT than is available elsewhere. Aspects of this review that are relevant to this final report are summarized below. The second function of the review process was to serve as an information source for the research team who were collecting data about OJT providers. For example, the review primed us to search for indicators of adult learning principles in the repertoires of the OJT providers we interviewed and observed.

The remaining three objectives are interrelated and serve all of the project's goals. We wanted to learn about OJT in the Army so that these data could inform our model, provide information about individual and collective OJT, and guide us in developing a training program for targeted OJT providers. We selected Armor, specifically M1A1 tank crews, as a domain representative of OJT in the Army. We obtained support and cooperation of two armor battalions in the Ohio National Guard.

We also wanted to learn about OJT in other domains. We chose three domains in the private sector which involve a range of task complexity and include individual and collective tasks. We expected data from these three "tracks" to broaden our knowledge of good OJT practices, which we could then pass on to the military through our training program. We also expected data from these tracks to inform our model, and to meet the dual-use requirement of this project. Finally, we chose domains in which a partnership could develop which might lead to follow-on work. As we collected information in these tracks, we were focussed on these questions: What does a good OJT provider look like in this domain? What do actual OJT providers do? Are there opportunities for improvement in the way OJT is delivered in this domain? And, in the military track and one of the commercial tracks, we asked: Can you train the skills needed to provide effective OJT, and, if so, how?

Scope of Effort for this Phase II Project

The intended scope of effort of this project is important to specify, since it helps to sharpen an understanding of what to expect in this report.

First, although this report describes a cognitive model of OJT that we developed from interviews with actual OJT providers, it was not the intent of this project to sponsor rigorous

empirical model validation. Rather, our intent was to derive a model that describes what good OJT appears to involve across a variety of domains and types of tasks, and to determine if the model serves as a useful frame for both designers of OJT training and for OJT providers who learn how to apply the model in the training they deliver. Empirical validation of the model is a target for future research.

Second, as stated above, one of our goals was to gather data about the training of collective tasks in OJT settings. By "collective," we mean tasks that involve interdependency among multiple individuals. Collective skills such as coordination of subtasks by tank crew members or hospital team members during an emergency procedure are clearly important. Yet, logistics barriers in our testbeds did not allow us to gather much information about how this type of training occurs during OJT sessions, and the project could not be extended to address that difficulty. We did get glimpses of how collective training occurs in two domains. These few insights and the specific difficulties in gathering these data are reported in subsequent sections about the Army and the Neonatal Intensive Care Unit. These findings do not allow us to draw strong conclusions about OJT for collective tasks.

Third, we adopted a liberal definition of OJT in this project, since imposing a strict definition would have eliminated our ability to conduct research in a combat arms unit. The Army is interested in understanding how training occurs in its units. Strictly speaking, OJT can occur only when soldiers are learning to do their job while on the job—when they are in live, non-simulated situations. Such a strict definition would have precluded our studying how training occurs in combat arms units. The OJT we investigated in the Army involved training in armor units that was provided during field exercises or during simulations by personnel who see themselves as providers of OJT.

In contrast to the type of training we studied in the Army, the OJT we investigated in the civilian sector involved "pure OJT" —training given while on the job. This is the type of training consistent with definitions of OJT found in the literature. OJT is generally defined as training given by someone who is skilled in a job or task to a trainee while the trainee is working on the job. The process by which OJT is delivered can include some off-line practice or testing, but the majority of the training occurs while the worker is on the job.

To summarize the third boundary condition, in this document we report on OJT as it was defined in the context of the domain of study.

Purpose and Organization of this Report

The purpose of this final technical report is to document our activities in this project, to describe its products, and to explain how they can be used in follow-on work. This report is organized into seven sections, including the Introduction. In the next section, we discuss our reasons for developing a new OJT model, we describe our cognitive model of OJT and we

summarize its development. In the three subsequent sections we describe our data collection activities and findings in two of the civilian tracks–the Retail Company Track–the Ohio National Guard Track, and the Health Care Track. A description of how we designed the interview protocol, and how we developed the data coding process is fully documented in the Retail Company Track and is not repeated in descriptions of the following two tracks. The sixth section contains a description of our training program for OJT providers in the Armor community. It also includes a brief description of our work in the third civilian track–a local utility company–which laid the groundwork for training design for the Army. In the final section, we synthesize findings from the tracks by way of comparing and contrasting across the tracks. Then, returning to the goals and objectives of this project, we summarize our advancements in addressing them. Finally, we look to the future by summarizing ways in which the Army might use our products and research findings.

SECTION 2: A COGNITIVE MODEL OF OJT

A New Model of OJT

Based on our literature review of OJT and related lines of research, we came to the conclusion that a new model of OJT was required (Zsambok, Crandall, & Militello, 1994). Some of the OJT models we encountered were very procedural, omitting important cognitive components we had identified in a pilot study. A prototypical procedural model of OJT from the literature includes these steps: Plan your demonstration, gather necessary materials, practice your demonstration, execute the demonstration, allow trainee to try, correct trainee, allow for trainee practice, repeat last four steps until proficiency is achieved. Models like this do not address the cognitive aspects of providing OJT, such as diagnosing barriers to trainee learning, flexibly tuning an instructional technique to meet a trainee's needs, or managing the learning process from a "big picture" perspective.

Other models contain cognitive aspects of tutoring, as in the cognitive apprenticeship literature (Brown & Campione, 1986; Brown & Palinscar, 1982; Collins, Brown, & Newman, 1989; Farmer, Buckmaster, & LeGrand, 1992; Hamilton, 1989; Hamilton & Hamilton, 1992; and Palinscar & Brown, 1984). But these models have been derived from studies of tutoring involving mostly declarative knowledge transfer and the teaching of reading comprehension skills. In OJT, the target of learning is usually declarative knowledge plus procedural knowledge and skill proficiency on job-related tasks. Ultimately, we discovered that the cognitive apprenticeship literature is very compatible with the model we developed, but its models are not precisely suited to depict OJT provider functions.

Classroom training models did not seem to be likely candidates since they were developed for a very different format and setting. There are many distinctions that can be made between the format and setting of the classroom versus OJT, but it lies beyond the scope of this project to provide a comprehensive comparison. However, a few examples will clarify our reasoning about the need to develop an OJT model, rather than adapting classroom models.

First, transfer of training becomes a significant element in classroom models, since the lesson content is less directly applicable to its ultimate functional use than is lesson content in OJT. Second, motivating the learner becomes more important in the classroom, since often it is not readily apparent why information must be mastered or why a procedure must done a particular way. In contrast, if learning on the job, consequences of poor procedure or lack of knowledge are usually apparent, providing motivation to learn. Third, classroom models assume that learners have attained mastery of relevant prerequisites to the material being taught. In reality, students may lack this mastery, but it lies outside the purview of the classroom instructor to bring students up to speed, so classroom models do not reflect elements related to this requirement. In OJT, if the learner lacks relevant skills and abilities,

the OJT provider is usually expected to fill the gap since the learner must be trained to do the job at hand. The function of setting and clarifying goals, based on assessment of the learner, takes on a whole new meaning in OJT compared to the classroom. As a final example, classroom models address the situation of teaching many trainees at the same time, while OJT is expected to be delivered one-on-one or one-on-few. Further, OJT is often delivered by a person who is either the trainee's supervisor or future co-worker. Thus, models of OJT need to reflect the larger impact of interpersonal elements of training than what classroom models must address.

A Description of the Model

Figure 2.1 depicts the cognitive model of OJT that we developed through research conducted in this project. This model was developed through an iterative process. The particular representation depicted here emerged towards the end of the project. It resulted from extensive discussions among the research team about the meaning to be made of a variety of information sources.
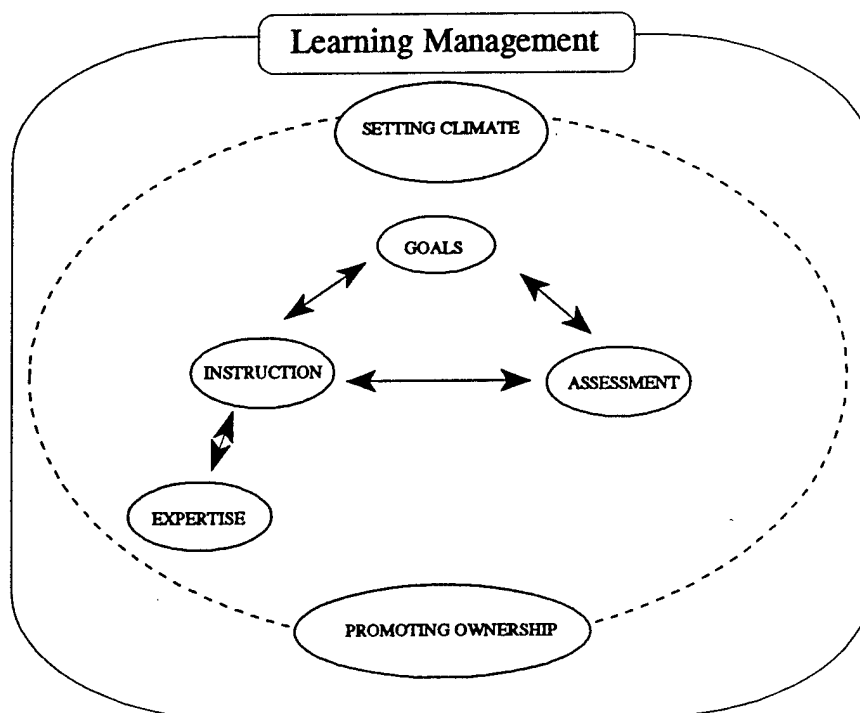
Figure 2.1 A Cognitive Model of OJT.

Our sources of information include the findings, ideas, and preliminary model of OJT from our Phase I study of tutoring in two domains, and our Phase II sources. Phase II sources included our qualitative analyses of in-depth interviews with OJT providers in three varied domains, our abbreviated interviews with OJT providers in a fourth domain, observations of OJT providers from three different job settings who participated in three different OJT training programs, observations of OJT providers in the field, and insights we gained from conducting a review of the literature. We describe these information sources in more detail in the discussion concerning the development of the model.

This model depicts the functions that represent what we found good OJT providers do when they engage in training others to perform a job or task. The super-ordinate function is learning management. This function concerns the extent to which the OJT provider is pro-active in managing someone else's learning process, as opposed to mindlessly following a set of procedures. This managing requires maintaining a "Big Picture" by standing outside of the training process and reflecting on how activities fit together and impact the trainee. As such, Learning Management is a function that is more than the "sum" of the other six functions of an OJT provider.

Following are brief definitions of the other six functions in the model. More complete descriptions follow in subsequent sections, and these functions "come to life" in Sections 3 to 5 where we describe what actual OJT providers do.

Assessment—conducting initial and ongoing evaluation of the trainee's performance level and diagnosing barriers to expected progress so that instructional method and content can be fitted to the current and future training goals.

Instruction—tailoring one's teaching and coaching practices to meet individual needs (based on the assessment) and training goals. This involves flexibility in adjusting or switching training techniques that aren't working, and it assumes a repertoire of available training techniques from which to choose.

Expertise—teaching more than what is available in a training manual or that is involved in basic procedures by passing on experienced-based know-how and judgments, such as detecting anomalies, recognizing opportunities, anticipating and preventing problems, compensating for errors.

Goals—setting and clarifying realistic learning and performance goals that are based on assessment of progress and organizational timelines and requirements. Making explicit to the trainee the overall training goals and the plan for attaining them, and regularly making clear the link between current training activities and overall goals.

Climate—creating, maintaining, and adjusting a climate that is conducive to learning. A conducive learning environment is open, supportive, and non-threatening, and it invites honest disclosure from both trainer and trainee.

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Ownership—promoting a sense of ownership in the trainee by offering opportunities for the trainee to take responsibility for his or her learning and skill attainment. This can include mutual goalsetting, and a collaborative approach to assessment and tailoring of instructional techniques.

The relationships among the seven functions that are depicted in this model are based on qualitative analysis of our data. Across four varied domains and six researchers who interviewed and/or observed OJT providers, these relationships tell the story of what we found: The functions of assessment, instruction, and goal setting are tightly interrelated. Injecting expertise into the content of what is being taught is related to the function of instruction. These four functions form the core of the content-saturated functions of OJT. That is, they relate most directly to the specific content of the job that is being taught.

The functions of promoting ownership and climate setting are less content-saturated than the other four, although they do involve job-related content. But, these two functions relate more directly to the atmosphere, or tone that accompanies the process of providing OJT. Finally, the function of learning management is a super-ordinate function. That is, an OJT provider's general ability level on each of the other six functions is necessary but not sufficient to describe learning management ability. This is the big-picture function, and one that requires a proactive approach to helping someone learn.

Characteristics of the Model

There are four characteristics that describe what this model is, and what it is not. Below is a discussion of these characteristics:

- a descriptive model
- a cognitive model
- a holistic model
- a useable model

A Descriptive Model

We have developed a descriptive model of OJT. It is descriptive in that its elements (i.e., OJT provider functions) represent what we found actual OJT providers know about, think about, and attempt to do when training someone on the job. (Of course, OJT providers differ in their general knowledge and abilities related to each of the functions.) Further, its elements are consistent with adult learning and teaching principles found in the literature. For example, setting a climate conducive to learning and promoting ownership are two of six frequently cited adult learning principles (Knowles, 1987). Likewise, the inclusion of a function for sharing expertise, while absent from other OJT models, is consistent with our own research on expertise.

A Cognitive Model

One of the goals of this project was to develop a cognitive model of OJT, as opposed to a task model of OJT. The distinction is analogous to the one made in the task analysis literature between Cognitive Task Analysis and Behavioral Task Analysis. Traditionally, jobs have been studied using Behavioral Task Analysis in which the job is decomposed into observable, specific behaviors. The behaviors can then be listed as a set of procedures. Presumably, one could complete the task by simply following this list. Cognitive Task Analysis goes one step further, emphasizing the cognitive elements of the task—the elements that require thought, reflection, judgment, etc. while performing the tasks.

In many cases, the complete task cannot be fully specified by, or reduced to a list of behaviors or procedures (Howell, 1993; Means, 1993; Means & Gott, 1988; Means & Roth, 1988; Redding, 1990; and Roth, Woods, & Popple, 1992). These are the aspects of task performance that require some degree of judgment or expertise on the part of the human. Cognitive Task Analysis attempts to document these cognitive aspects that relate to task behaviors so that the cognitive aspects can be considered explicitly when designing an application.

Similarly, our cognitive model of OJT depicts functions associated with not just the behaviors required to be a good OJT provider, but also the cognitive elements that are necessary to train others (Means, 1993; Means & Gott, 1988; Means & Roth, 1988; and Redding, 1990). Our literature review and in-depth interviews with 33 experienced OJT providers in three different work domains and abbreviated interviews with seven OJT providers in a fourth domain were the sources of information about these elements. It is clear from our interviews that good OJT providers are not simply following a list of procedures. They are thinking about what they are doing and managing the learning process.

For example, as depicted in Figure 2.1, one element in our model is *instruction*. This element, or function, subsumes behaviors such as demonstrating a procedure, telling why something should be done a certain way, or giving hints as the trainee tries to learn something new. Listing these behaviors is not enough, however, to give a complete picture of good instruction. The definition of the model's function of instruction goes beyond simply naming or describing these procedures, and includes the requirement of flexibility—knowing how and when to use different instructional techniques. So, for example, if an OJT provider were to use the hint-giving strategy indiscriminately, the learner might interpret this as badgering or lack of confidence, or the learner may begin to rely on the hints too much and not engage in independent thinking or problem solving. The OJT provider must choose an appropriate instructional technique for a specific learner in a specific situation. The OJT provider must also monitor his/her own delivery of the technique as well as the learner's reaction to the technique. It is these cognitive elements that fill out the picture of good OJT.

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A Holistic Model

Although our model depicts seven functions of the OJT provider, the purpose of representing these as individual functions is not to impose an artificial decomposition on what we actually believe to be an integrated process (i.e., the process of providing OJT). Rather, it is an attempt to make accessible for study and discussion the array of cognitions (e.g., reflections, plans, judgments) and purposeful behaviors (e.g., telling, showing, using humor, being patient) that compose OJT providers' knowledge and skills as they engage in training someone.

Once having distinguished these functions, the temptation is to list particular behaviors, or OJT practices, that serve a particular function. But what we found when we interviewed OJT providers, which was corroborated in our literature review about tutoring and coaching, is that any one OJT practice can and often does serve multiple purposes. For example, asking open-ended questions can serve all of the functions of the model; we will demonstrate by discussing its effects on five of them.

Open-ended questions such as: "If we had an equipment casualty, how would you ensure that the main gun gets bore-sighted?" or "Why do you think it is important to follow these steps in the procedure?" can be used to *assess* the learners' level of knowledge and clarity about the topic. What gets discovered will influence the way the OJT provider sets or clarifies the training *goals*. For example, a gunner might have passed tests about how to do a bore-sighting, because he has the procedures down cold, but he may not be able to apply them in a difficult situation.

The practice of asking open-ended questions can also serve an *instructional* function in that it invites trainees to think about and construct their own understanding, which results in more elaborated and more useable knowledge than what results from answering closed questions with right/wrong answers. Additionally, this practice can be used deliberately to influence the learning *climate* by demonstrating an open, supportive stance towards trainees— one in which they realize they won't be embarrassed and where their developing understanding will be valued and augmented. This practice can also be used to promote a sense of *ownership* in trainees regarding the training process and their attempts to reach proficiency. By being asked to put things in their own words, trainees are invited to own what they are learning, and they are therefore more motivated to learn.

Of course, the reverse can occur: Asking open-ended questions before a trainee has enough knowledge or experience to be able to formulate a reasonable answer, or asking them in a threatening way, or phrasing questions too vaguely for the trainee to know what you're really after, will lead to negative impacts within the OJT functions.

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So, as an OJT provider who's learning how to be a better trainer, what's important is not that he or she dutifully asks a number of open-ended questions (because it's on a list of trainer "to-dos"), but rather that he or she's motivated to engage in the full range of functions that constitute good OJT. This means he or she's watching for the effects of any one OJT practice on all the functions. That he or she begins to see how attempts to assess or instruct affect the learning climate and the trainee's sense of ownership; how attempts to impact climate or ownership also relate to assessment and instruction; how goal-setting is affected by assessment and vice verse, etc. In short, how actions taken in service of any one function affect the others and the total training process.

A Useable Model

Another characteristic of this model is that we intentionally created a user-friendly representation of our findings. We wanted the model to be useable as a framework for helping OJT providers improve their knowledge and skills as trainers. Our goal was to produce an intuitively appealing model that captures the critical functions of providing OJT. As we wrote in our literature review (Zsambok, Crandall, & Militello, 1994), "Our judgment is that there is an 'art' of OJT provision. The art lies in the OJT provider's mastery of a flexible approach to interacting with and instructing the trainee. The trick is to offer a structure for OJT providers to follow that allows the art, instead of obliterating it" (p. 52).

Therefore, the level at which we depicted OJT functions is not so high that it fails to clarify beyond the obvious (where "everything is everything"), nor is it so low that it becomes a list of "to-dos" that produces "brittle performance" in OJT providers (Wehrenberg, 1987) or that is too cumbersome for them to remember and use.

Development of The Model

Now that the model has been described, we will summarize the emergent process from which it was derived. A detailed description of the model's development lies beyond the scope of this report, but we will describe the information sources we used and we will briefly explain how these information sources were incorporated into our model development process.

We developed this model through an iterative process. In our Phase I pilot study, we began to see evidence of cognitive elements involved in providing OJT (Crandall, Kyne, Militello, & Klein, 1991). This study was based on preliminary research with OJT providers in two domains and on a brief literature review. These OJT providers were either music tutors or nurse-preceptors in a hospital's telemetry unit. This study highlighted the critical interrelation between the functions of assessment and instruction during OJT which primed us to include questions about both the cognitive and the behavioral aspects of these functions in our continued research with OJT providers. For example, we probed our interviewees not only about specific instructional techniques they used in particular instances, but also about how and why they chose them. Often, this led to descriptions of assessment techniques and

disclosures about their awareness of the importance of assessment in tailoring instruction and adjusting goals.

A second information source was a more thorough review of literatures on OJT, tutoring, coaching, cognitive apprenticeships, mentoring, adult learning, and the like, which we conducted in the Phase II effort (Zsambok, Crandall, & Militello, 1994). This review led us to the conclusion that the quality of the interaction between trainer and trainee would be important to maintaining an effective learning climate, and that this function is not made explicit in extant models of OJT. Likewise, the adult learning literature includes the prescription of promoting a sense of ownership by the trainee in the learning and training process, but this function also is not explicit in extant OJT models. Additionally, consistent with all the literature we reviewed is the importance of the learner's knowledge of ultimate goals of the training, and of the need for the trainer (or the trainer/trainee dyad) to generate both long-range and short-range goals that are consistent with trainee progress.

A third source of information came from pilot interviews, which were conducted in tandem with our literature review. We conducted pilot interviews in three domains for the purpose of discovering what OJT providers actually think about and do. This information supported our views about the necessity of including in a description of the cognitive elements of OJT these five functions: assessment, instruction, goal setting, climate setting, and promoting ownership.

A fourth source of information about OJT came from our early pilot training programs with OJT providers in a utility company. A variety of workshop activities provided support for the view that these five functions are required in order to capture the nature of what these OJT providers do and think about when training others. Furthermore, this workshop provided an opportunity for us to explore the role of the OJT provider in passing along his or her own domain expertise. Our background in the study of expertise led us to suspect that sharing expertise—teaching trainees shortcuts or tricks-of-the-trade that are borne from experience and not from procedure manuals—would play an important role in OJT. Findings from the workshop convinced us that sharing expertise should be added as a sixth function.

We added the function of learning management to our model of OJT as a result of synthesizing our findings from the Phase II literature review with pilot interview data and information from participants at our pilot workshops. It became obvious to us that it is possible to distinguish between the least mindful OJT providers and the most mindful ones. On the low end are trainers who merely follow a manual that tells them when to teach which sub-task or trainers who repeatedly demonstrate how to do tasks and expect the trainee to eventually "get it." On the high end are those who actively figure out what to do to help someone learn—who manage someone else's learning process. And, we believed this management function was more than the "sum" of knowledge and performance on the other six functions. We began to see from our interviews and from participants of our pilot

workshops that learning management requires a "big picture" view—standing outside the training process, sensing how activities fit together and impact the trainee, reflecting on progress across the six functions, generating or adjusting overall plans accordingly, and creating or seizing learning opportunities whenever possible.

We generated preliminary definitions for the OJT provider's functions, which were meant to guide us in designing an interview plan that would allow us to fully explore cognitive elements of the OJT providers' job. These definitions were refined as the project progressed, but their basic meaning remained unchanged throughout the data collection and data coding period. These definitions were listed at the beginning of this section.

Data gathering occurred at different times for each of the tracks. Our process was to meet early in the data gathering effort of each track and determine whether we were getting at the cognitive elements of our interviewees' OJT jobs with the in-depth interview methodology we had designed. We also challenged ourselves to look for evidence of additional OJT provider functions. What we found through these discussions was that OJT providers appeared to be engaging in similar practices across tracks, but that they emphasized certain functions more in one track then another. We also discovered that OJT providers were better equipped to act as trainers in certain domains compared to others. What we did not find in these discussions was evidence of practices related to other OJT functions.

We again questioned the face validity of these functions as we designed our data coding process. The basic issue was whether we felt we could account for what we had heard and seen by coding OJT providers on their reported ability level for each function. From what we had learned during the interviews, we felt it was important to distinguish between an OJT provider's awareness of a function versus his or her reported skills in performing it. We designed a pilot coding scheme and independently coded a few interviews to see if agreement levels across coders warranted further data analysis of this kind. Initial agreement levels were high, so we continued with this process. As we will report in subsequent sections about each track, statistical tests of reliability revealed high correspondence across coders.

The cognitive model that is presented in this report, then, is a descriptive model. It attempts to portray the holistic nature of the OJT providers' job. The model is based on what we learned in this project. Rigorous empirical validation lies beyond the scope of this project and remains an interesting project for future research. The strength of the model is that it has proven very useful in:

- designing interviews that get at the core of the cognitive elements of OJT providers' jobs
- designing reliable coding processes for interview data
- providing a framework for OJT providers to understand their role and functions

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- designing skill-building activities that help OJT providers improve their training performance
- designing methods to prepare OJT providers to train others in their OJT delivery.

We also think the model makes a contribution to the literature on OJT. As discussed in our literature review (Zsambok, et al., 1994), we were unable to find a cognitive model that specifies a full range of OJT provider functions, as this one does.

SECTION 3: OJT IN A FRANCHISE RETAIL ENVIRONMENT

Goals

The goals for our investigation of OJT in a franchise retail environment were:

1. To understand how OJT is conducted by experienced people in a non-military domain so that:

   a. comparisons to OJT in the Army could be made,
   b. development of prototype OJT training programs for the Army could take advantage of OJT practices identified elsewhere, and
   c. our model of OJT could be tested for generalizability in a non-military domain.

2. To satisfy the dual-use requirement of the SBIR program by positioning ourselves in a large market (the retail franchise market) with high potential for commercial applications of the OJT products developed through this project.

Snapshot of OJT in this Setting

The Tasks

OJT in this environment is delivered mostly while newly hired workers are actually doing their jobs. Some orientation (e.g., viewing videotapes) and practice (e.g., role playing) occurs off-line, as will be described below. But, in this domain, OJT meets the standard definition provided in the literature; namely training while on the job.

We studied how OJT is delivered to new employees below the owner or manager level in a small-store retail environment in the photographic industry, hereafter, the "retail company."[1] The tasks these employees are trained to perform are typically considered to fall into either two or three categories. Printing from developed film is one of the categories. Counter skills and customer service is another category. This includes a host of tasks such as taking orders, film processing, promotional and ancillary merchandise sales, using the cash register, and general customer service. Some OJT providers also include quality checking skills (determining if each order of prints meets quality standards) in this category; others treat it as a separate category, or "position" in their store team, and train for it accordingly.

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[1] This company wishes to remain anonymous. We gratefully acknowledge their willingness to participate in this research project by donating their time for lengthy interviews, by offering logistics and administrative support, and by participating in meetings to discuss the outcome of the research.

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The complexity and dynamism of tasks to be trained varies from simple (e.g., following procedures for order taking and film developing) to moderately complex and dynamic (e.g., making color-balancing decisions during printing or quality checking; using judgment about how far to go to satisfy a difficult customer). Among the skills associated with the more complex tasks are perceptual skills required to detect and correct subtle hue, density and brightness inconsistencies both within a print (e.g., flesh tones on a snowy background) and across prints in the same order (e.g., amount of cyan they need to add when printing indoor versus outdoor and day versus night shots so that individual prints are true to color, yet "coolness" versus "warmth" of the overall order appears consistent).

Other moderately complex and dynamic skills are interpersonal. Virtually every OJT provider reported that it is extremely difficult for most people to learn how to sell products when customers do not explicitly ask for them. Initially, salespeople feel they are pestering customers when they suggest special products and services. It takes months to teach new staff how to genuinely offer this information in a helpful, confident manner. Elements of this skill include direct eye contact; confident, smooth and fast delivery of key points; "reading" customer body language; judging when to stop talking and when to continue. Likewise, handling customer complaints by figuring out ways to solve their problem rather than defending standard procedure or policy is another moderately complex interpersonal skill that OJT providers in this domain must train.

The OJT Providers

In this domain, the OJT provider is nearly always the supervisor of the trainee, and generally serves in a managerial role in the retail store. In company-owned stores, OJT is provided primarily by store managers; sometimes a part of the OJT is provided by a district manager. In franchisee-owned stores, OJT is provided either by the owner, a store manager, or the combination of both. Occasionally, a regional manager provides a portion of the OJT in franchisee-owned stores. Our generalizations about OJT in this domain are based on interviews with all of these types of OJT providers.

The Training

Timing

Basic training for customer service and counter skills is generally expected to take from 30 to 40 hours. Quality checking typically is taught in the first week of training also, along with customer service and counter skills. If so, this lengthens the total training time to at least 40 hours. Some new employees are expected to learn only these two skill sets (i.e., customer service/counter and quality checking); others are hired to be only printers; still others will be expected to learn all positions. Learning basic printing at acceptable levels of quality, speed, and paper waste (for "re-dos") takes several weeks. But learning to print quickly and accurately during high-volume times takes months of experience. In general, OJT providers

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consider initial training to be "done" when trainees can be left in the store in the manager's absence, with the normal number of other employees, and be expected to function relatively independently in their position. By "relatively independently," they mean a variety of things. In general, this includes having confidence that the new employees can be trusted not to make certain irreversible mistakes (e.g., developing film in the wrong chemicals), and that they can deal with customers comfortably and appropriately. It also means they have a low error rate on normal procedures, and that they don't need to ask for assistance so often that other employees can't get their jobs done in the expected time.

We should add to our above generalizations about the timing of training that virtually all OJT providers were reluctant to state how long training takes until they consider someone "done." They see training as an on-going activity: "There are always new situations to learn from;" "You can always increase your sales levels with customers and I try to help them with that all the time;" "I can always use general store management help, so I'm always teaching someone a part of my job." Because we needed to bound our research efforts, we concentrated on understanding the way basic training is offered at the beginning of a new employee's hiring.

Materials

Materials for trainees are available from the corporation in the form of videos, employee manuals, job aids, and proficiency tests. A manual for the OJT provider is also available. It describes how to introduce these materials to trainees, estimates the amount of time it should take to teach basic skills, offers suggestions on how to teach the skills, and describes how and when to administer the tests. OJT providers vary widely in their use of these materials. Some use only the videos, others make use of a few of the materials, while a few OJT providers use all of these materials.

The company developed the trainee materials as basic building-blocks for OJT; they expect OJT providers to augment them with a great deal of personalized, interactive, hands-on activity. The OJT provider manual offers general guidelines about how to accomplish the training and a few step-by-step examples; it is not expected to actually train the OJT providers in broad OJT functions and skills. The corporation is aware that offering training to OJT providers is the next step they must take in order to improve the quality of OJT delivery throughout their system.

Speed/quality Trade-off

In this domain, it is important to get new hires up to speed as quickly as possible. In some stores, new hires count against productive labor hours from day one, even though they are a second person on the payroll for the position they are learning from the OJT provider. Therefore, they temporarily lower store profit. In other stores, a new hire's labor hours are

exempted from productivity statistics for two to five days, but after that time they are counted in the labor pool. Therefore, their initial training cost is borne by overhead, which also lowers profits. With either accounting practice, because many stores hire new people on a monthly basis, if trainees can't quickly become independent on a sizeable subset of their tasks, the additional labor hours for backup employees creates an untenable financial burden by cutting into their profitability. Additionally, if the trainees can't pick up excellent sales techniques quickly, they will dilute storewide sales and profits.

On the other hand, because this is a "high-end" retailer, there is an emphasis on customer service, and on product quality as essential to profitability. The loss of disgruntled customers in businesses like this has been estimated to cost thousands of dollars annually per store, in terms of unrealized sales both to lost customers and to "new" customers who never materialize due to word-of-mouth from the disgruntled customers. Therefore, the drive to hasten the training process is tempered by the drive to produce associates who are capable of offering a very high level of customer service and product quality.

These two drives play out with differing amounts of emphasis in different OJT providers. Some feel they must hurry the trainee along and hope for the best; others emphatically refuse to teach new skills unless trainees are comfortable with current ones.

The Trainer/Trainee Relationship

The relationship of OJT provider to trainee in this domain is inherently one of supervisor (or owner) to subordinate. OJT providers vary in their sensitivity to trainees' potential tenseness or anxiousness during learning as a result of this relationship. They also vary in their skills at alleviating anxiety (as a part of the general function of setting a good climate).

Typically, OJT is offered one-on-one by the OJT provider to a single trainee. However, some OJT providers make liberal use of other store employees in the training process. Once they have established with trainees the basics of how to perform particular tasks, they will encourage trainees to watch other employees, ask them questions, and learn from them as well. In general, these are the OJT providers who value a store team approach, and they see the training period as an opportunity to initiate the trainee into the store team culture and to reinforce the team approach in existing employees.

Summary of Findings

OJT is the means by which newly hired non-managerial employees receive training in this company's retail stores. It is understood by the corporation that this is the training vehicle. Yet, the person who provides OJT (primarily, store owners or store managers) does not receive any training from the company about how to train others. The company does provide basic aids for OJT providers such as videos and training manuals, but these are not designed to

train the full range of OJT provider functions. Given this situation, it is not surprising that our study revealed inconsistent OJT performance in this company. It also revealed that our model of OJT is applicable in this domain and that it serves as a very effective organizing framework for studying how OJT is delivered and for evaluating the results of the study.

More specific summary findings are as follows. First, although by design we interviewed OJT providers whom the company thought were among their best, we were able to discriminate among them and identify individuals who have high, medium, and low global OJT reported ability relative to each other. This means there is an opportunity to improve OJT delivery in this company in virtually all of their OJT providers, even among the "cream of the crop."

A second finding concerns consistency within the high, medium, and low categories of OJT providers. It appears that the low group is less consistent in their awareness and reported performance of OJT functions and of other OJT skills we measured than is the medium or high group. Third, the low and medium groups appear somewhat more aware of the functions than they are able to perform them. The meaning we derived from these findings is that the better the OJT provider, the more he or she develops a consolidated picture of the variety of functions and skills that constitute high quality OJT, and the more able he or she is to perform all of them at commensurate levels.

Finally, concerning OJT strategy use, we found that across all these OJT providers, there is a large number of techniques they can describe when asked how they perform OJT. But, the number of strategies mentioned by any one OJT provider varies considerably; there is evidence that many should increase their repertoires. And, most OJT providers do not mention using the more difficult or advanced strategies. On the positive side, a majority of OJT providers use not only one-way communication (e.g., telling), but also interactive communication, and they frequently use strategies designed to set a comfortable learning climate.

Research Method

Participants

Participants were 16 store owners, store managers, or district managers with experience as OJT providers in this company. We requested that the company arrange interviews with highly experienced people because we wanted to understand the breadth of OJT practices within a given domain. The company was able to arrange 13 interviews with people who had three or more years of OJT experience at the firm. The other three interviewees had from .75 years to 1 year experience. Participants' average OJT experience within this company was 4.9 years, with a range of .75 years to 9 years.

Interviews

Each interview lasted about two hours. Two interviewers were present at all but the first interview (where three interviewers were present) and the final three interviews (which were conducted by a single interviewer). Interviewers took comprehensive notes during the interview. All interviews were taperecorded for later reference in case the notes proved unclear or incomplete.

Interviews consisted of three main parts: 1) questions about the interviewee's history as an OJT provider prior to and with this firm; 2) a case account of a recent and typical OJT experience; and 3) 15 open-ended questions designed to reveal additional information about OJT providers' knowledge and skills that may not have been applicable in the case they described, but which played a part in their general approach to providing OJT. See Appendix A for the interview protocol.

For part two of the interview, we followed procedures for a Critical Decision method (CDM) interview. The CDM is a semi-structured interview technique derived from Flanagan's (1954) critical incident technique. Klein (1993) provides a description of the CDM technique. Briefly, we asked the OJT provider to describe what happened from beginning to end of a recent training case. Then, the interviewers went back over the account, using a timeline they had constructed during the initial case description, to clarify and probe for elaboration on points of interest. We were primed to seek elaboration on specifics like: how they knew to train particular tasks in particular ways or at particular times; the details of instructional methods they used; what they were noticing in the trainee during their interaction with them; how they noticed and resolved interpersonal or motivational difficulties with trainees, etc. We also wanted to uncover as many OJT practices as possible that the OJT provider used so that we could test the comprehensiveness of the model.

Data Coding

The descriptions that follow relate not only to the retail track, but also the other two tracks.

The Coding Form

We developed the coding form after all interviews were complete and after a summary had been written about the interviews and had been read by each coder. First, because our initial ideas about a seven-function model of OJT had guided our data collection, we generated one question for each of the seven functions in the OJT model, which would allow us to rate OJT providers for awareness as well as reported performance level on each function. Here, we used a 4-point scale ranging from "completely lacking" to "high" on their awareness of each of the functions. Similarly, we used a 4-point scale ranging from "absent" to "high" on their reported performance of each of the functions.

Next, because we wanted to give ourselves the opportunity to track any other meaningful constructs that could be used to discriminate among our interviewees, each interviewer independently sorted the OJT providers into reported ability categories of high, medium, and low, based on our global impressions of them. We described our reasons for placing them in these categories. Any of these reasons that were not explicitly contained in the definitions of the seven OJT functions, or that were sub-parts of functions which we wanted to code individually, became the source of additional questions on the coding form. Some concerned factors of interest only to the retail company (e.g., emphasis placed on training the *company* way); others concerned behaviors or OJT provider attributes related to the seven functions in the model. Examples are: the size of their repertoire of OJT skills ("none" to "extensive") and their flexibility in using it ("none" to "high"); the regularity with which they check on the trainee and take the trainee's point of view ("never" to "always").

In addition, we were interested in tracking our overall impressions, such as the general store climate ("poor" to "superb"), attention to merging the trainee into the store culture ("no mention" to "strong emphasis"), and the quality of OJT that we believe the OJT provider thinks he/she is providing ("poor" to "superb"). Finally, we included on the coding form a list of 57 specific practices that an initial review of most of the interview notes revealed as being mentioned at least once. Examples are: "be accessible but not on top of," "ask how it's going," "offer hints," "pose open-ended questions." Our purpose was to track the number of OJT providers who mentioned using each of these practices. See the results sub-section, Table 3-4 for a listing of these practices.

See Appendix A for the coding form.

Reliability

Prior to coding the interview data, we independently sorted OJT providers into categories of high, medium, and low overall "ability" levels, based on a very global impression we had formed of them. This impression had been formed by each of us from all the things the OJT providers had said in their interview, in the context of all we knew from interviewing many other OJT providers in this and other domains. As discussed above, this sorting was done primarily to determine whether there were additional questions to be added to the coding form that would be useful in discriminating among the OJT providers. However, since we discovered that we were able to come to consensus about their placement with only minimal discussion, we realized there was a second use of this sorting process: we could determine the relationship of ratings on individual questions to the overall rating.

Before we could become reliable coders, we needed to calibrate ourselves. All three interviewers had participated in the first interview, so we all independently coded that interview and then discussed the reasons for our ratings. Subsequently, to avoid drift away from standard, each pair of interviewers independently coded no more than two interviews

before they discussed their ratings and came to consensus on a single data point for each question on which they differed. Coders rated only interviews for which they had been present. They used their interview notes and the audiotapes where necessary.

After all the OJT providers' interviews had been subjected to this rating process, reliability analyses were conducted on the original ratings from each pair of coders. For the dichotomous variables ($N= 23$ items), agreement was 89%. For the nominal scale variables ($N= 27$ items), the average Pearson Product Moment Correlation value was .71. Both of these indices of reliability are in the acceptable to good range. Therefore, we concluded that all three interviewers were using the coding forms reliably. Given these high reliability values, we were not concerned that only one interviewer could be present for the final three interviews and that subsequently only one person would code these interviews.

Results

Descriptive Results

One way to describe OJT in this domain is through the perspective gained from empirical analyses of OJT providers' skills and strategy use, which follows in the next sub-section. That section may take on more meaning if the reader first gets a "feel" for what *good* OJT providers actually look like in this domain, or how they think about what they're doing. We have produced the following narrative of quotes from our interviewers which is intended to draw this picture. It is written in first person from the perspective of the OJT provider, and it is interspersed with counter-examples to draw the contrast of what poor OJT practices look like. (We should note that these poor practices, while real, are not the norm in this domain.) The narrative is a composite of quotes and paraphrases from several different OJT providers, and therefore portrays a fictional, yet representative, provider of good OJT in this domain.

> *"My philosophy is that this is a fun job, where we can have a good time working together. Our product is one that inherently makes customers happy. We really do put out excellent quality on our products and we're several notches above other retailers in knowing how to treat customers—this is something we can all take pride in. Sure, we get overloaded at times and things don't always go well. But people should get satisfaction out of working here, and they should walk away with some life skills they didn't have when they came. We all respect each other here—staff to staff and staff to customers. This is what I try to get across the very first morning when new employees begin their training."*

[Contrast: "These people don't get paid much, and it's not fair to expect much from them. It's hard to find people who are going to care. They're just using this as a stepping stone to another job. We made a rule that one of the owners has to be in the store at all times." This OJT provider mentioned he has trouble with high turnover, with training, and with employees who don't show much initiative.]

"So, it's important to start with the philosophy—what our business is all about, how we treat customers, how we work together. And to give them a big picture of their job, to show them how what they do affects the job others do, and to show them what they'll be learning during training. But, when I show them what they'll be learning, I'm careful not to overwhelm them with too much at one time—I watch their eyes to be sure they're not glazing over. And, I don't want to scare them or have them lose their confidence that they will be able to master the job."

[Contrast: "You just have to throw them in the pool and see if they swim. I tell them to watch me—to watch the others. They'll pick it up."]

"If you're not careful, you'll set up a situation where they'll 'yes' you to death. You'll be going on about how to operate the register or how to do color balancing—there's a lot of detail in these things, a lot of procedures, and you have to do them right. You'll be asking as you go if they understand and they'll be nodding. But how can they know if they understand? After you show them, you have to let them try it, and you need to be there to help. They stay more interested and they learn better if you set things up so most of the time they're asking you the questions."

"Sometimes they get stuck. I try to give hints. Like when Jerry was learning the register. He couldn't figure out what to do next. I said 'Was it on the menu?' 'No.' 'Was it the repeat key?' —no answer. 'Well, what is on the repeat key?' 'I don't know.' 'OK, then, what's left?' 'Oh yeah, the help key.' Now, I could have just hit the help key, but by not having him think about it, he wouldn't learn as well. But I'll tell you, I've had supervisors do this sort of thing, and when it feels like they're grilling you or they're disappointed in you, that's awful. That's when my mind would freeze and I couldn't do anything. See, it's not the technique per se. It's your attitude while you're doing it. If you're there to help someone learn, they feel it. That's what counts."

"It's like the ring around game I made for teaching color balance. I put a good print in the center, and I make a ring around it of off-balance prints from the same negative. For each print in the ring, I ask, 'Can you tell what's off? How would you correct it?' I make it fun, I use humor. They all like the game. But, this only teaches how to recognize a print that's way off. To teach fine discriminations, I've made up flash cards of prints that are only off by a little. I hold them up—really, to everybody, not just new hires—and people call out what's wrong. That way we all stay sharp, and the trainee sees other people make mistakes too, and that it's OK."

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[Contrast #1: "I just find myself repeating and repeating myself. That's one of the things I really dislike about this job. People take such a long time to learn things. You just have to keep telling them over and over."]

[Contrast #2: "I try not to yell at them."]

[Contrast #3" "The thing that bothers me most is stupid people. I just don't have a tolerance for that."]

> *"Another big thing is to make sure trainees feel comfortable. I don't ask them to take on new tasks until they're comfortable with what I've given them already. You can tell if they're comfortable—they look natural and relaxed, they don't pause or hesitate. Sometimes they ask to learn new things. And, it's a good idea to ask them at the end of the day whether they feel ready to move on."*

[Contrast #1: "No, I don't ask them how it's going. We don't have time to wait around until trainees are comfortable—I just have to make them do it."]

[Contrast #2: "Brian had been on nothing but film prep and light counter skills for his first week. He asked if he could move on to other things. I told him 'no' —that he'd move on when *I* thought he was ready. Actually, I thought he was doing well, and it was probably getting pretty boring for him, but I wanted him to really over-learn everything."]

> *"One of our major goals is to be friendly with customers. I spend a lot of time doing role playing with my trainees so they aren't nervous and they project confidence. Selling is especially hard for some people, so I help them find a way to do it where the customer will experience it as a service. We go over the role plays in detail, like in the ring around game. Where they stumbled, I ask them to generate alternative ways to handle the situation. If they can't come up with an idea, I give them some and they practice to get them into their own words. They need to learn new ways of working with the public, but they need to feel natural doing it. That's why practice with real specific feedback and discussion is so important."*

[Contrast #1: "In this business, you need to be outgoing. I tell my trainees to 'get a personality!'"]

[Contrast #2: "It's almost impossible to teach customer relation skills. It's not like teaching printing. You don't have anything physical to point to or compare to something else. Role playing isn't an answer—nobody ever takes it seriously."]

"If somebody isn't getting it in a reasonable amount of time, I try to say it a different way, or to demonstrate what I mean in a different way. Or I'll just ask them how they think I can do a better job of helping them to understand. Sometimes this works, but sometimes you need to help them figure out what the problem is."

[Contrast: "I must have shown her how to notice when the film was about to jump the track at least 10 times. Each time, I showed her exactly the same way. She just couldn't get it, so I gave up."]

"Everyone wants to know how we develop employees with so much initiative. It's simple. If they're not afraid to try things, if they know they're allowed to make mistakes, they'll take initiative. I tell them, 'There's only one irreversible mistake you can make: sending the film through the wrong developing chemicals. We train and train and train on that, so you probably won't ever make that mistake. Everything else is fixable. If you have a dissatisfied customer and you can't please them, pass them on to someone else. That's our rule—please 'em or pass 'em. We've all passed 'em from time to time. If you print the negatives out of balance, well, print them again. If you're having too much paper waste, we'll figure out how to help you get it down. If your sales are low, we'll practice your 'pitch.' This is what I say to trainees, and these are the things we talk about in our store meetings. This stuff is important to all of us, all the time."

[Contrast #1: "When I'm at the counter, I listen with half an ear to what my employee is saying to a customer. If I don't like what I'm hearing, I butt in. I know I shouldn't do this, but I just can't help myself. It's especially bad when I do it with a trainee."]

[Contrast #2: "You can't teach some people to print, and you can't teach some people customer relations. You find out who's good at what, and you just keep them on that position."]

"On day one of the training, I give trainees a break in mid-morning. I say, 'Go explore—just observe—then come back and ask me any questions you have.' Rather than saying 'here's this, here's that' —if they explore on their own, this gives them a start in generating questions. It's them coming to you, not you lecturing them. And, it helps break the ice so they get used to asking you questions and they know you won't embarrass them."

[Contrast: "I tell them right away, the first day. If you don't ask me questions, I'm going to assume you don't have any. It's up to you to let me know what you don't know."]

"I reinforce what the training video and the employee manual is trying to teach trainees. I usually interrupt the video at several places and say something like: 'Just tell me in your own words what the video is saying', or 'what are you learning about now?'. Asking open-ended questions helps them to learn, and it lets me know where they're going to need extra help from me. Also, since I know they always think the actors are stiff and funny, it lets me assure them that the value of the tape is to teach these three basic things, and that we'll spend a lot of one-on-one time working out the style issues."

[Contrast #1: I don't use the training tapes. In this part of the country, that's not the way people act. You're teaching the wrong things if you expect trainees to mimic the actors."]

[Contrast #2: "Sure, I ask open-ended questions. On the first day, I have trainees take home the card which explains one of our promotions. I say: 'This is about money. Study it.' Next day when they come in, I say: 'OK, how are you supposed to sell the program?'"]

"We have a team approach to running the store, so I incorporate that into the training. Everyone gets involved in the training. I introduce trainees to everyone the first day. I tell trainees what each person is especially good at, so they can go to them to learn tricks-of-the-trade after they've learned the basics. And, right from the start, I have different people demonstrating certain things to the trainees. Periodically we talk about this as a group, maybe in a store meeting or maybe informally, like over lunch. Just to be sure we're all going in the same direction and the trainee isn't getting confusing signals. Trainees discover they can ask anyone anything, and this helps them learn. Plus, teaching others keeps all of us sharp—sometimes we discover we're not practicing what we're preaching. And, by doing it as a group, it helps keep our team spirit up."

[Contrast #1: I don't like other people teaching trainees the basics. I don't know what they'll teach them. I want them to learn the right way, from me.]

[Contrast #2: "The rest of the employees will always gang up on the new hire. I've never seen it to fail. They'll find something the new one isn't good at and they'll just pick and pick on them. I yell at them to stop it, but I haven't been successful. I had a new person quit recently because they couldn't take it any more. As for store meetings, I tried those too but they just became bitch sessions."]

To summarize our descriptive account, we think that good OJT in this company is characterized by OJT providers who see themselves as responsible for *managing* the learning of trainees—actively seeking ways to help them learn—not just going through the motions (e.g., endlessly repeating themselves); or expecting trainees to pick it up pretty much on their own (e.g., throwing them in the pool to see if they can swim); or *backing* into the training

process either hostilely (e.g., "you can't expect these people to care all that much") or apologetically (e.g., "we pay such low wages, you can't expect that much from them").

Another characteristic of a good OJT provider is their knowledge of the importance of a good learning climate, along with their reported ability to set it up, maintain it, and take readings on its health along the way. These are the OJT providers who talked about practices that create an open, supportive climate which encourages trainees to explore and question, and which (in our words) promotes in them a sense of ownership in the learning process and in their progress towards excellent performance. Although it is doubtful that any of the OJT providers we interviewed would disagree with this philosophy, some of them clearly do not have the skills to put it into practice, and some violate this philosophy without knowing it.

Another characteristic of good OJT in this company is the reported ability to tailor instructional practices to the trainee's needs while still meeting the training goals. Behind this ability lies a sizeable repertoire of instructional practices, and the flexibility to select among them in accord with their assessment of individual trainee needs and progress. These are the OJT providers who could identify ways they work with trainees to diagnose the problem if learning was not progressing as expected, or if performance was subpar. Related to instructional practices is the sensitivity of good OJT providers to teaching more than the basics, and incorporating expertise into training. One example concerns the OJT provider who made sure trainees know who is particularly good at certain skills so they can go to them in the future when they're ready to tap into their expertise. It is important to note that we heard the least amount of information about sharing expertise of any of the OJT functions. We believe one of the reasons is that much of what gets trained is procedural and routine. Another reason is that those skills that do require expertise—customer relations and selling skills—are seen by most of these OJT providers as difficult or impossible to train. Only a few of them were able to describe ways they pass on their selling expertise (e.g., going over selling episodes in enough detail to uncover weaknesses and then helping trainees to generate alternative ways of handling the situation.)

Finally, good OJT providers in this company take a holistic view of training. This is one of the aspects of learning management which is more than the sum of abilities on individual OJT functions. In several cases, OJT providers described the way they used a practice and the way they were thinking about its use, which meant a single practice was serving many functions. For example, open-ended questioning was used as an assessment and as an instructional practice. Further, there was a sensitivity to the *way* these questions should be asked (in our terms, to maintain good climate, and to promote trainee ownership). These OJT providers were sensitive to the need to watch for the effects of this question asking—to be sure it wasn't being received by the trainee in a negative way (in our terms, that it wouldn't degrade the climate or dampen trainee ownership in the learning process). Another way good OJT providers demonstrated a holistic approach to training concerns the larger working group. Some of the OJT providers were sensitive to the idea that what they did during training should mirror the day-to-day workings of the group and their own management style. A good

example was the OJT provider who incorporated trainees into the store team early on by inviting employees to help with the training, and of reinforcing team unity by discussing the process during team meetings.

In short, based on interview data with OJT providers, good OJT in this domain was characterized by an awareness of the total role of the OJT provider, and by skills in being able to perform the seven OJT provider functions.

Empirical Results

Ratings on Questions from the Coding Forms

Analyses of Means. Figure 3-1 depicts mean awareness and reported performance levels on the seven OJT functions for the entire sample we interviewed (N = 16). We display these data merely to provide a comparator for parallel analyses subsetted by the global ability rating of high, medium, and low OJT providers. That is, our interest in this track was not in the "average" OJT provider, but in differences across reported ability groupings of them.
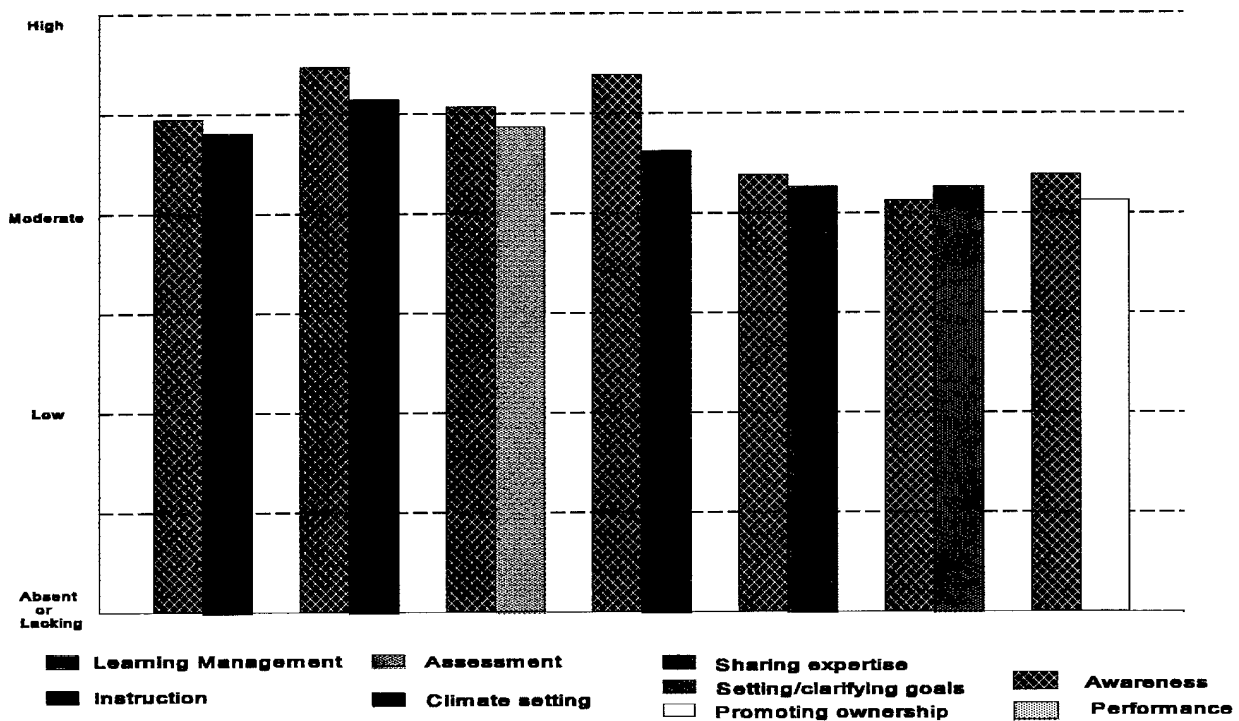
Figure 3-1. Mean awareness and reported performance of OJT functions by OJT-Ps in the retail company.

Although these results produce an irregular pattern of differences among OJT function means, a general indication is that the three functions of sharing expertise, setting/clarifying goals, and promoting ownership are functions for which OJT providers have less reported ability compared to several of the others. Conversely, OJT providers appear to be more aware and skilled at learning management, instruction, assessment, and climate setting.

We were more interested in investigating separate awareness and reported performance levels for OJT provider groups of low, medium, and high "global" ability than we were in the above results. Means for these three groups are depicted in Figure 3-2. Traditional parametric statistics were not appropriate because of the small sample size (high, $N = 6$; medium, $N = 6$, low, $N = 4$), and because of low within-group variability in the high group.
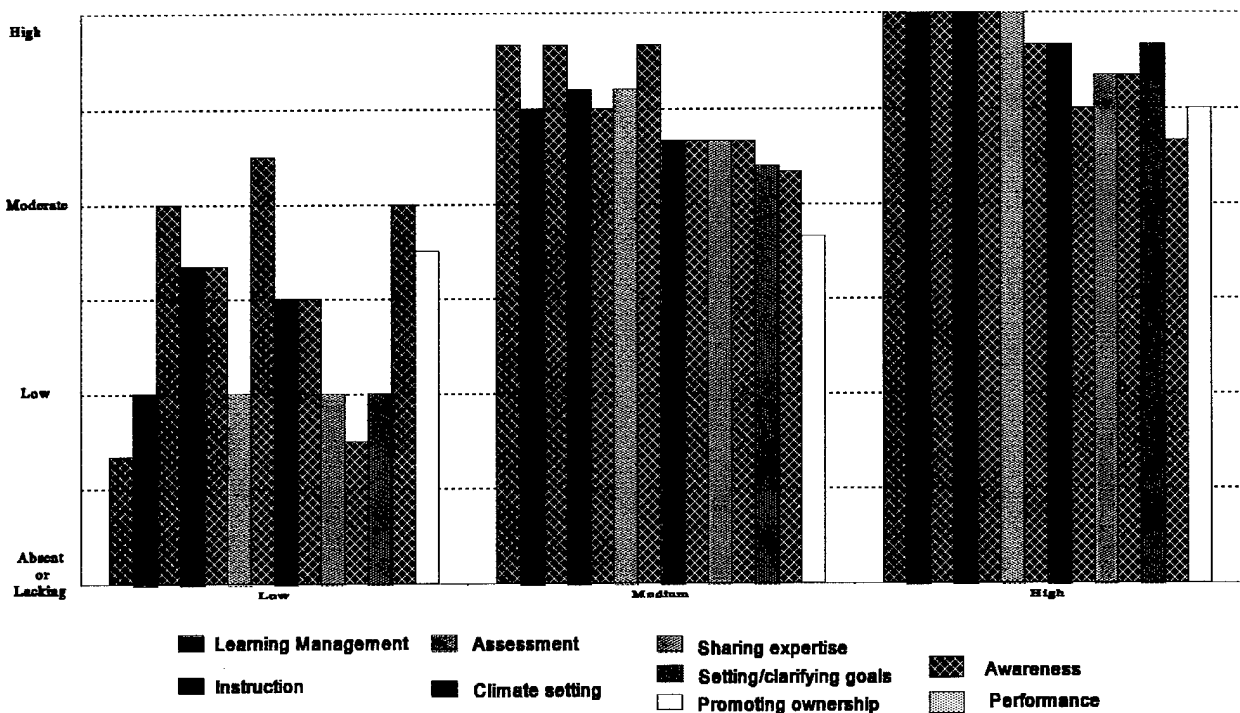
Figure 3-2. Comparison of mean awareness and reported performance of functions for OJT Providers of low, medium, high "global" reported ability.

However, inspection of Figure 3-2 clearly reveals two interesting patterns: As a group, OJT providers in the low global category were less aware and skilled at the seven OJT functions than were those in the medium global category, who, in turn, were less aware and skilled than those in the high global category. The second finding is that as a group, OJT providers in the low global category are less consistent in awareness and reported performance levels across the seven OJT functions than OJT providers in the medium or high category. As depicted in Figure 3-3 and Figure 3-4, this same pattern of greater inconsistency among low rather than medium or high groups is apparent when inspecting means for related skills and characteristics on which we rated them.

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Figure 3-3. Comparison of related characteristics for OJT Providers of low medium, high "global" reported ability.
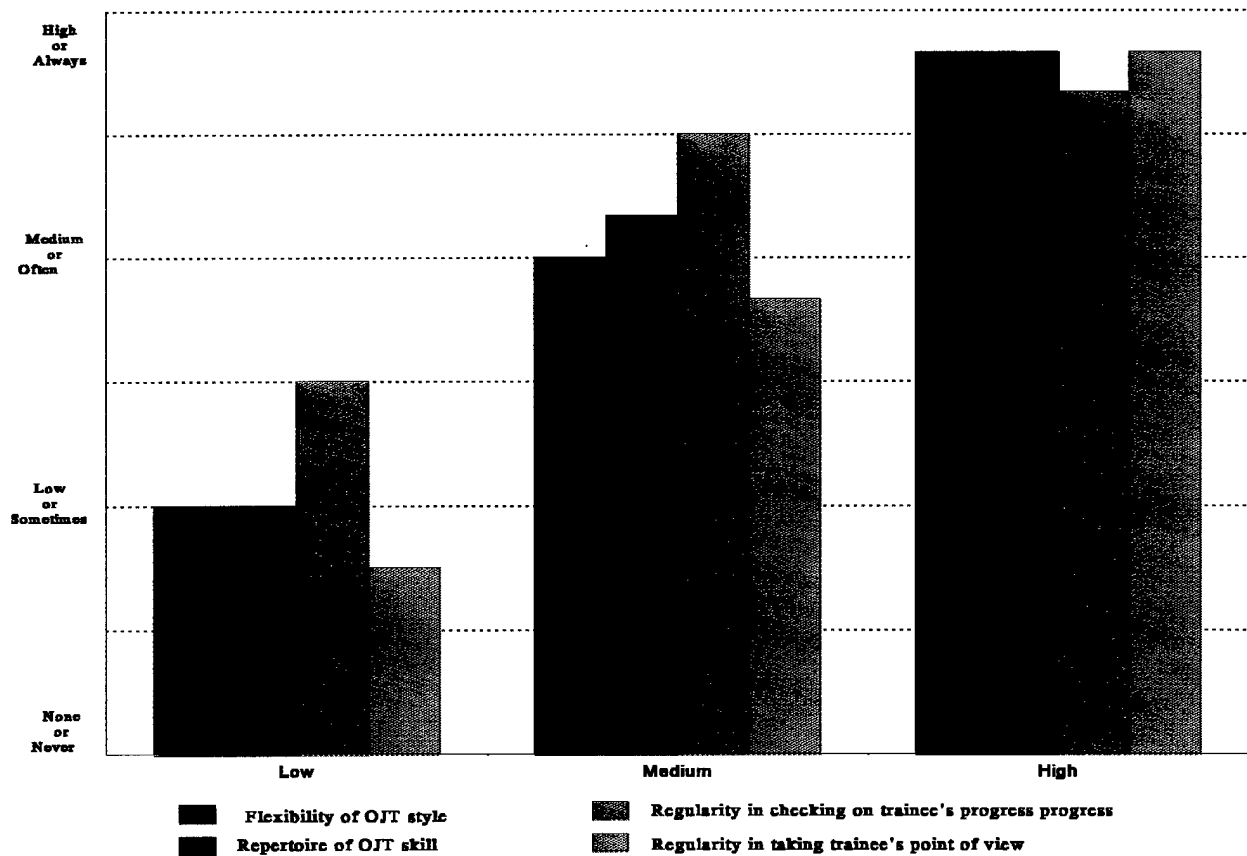
Figure 3-4. Comparison of related skills for OJT Providers of low, medium, high "global" reported ability.

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Correlational Analyses. We produced an inter-correlation matrix of scores for questions on the coding form. Because our N was too low to subset by the low, medium, and high "global" categories, this analysis was conducted over all interviewees. Results are consistent with those described above, and displayed in Table 3-1. First, there is a significant positive relationship between level of awareness and reported performance on each of the functions (using the .05 significance level). Pearson Product Moment correlation coefficients were very strong for most of the OJT functions, ranging from $r = .77$ to $r = .89$. They were significant but weaker for promoting ownership ($r = .67$) and setting climate ($r = .50$).

Table 3-1

Correlations (r values) Between Awareness and Reported Performance of OJT Functions

Function	r Value
Learning Management	.89
Instruction	.83
Assessment	.78
Setting Climate	.50
Sharing Expertise	.77
Setting Goals	.82
Promoting Ownership	.67

Second, we looked at consistency in reported performance of the OJT functions. These findings are displayed in Table 3-2. Of the 21 possible pairings of functions, 16 were significant (and all were positive). All five of the non-significant correlations involved reported performance on promoting ownership as related to reported performance on five of the other OJT functions. This weak relationship was depicted in Figure 3-2. Low OJT providers are better at promoting ownership relative to the other functions, while medium and high OJT providers are relatively poor at this function compared to their reported performance on the others. Apparently, as OJT providers advance in their "global" ability, promoting ownership is a skill they are least likely to improve on. Conversely, even OJT providers with low "global" ability are fairly skilled at this function (but high OJT providers still are better at this function than low OJT providers).

Considering the significant correlations, r values ranged from moderate ($r = .59$) to high ($r = .95$). The lower r values were associated with pairings that included climate,

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expertise, goals, and ownership. This indicates that OJT providers do not maintain similar skill levels on these four functions compared to the others—they do not comprise a highly interrelated package of skills. Higher r values were associated with inter-correlations among learning management, instruction, and assessment. This indicates that OJT providers maintain similar skill levels on these three functions—they comprise a relatively interrelated package of skills. However, generalizations like these that include the entire set of OJT providers should be viewed cautiously in light of the different profiles revealed for the high, medium, and low groups (see Figure 3-2).

Table 3-2

Correlations (r values) Between Reported Performance Levels on OJT Functions

	Learning Management	Instruction	Assessment	Setting Climate	Sharing Expertise	Setting Goals	Promoting Ownership
Learning Management	—						
Instruction	.87**	—					
Assessment	.95**	.92**	—				
Setting Climate	.85**	.82**	.80**	—			
Sharing Expertise	.77**	.71**	.75**	.70**	—		
Setting Goals	.79**	.79**	.87**	.59*	.67*	—	
Promoting Ownership	.06	.41	.41	.70**	.23	.17	—

$* = p < .05$
$** = p < .01$

As we would expect from our model of OJT, the function with the greatest number of significant correlations with each of the other functions is learning management. This is true whether reviewing the number of significant correlations in the Performance X Performance matrix (i.e., Table 3-2) or in the Awareness X Awareness matrix which appears in Table 3-3. There are more significant relationships between learning management and the other functions

than for any other function (10 of a possible 12 pairs). This indicates that level of knowledge and skills for learning management is highly related to level of knowledge and skills on the other functions. Further, because inter-correlations among the other six functions reveal a mixed pattern of significance (for awareness against awareness and reported performance against reported performance), this offers support for the notion that these functions represent different knowledge and skills and that they should be retained as separate constructs in the OJT model.

Table 3-3

Correlations (*r* values) Between Awareness Levels on OJT Functions

	Learning Management	Instruction	Assessment	Setting Climate	Sharing Expertise	Setting Goals	Promoting Ownership
Learning Management	—						
Instruction	.92**	—					
Assessment	.71**	.76**	—				
Setting Climate	.51*	.42	.36	—			
Sharing Expertise	.52*	.36	.20	.14	—		
Setting Goals	.72**	.69**	.83**	.37	.25	—	
Promoting Ownership	.22	.33	.31	.26	.26	.31	—

$*\ = p < .05$
$**\ = p < .01$

OJT Experience Versus OJT Reported Ability. Finally, we looked at the relationship between years of OJT experience and reported OJT provider ability. Correlational analyses comparing two indices of experience (total years as an OJT provider; years as an OJT provider at the company) to all the measures of reported ability present on the coding form yielded only three significant correlations, which would be expected by chance.

Figure 3-5 depicts means for the low, medium, and high groups of OJT providers for total training experience, training experience at the retail company, and training experience prior to the company, and it clearly portrays the lack of significant relationship between experience and reported ability.

Figure 3-6 portrays a more detailed view of these data. It plots years of OJT experience of individual OJT providers, by their "global" reported ability. Of particular interest is the fact that OJT providers with roughly one to nine years of experience as OJT providers at the retail company are just as likely to have attained a low, medium, or high "global" reported ability level. These two figures were of particular interest to the company. They highlight the finding that the amount of OJT experience at the company, is only weakly tied to reported general abilities of OJT providers present in the system. One speculation is that sheer time in the company trenches does not lead to improvement in general OJT ability.
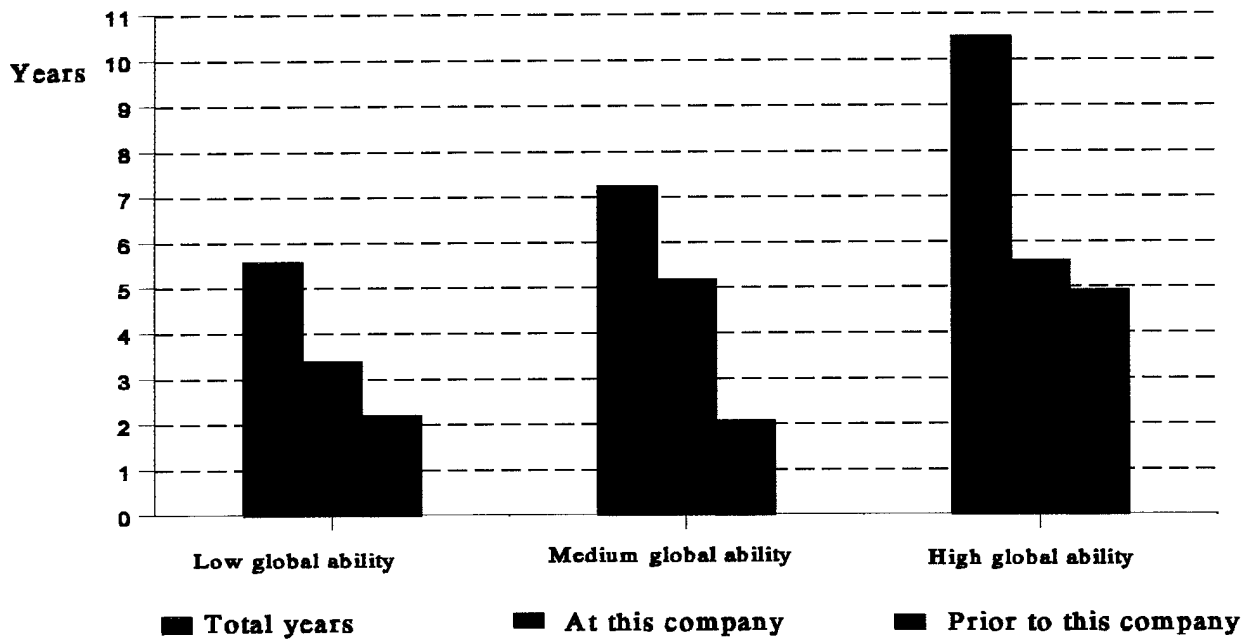
Figure 3-5. Mean OJT experience by OJT Providers "global" reported ability level.
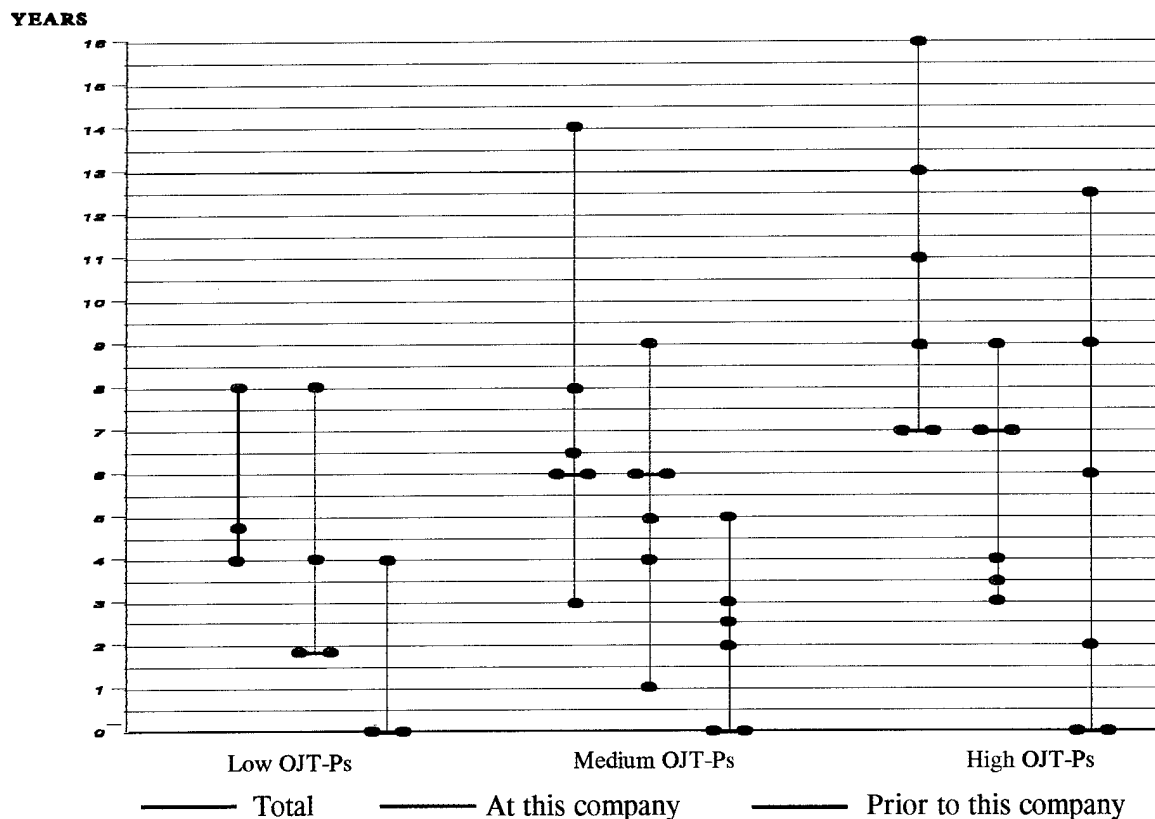
Figure 3-6. Variability in training experience of OJT Providers with low, medium, high "global" reported ability.

Strategy Use

We were interested in discovering the general size of the repertoire of OJT strategies in use by OJT providers in the company. And, we wanted to determine which strategies were used by the greatest number of OJT providers. By "strategy," we mean any technique or practice that an OJT provider uses to deliver OJT to a trainee.

During our interviews, OJT providers revealed their OJT practices both during the case account which we probed using Cognitive Decision model (CDM) (Klein, Calderwood, & MacGregor, 1989) and also in answer to several direct questions about their practices. For example, we asked them to state how they assess trainee progress, or to describe what they did when one of their standard instructional techniques wasn't working, or how they changed a poor climate to a good one (see Appendix A, questions 6 - 15)

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During coding, our process was to first review the interviews and develop a list of each OJT strategy (or practice) that interviewees said they use during training. Then, during the coding process, we recorded the number of OJT providers who mentioned using each of these strategies at least once.

A list of 57 strategies was produced by this process. It is important to note that we did not have this list until after the interviews were completed. Therefore, we did not ask OJT providers about their use or non-use of each strategy. It is likely that frequency counts per strategy would change if we had. Instead, our intent was to discover which practices OJT providers described themselves, when remembering instances of their OJT interactions.

Concerning the first objective (size of repertoire), we found that the range of strategy use per OJT provider was 13 - 39; $M = 28$, median = 29. This demonstrates a fairly sizeable repertoire, on average, of OJT strategies in use by trainers in the company. But, the range demonstrates considerable variability in size of repertoire—as low as 13 and as high as 39. It appears that OJT providers could benefit from communicating with one another about the strategies they use.

Concerning the second objective (regularity of strategy use across OJT providers), Table 3-4 lists each of the OJT strategies and the percent of OJT providers who reported using them at least once. This list represents a wide array of practices. However, 34 of the 57 strategies are used by fewer than half of the interviewees which reinforces the above indication that OJT providers could benefit from simply communicating with one another about their practices. One caveat is that some of these practices are difficult to use; just talking about them probably isn't a sufficient solution, as discussed below.

Notice that strategies may or not be "good." For example, posing closed questions (e.g., those with right-wrong, or yes/no answers) may be reasonable in certain circumstances (e.g., helping trainees memorize required information), but in others this strategy may not be as useful as, say, open-ended questions. Further, overuse of closed questions would definitely constitute poor OJT, as in regularly assessing a trainee's understanding by asking if they've "got it." This strategy listing, therefore, represents a description of what OJT providers actually do in this domain, and its value as an evaluative tool is limited to these inferences that can be reasonably drawn without benefit of knowing the context in which the strategies are embedded.

We attempted to group these practices according to the function they serve (e.g., assessment, instruction, promoting ownership). But, any one practice can be used for multiple purposes, and because we felt our interview data would not support this type of classification for each instance in which a strategy was mentioned, we did not code for the purpose (i.e., OJT function) to which strategies were put.

A review of Table 3-4 reveals that strategies used by 80% or more of the OJT providers include techniques that are one-way (e.g., tell, model, direct trainee's attention) as well as interactive (e.g., encourage trainee to summarize, elicit questions, role play, and pose open-ended questions). Some practices in this category indicate an awareness of the larger OJT provider role, such as being nearby but not on top of, and adapting the amount or level of support to the learner's current state.

Not surprisingly, among the practices in use by fewer OJT providers are those where criticism is required (most people are not comfortable giving criticism), and those that require more advanced tutoring skills (e.g., eliciting reasons; offering hints and promptings, eliciting trainee predictions about cause-effect relationships; thinking out loud while demonstrating, summarizing, linking concepts and skills to trainee's ability to perform the task, and eliciting trainee reflection on various aspects of learning). Also used infrequently are those practices that request trainee input either to the training process or to task performance. Our sense is that most OJT providers see trainees as too green to provide meaningful input about training or ways of performing their job; for a few of them we sensed they simply would not want to share control of the training process by inviting trainee comment. Yet, the few OJT providers who do invite trainee input reported that they were able to respond and that this strategy proved useful.

Again, simply sharing information about effective strategies might prove helpful to expand OJT providers' repertoire of practices. But, for the more advanced practices (those associated with tutoring skills), and for practices that cause discomfort (offering criticism), training might be required.

Table 3-4

Percent of OJT-Ps in the Retail Company Who Use Particular Strategies

100% (16/16) respectively	94%—81% (15/16,14/16,13/16) respectively	75%—63% (12/16,11/16,10/16) respectively	56%—44% (9/16,8/16,7/16) respectively	38—25% (6/16—4/16) respectively	19%—6% (3/16,2/16,1/16) respectively
• tell (describe procedural steps) • observe • use training tapes (provided by company) • encourage trainee to summarize (self-review)	• model (watch me) • direct trainee's attention • elicit questions • give performance feedback re: incorrectness • role play • pose open-ended questions • give reasons why • be nearby, but not "on top of" • adapt amount/level of support to learner's current state • shadow (follow) trainer	• give performance feedback re: praise • use examples; analogues • evaluate trainee's questions (quality, frequency, etc.) • offer independent practice opportunities • explain why trainee needs to do it a certain way • generate job aid • give performance feedback re: offer alternatives • allow trainee to make mistake and see consequences • put trainee at ease	• give performance feedback re: correctness of specific behavior within a performance stream • set performance goals • monitor body language for understanding • be patient • guide trainee through task verbally while they do it • give what can go wrong • give test(s) • encourage trainee exploration of interaction with work env't (i.e. trainee "experiments" with printer) • convey context of job—big picture • assign to SME[1] for specific periods • offer incentives for mastery • expose trainee to peer modeling	• break material into smaller pieces • ask how it's going (seek trainee FB about training process) • use humor • praise in public • give hints/prompting • elicit reasons • keep other employees informed of trainee's progress; where s/he needs their help • display confidence in trainee's ability to perform target job • scaffolding [hands-on help, gradually tapered off] • posing questions: closed • elicit trainee suggestions (about how best to perform task)	• performance feedback re: criticism of either specific or general behaviors • invite trainee to voice worry/stress/fear • criticize in private • pause frequently during verbal explanations • maintain records showing progress • elicit trainee predictions re: cause-effect relations • give "panic button"—what to DO when "X" goes wrong • think out loud while demonstrating (not just naming what you're doing; but describing your thinking) • summarize • link concepts and skills to trainee's ability to perform target job • elicit trainee reflection on various aspects of learning (e.g., their performance compared to others')

[1]SME = Subject matter expert

Discussion and Conclusions

The Retail Company Track provided an opportunity for us to study how OJT is conducted when training people on tasks of low to moderate levels of complexity. This is an environment in which the OJT provider's role is explicit, but where training for OJT providers in *how* to engage in the training role is not offered. Even though manuals and videos are provided by the company about the tasks that need to be trained, our in-depth interviews revealed that OJT providers vary considerably in their skills and knowledge about how to train others. And they vary considerably in the number of OJT techniques they report using.

Usefulness of the Model

The model was very useful in this domain. First, we were able to reliably rate OJT providers on their awareness and reported performance levels of the functions in the model. Second, examination of the interview data revealed no evidence for additional functions. Third, when presenting the results of our study to corporate staff in this company, the model provided a useful framework for explaining the full role of the OJT provider: the cognitive and behavioral aspects of the job. Members of the Human Resources Division described the model as "very illuminating" and "more comprehensive" than any others they had seen. Viewing graphs that depicted reported ability levels of their OJT providers in terms of the functions of the model allowed them to get a "much better handle" on how to think about OJT in general, and within their system.

Gaps and Disparities

Even though the majority of the OJT providers we interviewed were individuals whom the company considers to be among their best, we discovered considerable gaps and disparities between what we might have expected to find and what we actually did find. There is variation in OJT providers' ability levels which is apparently not related to years of OJT experience at this company. The form of support currently offered by the company to OJT providers is not sufficient to help them improve with repeated practice in using the existing materials and guidance. In addition, we found evidence that many OJT providers have a smaller repertoire of OJT practices than others. The company will need to augment the support they offer to their OJT providers if they want to see system-wide improvement in the quality of training offered to their new hires.

We can summarize these gaps and disparities as follows:

- OJT providers differ in terms of "global" ability. Over half the sample were placed in low to moderate ability levels, based on reported practices.

- Consistency of awareness and reported performance levels across the functions of OJT is less uniform for groups of low and moderate OJT providers, compared to the high group. Low and moderate groups apparently lack a cohesive skill set for performing OJT functions, as well as a consistent knowledge of the functions.

- Low and moderate groups are generally more aware of OJT functions than they are skilled at performing them.

- Low OJT providers have most difficulty in performing the functions of learning management, assessment, sharing expertise, and goal setting. They are best at instruction, climate setting, and promoting ownership. This pattern is very different than the one found for medium and high OJT providers, whose group profiles resemble one another.

- In general, the higher the "global" reported OJT ability, the more likely that these functions are performed best: learning management, instruction, and assessment. Support appears particularly necessary to help OJT providers improve performance on the other four functions.

- Reported performance on promoting ownership is least well related to reported performance on the other functions. Another way of saying this is that as OJT providers move from low to medium to high global performance levels, improvement on this function is least likely to change.

- There is large disparity in the number of techniques that OJT providers reported they use (range is 13-39). OJT providers can benefit by learning how to engage in a greater range of practices.

- There is no correlation between reported ability level and years spent as an OJT provider in this system. Therefore, nothing in the system is helping OJT providers advance their skills.

Future Products

As a result of our study of OJT providers in this company, we will conduct in the near future a Phase III effort (funded by the company) to design pilot training for their OJT providers. This training will target not only the training offered to new hires, which we studied in this project, but also on-going training offered to existing store staff. On-going training, or skill upgrading, was mentioned frequently in our interviews as a difficult problem faced by store managers and owners. The Phase III effort will allow us to test whether our model can be extended to training applications involving skill upgrading.

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SECTION 4: OJT IN THE OHIO NATIONAL GUARD

The Ohio National Guard (ONG) provided an excellent opportunity to study on-the-job training. First, the ONG relies heavily on on-the-job training. Second, armor is an important Army branch that is feeling dire pressures created by shrinking training resources. Third, the ONG was a willing and cooperative participant in the research. Enough cannot be said about the support that the ONG provided.

OJT as conducted in the National Guard has at least one significant difference from OJT in other domains. Trainers in the National Guard do not treat patients, service customers, or develop a product while concurrently conducting training. In peace time conditions, a guardsman's job is to train. The trainer and trainee do not have concurrent goals competing for the their attention and resources. The critical feature that OJT in the National Guard shares with other domains is the focus on one-on-one or one-on-few relationships in training. One trainer is responsible for developing the skills of one other individual or a small group of individuals such as the tank crew. This training occurs on the operational equipment, often in simulations of the operational environment. Our study of the ONG focuses on this one-on-one training relationship between trainer and trainee.

The unit studied was an armor battalion of M1A1 tanks. We concentrated on the tank crews which comprised four duty stations: a Tank Commander, a Gunner, a Driver, and a Loader. The training and the tasks are described in more detail later.

Why would the Army have an interest in on-the-job training and the skills which trainers need to make it effective? Is OJT an important component of training in the Army and the Ohio National Guard (ONG)?

OJT is infused throughout both the Army and the ONG. Rather than having trainees learn their jobs at a training center, the Army requires that soldiers master their jobs while on the job. OJT serves as a primary means of training in many of the Military Occupational Specialties (MOSs). In most MOSs, trainees gain basic skills at a Training and Doctrine Command (TRADOC) "schoolhouse." From this schoolhouse, soldiers transfer to a field unit where each soldier must enhance his/her basic set of skills, acquire new and advanced skills, and maintain all of these skills over time. This approach places quite a burden on the training resources of those field units. The only way that these units can accomplish such lofty training goals is by using experienced, proficient soldiers as mentors or tutors for the less experienced soldiers. Such training might occur as a formal OJT program or not. However, it frequently involves an extensive amount of one-on-one or one-on-few training.

Armor is no exception. New crewmen learn the fundamentals of tanking at the Armor School at Fort Knox, KY. However, this training provides only a basic level of proficiency and exposure. It enables them to enter a field unit ready to learn more without becoming a safety hazard. At the unit, tank crewmen hone their skills and develop new ones under the

AEGIS and guidance of their Tank Commander (TC). Armor crewmen learn primarily on-the-job and through one-on-one interactions with their TC. This one-on-one relationship exists for many types of crewmen throughout the Army. It applies to aviators and infantrymen as well as tank crewmen. That is why it is the focus of our study in the Ohio National Guard.

It appears that TCs assume a responsibility for which they are ill prepared. Tank crewmen become TCs most frequently because of their technical expertise, not because of their skills in teaching others. In fact, they have not reached a point in their careers at which they might return to a formal school to acquire the skills associated with teaching. In addition, the Army places little emphasis on the skills which we believe are needed to provide effective OJT. The following passage from an Army training circular illustrates the point.

> *"Trainers must know how to perform the task being trained. This requires the trainer to master the task through study and practice. After mastering the actual task, trainers must rehearse the training exactly how it is to be presented....Before conducting training, trainers must know how to train others to perform the task. Good trainers ensure that training is performance oriented (hands on). That means getting enough training aids so that every soldier can practice the task."* (TC 25-30, A Leader's Guide to Company Training Meetings, DA, 1994)

Notice that the passage indicates that trainers must know how to train others, but neither this circular nor any other that we could find describes what the necessary skills are.

Objectives for this Track

Our goals are to rectify the gaps in our knowledge about the skills needed to provide OJT and how to train these skills to others. Accordingly, we established several basic objectives for our study of the ONG. They are the following:

- to learn about how OJT is conducted in the Ohio National Guard
- to learn whether the OJT functions identified in the model are relevant in this domain, and whether there are additional ones in this domain
- to learn about differences between individual and collective training
- to develop a prototype workshop designed to help individuals acquire the skills necessary for providing OJT effectively.

The following sections address our methods and our findings concerning the first three objectives. To address the fourth objective, we developed and implemented training workshops. A discussion of these workshops is presented later in this report.

On-the-Job Training in the ONG

To understand OJT in the ONG, we must also understand the context in which it occurs. The following paragraphs provide a short overview of the ONG training program, the tasks that tank crewmen must learn, and who provides OJT in the ONG.

The ONG Training Program

Training in the ONG is not a series of unplanned events nor is it a task left to the discretion of individuals. Training people to fight in tanks is not a new business. Tanks and their supporting technologies have evolved over most of this century. The lessons learned from the past have served to shape a well-defined training program that has been instituted throughout the armor community, including both the reserve and active components. Thus, armor training is regimented and controlled through Army doctrine. Training manuals describe what tank crewmen need to know, what skills they need to have, and how well they must be able to perform them.

The battalion's training program is a cycle that repeats every twelve months. The unit trains one weekend each month and for a continuous 2-week period in the summer. The goal of training for the armor battalion in the ONG is very specific: to produce a unit that qualifies a specific percent of its crews on Tank Table VIII (see FM 17-12; DA, 1992). This is a live-fire gunnery exercise designed for individual tank crews to demonstrate their proficiency employing the tank's weapons systems. Gunnery qualification occurs during the unit's 2-week training exercise. All training prior to this 2-week period is in preparation for the live-fire gunnery; all training after it is in preparation for the next gunnery qualification.

However, the unit cannot devote all of its training drills to the primary training goal. Soldiers train one weekend each month. The unit has specific goals for each weekend drill, but they do not all focus on developing gunnery skills. Some drills must be devoted to secondary or supporting tasks. For example, during the first weekend of the cycle, the unit will recover its equipment from the live-fire gunnery conducted during the previous month. This will include cleaning, maintenance, and inventory of all equipment. On the second drill weekend of the cycle, the unit may address non-gunnery training issues such as natural disaster support. Therefore, the unit concentrates on gunnery skills for approximately seven months.

Gunnery training progresses through a series of gates described in FM 17-12 (Department of the Army, 1992). Because of personnel turnover and skill degradation over time, crewmen demonstrate a range of proficiency at the beginning of each training cycle. Some soldiers will have just completed basic training and have no experience in the tank. Others will have been through the training cycle several times, but their skills will have degraded with time. Therefore, the unit begins gunnery training at a very basic level each year. The cycle starts with the development of individual skills which are evaluated in the

Tank Crew Gunnery Proficiency Test (TCGST). After TCGST, the unit moves into training its crews to perform offensive and defensive engagements on a dry-fire range. Crews must pass the Tank Crew Proficiency Course (TCPC) prior to going to live-fire gunnery. Finally, crew proficiency is certified on Tank Table VIII (DA, 1992) during the 2-week annual training period.

The battalion has a number of training devices available. These range from simple flash cards and system mock-ups to sophisticated part task trainers such as the Conduct of Fire Trainer (COFT). These devices are used at various points in the training cycle, but many believe that the most effective training device is the tank itself. Therefore, most gunnery training occurs on the tanks. Crews spend hours training on the tanks in a parking area without ever moving the vehicle. This is in preparation for TCGST as well as for TCPC and Table VIII.

The Tasks

Fighting an M1A1 tank requires a set of complex skills for each of the crewmembers and for the crew as a team. Each crewmember must be proficient on a set of tasks for his specific station. The crew must be able to maneuver the tank, employ the tank's sensors, and engage its weapons in a timely manner. But, a tank rarely fights alone. Once the crew can operate its tank proficiently, it must acquire a set of skills that enables it to operate the tank as an integral part of several larger teams on the battlefield including sections, platoons, and companies. The skills needed to operate in these teams are cognitively complex, and they place a considerable burden on the crew, particularly the tank commander and the gunner.

However, units in the ONG do not train to the level of sections, platoons, and companies. They train at the level of the crew of individual tanks. In the ONG, tank crews never train together as a unit comprising more than one tank. The training objective for the unit is to ensure that the individual crews can employ the tank's weapons effectively. This approach ensures that the crew has the skills necessary to enter training as a member of a larger team should the need arise.

There are a multitude of tasks and skills that tankers must learn. FM 17-12 (Department of the Army, 1992) describes in detail the tasks, conditions, and standards that define proficient tankers and tank crews. The focus of training is on tank gunnery, that is, developing the skills necessary for the crew to employ its tank as an effective weapon. These include the skills needed to function at individual crew stations as well as those needed to function together as a crew.

A tank crew has four stations: loader, driver, gunner, and tank commander. With progressive experience and demonstrated proficiency, the crewmen progress through each of these crew stations. Each crew station has a unique set of tasks that the tanker must learn. For

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example, the gunner must be able to "acquire targets using the thermal imaging system." In addition, there are common tasks that each crewman must learn (e.g., Disassemble/Assemble the Breech Block Assembly). Most of these tasks are procedural in nature. That is, they involve a step-by-step process that is prescribed either by a training document or by the TC. Many of the skills are perishable and require repetitive practice. In some cases, skill degradation can be observed from one month to the next, particularly when the soldiers do not reach proficiency.

The OJT Provider

Army doctrine describes what a tank crewman should be able to do and how well he should be able to do it. It describes the training events that must occur and training devices that should be used, but there is another aspect of training that must be provided in the ONG armor battalions. Someone must be responsible for changing the behavior of individual soldiers and crews so that they develop the necessary skills.

This responsibility lies with the commanders of individual tanks. Typically, TCs are E-5s and E-6s who have demonstrated technical competence on the tank, leadership skills, and good judgment. This is their first position of authority. The battalion has senior non-commissioned officers (NCOs) who are skilled trainers (a Master Gunner and Platoon Sergeants). However, they are responsible primarily for directing training, not delivering it.

Most TCs have not been to advanced schools to learn about developing or delivering training, yet they are the primary providers of training in an armor battalion. Success of the battalion depends on the TCs' ability to shape and maintain performance of their soldiers. The Master Gunner can prepare a perfect training plan, but its effectiveness depends on the abilities of the TCs to work one-on-one to enhance the performance of their crewmen. The TC is the one who is on the tank in the field when it's cold and muddy. The TC is the one who assesses the performance of his crew, stimulates motivation, and provides instruction. The TC has the responsibility to provide training under unfavorable environmental conditions and resource constraints, yet he is the person least prepared to do this. The Army has not given him the tools and skills needed to provide OJT to his crewmen.

Several factors have contributed to this. First, there are too few professional trainers in a unit to go around. The Master Gunner and maybe some of the Platoon Sergeants have completed advanced courses in how to conduct training. However, there are not enough of these "trained" trainers to accommodate all of the crews in the battalion. Furthermore, there are so few training opportunities in the ONG that Platoon Sergeants, who also function as TCs, must focus their attention on the needs of their own tank crews. They have very little time to help another TC with his crew. Second, much of the OJT occurs within the confines of the vehicle. There is no room inside an M1A1 tank for a fifth person. A designated trainer would have to displace one of the crewmen to observe, instruct, or evaluate the remaining crewmen.

Summary of Findings

OJT is a principal component of training in the armor community. The primary instrument for training delivery is the one-on-one relationship between a Tank Commander and his crewmen. However, many TCs are not completely aware of all of the functions that an effective OJT provider serves nor do they possess the skills necessary to accomplish all of these functions. Our study revealed the applicability of each of the model's OJT functions in this domain and pointed out illustrative examples observed during training. We did not find evidence for additional functions. Finally, our workshop delivered to the ONG represents a prototype training package designed to develop skills needed to provide OJT. The workshops demonstrated that these skills can be trained and that such training would be useful and well received by the target community. We have outlined a training intervention designed to enhance the quality of OJT delivered in field units. This intervention is described in detail in Section 6 of this technical report.

The Research

Data Collection

To learn about OJT in the ONG we conducted several data collection activities. Our first task was to "get smart" about the domain. Although we had conducted a number of projects with the Army prior to this one, we knew very little about armor, training in armor units, or the National Guard. Therefore, we began by reviewing a number of doctrinal and training manuals and by talking to experts. These steps helped us learn about the tasks that tankers must perform, the unit training program, and the culture of the National Guard.

In addition, we observed the battalion as it conducted training throughout the gunnery training cycle. These observations began as the unit started training individual tasks early in the cycle and continued through its live-fire qualification exercise. We observed a wide variety of training activities ranging from classroom instruction to exercises in the Conduct of Fire Trainer (COFT) to crew drills in the tank. The benefits of these observations were enhanced by our interactions with the crewmen, the equipment, and the leadership. These informal interactions proved helpful in understanding the tasks that were being trained and the process being used to train them.

A third set of data collection activities involved formal interviews with highly experienced trainers who provide one-on-one instruction or OJT in the ONG. The interviews were designed to incorporate techniques of the Critical Decision method (CDM) as well as specific probes regarding the functions and related skills of providing OJT. This interview was designed to be similar to the one used in the Retail Company Track. The protocol for this track is presented as Appendix B. We interviewed a total of nine OJT providers assigned to two armor battalions of the ONG. These OJT providers represented the most experienced

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NCOs in both battalions. All of them had completed a variety of advanced NCO courses. They occupy leadership positions in the battalion, and have extensive experience training soldiers in the ONG. Thus, we expected these interviews to represent the practices of the best trainers in the two units.

A final data collection activity involved the workshops that we conducted for Platoon Sergeants. The workshops focused on building awareness of the OJT functions and on building skills that the platoon sergeants could use to serve those functions. During the workshops, platoon sergeants engaged in exercises that revealed their experiences and OJT practices. These were recorded and treated as a source of data. The workshops are described in more detail in Section 6 of this report.

Findings

This section presents a detailed discussion of our findings from the ONG. We have broken them into two major parts. The first discusses the findings derived from the nine interviews with experienced trainers. The second discusses the more subjective findings derived from our observations of training conducted by the unit during its gunnery training cycle.

Analysis of Interview Data

The formal interviews provided a unique window into the world of OJT in an armor battalion. The nine trainers interviewed represented the elite trainers in the two battalions. This conclusion is based on the fact that they had extensive experience and held positions of leadership, and they were recommended by their supervisors and peers as among the best trainers in the unit. We used these interview data to illustrate the practices of the units' best trainers.

To develop an image of what good OJT looks like in the ONG, we submitted these interview data to some rather detailed analyses based on verbatim transcripts of the interviews. The objectives of these analyses were the following:

- to assess the trainers' awareness of each OJT function
- to assess the trainers' skill at providing each function
- to identify specific behaviors associated with effective OJT
- to determine if additional functions were needed to describe how OJT is provided in the ONG.

The findings for each of these objectives are presented in turn after a brief description of the coding procedures that we used.

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The strategy and the form used in the coding of these transcripts were modeled after the Retail Company Track; this is described in detail in the discussion of that track. Two researchers coded each transcript. First, the two researchers reviewed and coded each transcript independently. Then, they discussed their codes. The purpose of the discussion was twofold: to identify any mistakes in applying specific categories and to rectify any misunderstandings of the information reported by the interviewee. The discussions were not used to attain consensus between the coders; legitimate differences remained. After the researchers discussed an interview, they moved on to the interview transcript.

Awareness

The researchers rated the interviewee's level of awareness of each OJT function using a 4-point scale. Agreement between the two researchers was significant ($r = .74$, $p < .001$, $N = 62$). The anchors for the rating scale were:

     1 = Completely lacking
     2 = Low
     3 = Moderate
     4 = High

Small sample sizes precluded the use of parametric statistics for these analyses. Thus, we adopted a qualitative approach for analyzing the data. As a group, the nine trainers were moderately aware of the functions that an effective OJT provider serves ($M = 2.97$). Table 4-1 presents the mean ratings of awareness for each OJT function. The means indicate that the ratings of awareness differed among the various functions. For example, the OJT providers were most aware of the need for them to share expertise with their trainees. The difference was greatest when compared with instruction, goal setting, and promoting ownership. In contrast, the OJT providers were least aware of the need to promote ownership among their trainees. The difference in awareness was greatest when compared with instruction, assessment, setting climate, sharing expertise, and learning management.

Table 4-1

Mean Ratings of Awareness of Each OJT Function (N = 9)

OJT Function	Mean	Standard Deviation
Learning Management	3.06	1.06
Instruction	3.00	.84
Assessment	3.44	.78
Setting climate	3.17	.51
Setting goals	2.44	1.09
Promoting Ownership	1.89	1.08
Sharing Expertise	3.78	1.86

Inter-correlations among the seven functions indicated only three significant relationships out of 23 possible. These three relationships presented no distinguishable pattern. It appears that ratings of awareness of the seven functions are independent of one another.

Reported Performance

Using the same 4-point scale, the researchers also rated the reported skill with which each interviewee performed the OJT functions. Again, reliability between the two researchers was high ($r = .73$).

The nine OJT providers were moderately skilled at their reported performance of the seven functions of OJT ($\underline{M} = 2.56$). Table 4-2 presents the mean reported performance rating for each OJT function. Again, variability among the different functions existed. For example, the OJT providers appeared to be better at assessment than most other functions including instruction, setting climate, setting goals, promote ownership, and learning management. In contrast, the OJT providers appeared less skilled at promoting ownership when compared to four other functions: assessment, setting climate, sharing expertise, and learning management.

Table 4-2

Mean Ratings of Reported Performance on Each OJT Function (N = 9)

OJT Function	Mean	Standard Deviation
Learning Management	2.67	.77
Instruction	2.67	1.08
Assessment	3.17	.86
Setting Climate	2.50	.98
Setting Goals	2.44	1.15
Promoting Ownership	1.72	1.07
Sharing Expertise	2.78	1.00

Like the ratings of awareness, inter-correlations among the ratings of reported performance revealed only three significant relationships out of 23 possible. These three relationships presented no distinguishable pattern. Thus, it appears that ratings of reported performance are independent of one another.

Comparisons among the awareness and reported performance ratings indicated that generally the OJT providers were more aware of the need to provide the functions of OJT than they were skilled at performing them. Figure 4-1 presents the mean ratings for awareness and reported performance on each of the OJT functions. Looking at comparisons of individual functions, we found that the OJT providers' awareness of the function of sharing expertise

appeared higher than their reported skill at performing that function. A similar finding occurred for setting climate.
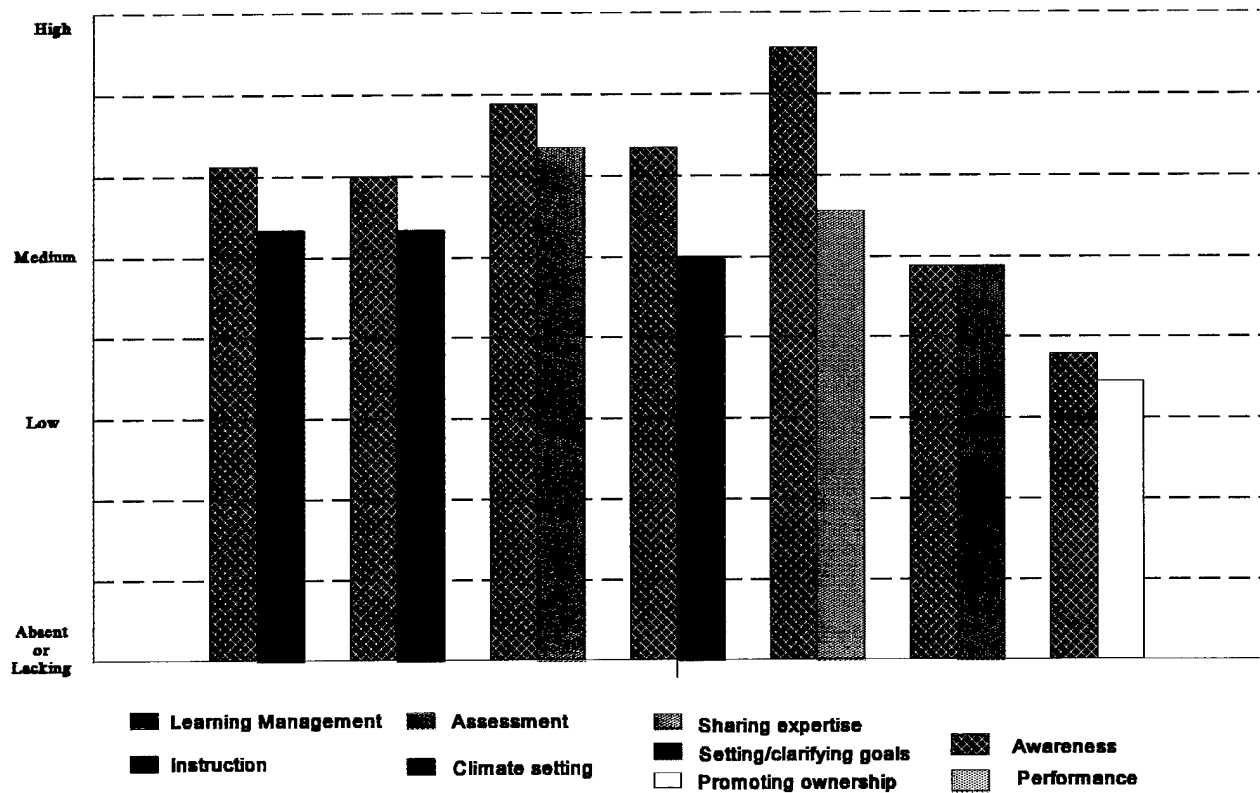
Figure 4-1. Mean awareness and reported performance of OJT functions by OJT Providers in the ONG.

Indicators of Effective OJT

In a third set of ratings, the researchers determined whether the trainers exhibited certain specific behaviors associated with effective OJT. This was a qualitative evaluation. During our observations and interviews, we identified these behaviors as likely to allow us to further discriminate these OJT providers. Members of the unit did not have any difficulty recommending individual TCs as the best trainers in the battalion. For the most part, these were TCs whose crews had the best scores at gunnery each year. These recommendations also included several senior NCOs who knew much more than the others by virtue of their advanced training and their experience in the active component. We wanted to know what these "good" trainers did differently. As we observed these NCOs provide training to others, we generated a list of behaviors that distinguished them from other trainers. These more specific behaviors are:

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- take actions to motivate crews
- place tasks within the context of a "big picture"
- work around learning and training barriers
- demonstrate a strong positive attitude
- assess performance outcomes during training
- assess performance process during training
- demonstrate a wide range of training strategies
- employ training strategies flexibly

Again, the researchers used a 4-point rating scale, but the anchors differed from those described above:

1 = No evidence
2 = Never
3 = Sometimes
4 = Often

Agreement between the two researchers was good ($r = .74$).

All of the experts interviewed exhibited some evidence of these key behaviors, and all of the behaviors were exhibited by more than half of the interviewees. In addition, the interviewees received moderately high ratings for these behaviors; the total mean ratings for individual interviewees ranged from a low of 2.61 to a high of 3.81.

Of interest are the relationships between these key behaviors and the ratings of reported performance on the OJT functions. Table 4-3 presents a correlation matrix for these two sets of ratings with only the significant relationships indicated. The most interesting finding here is the set of behaviors directly associated with the ratings of the learning management function. Several behaviors had significant direct relationships including exhibits a positive attitude, assesses both outcomes and process, and flexibly employs a wide range of instructional techniques.

In addition to our own ratings of these key behaviors, we asked the Battalion Master Gunner to provide two sets of ratings for the same set of trainers based on his observations of them over the years. First, the Master Gunner rated the overall effectiveness of each individual as a trainer. Second, he provided ratings for each individual on the same key behaviors described above. The Master Gunner had supervised the trainers for a number of years and was in a position to evaluate the quality of training provided by each.

Table 4-3

Correlations Between Reported OJT Performance and Indicators of Effective OJT

	Learning Management	Instruction	Assessment	Setting Climate	Sharing Expertise	Setting Goals	Promoting Ownership
Motivate	.52	.38	.42	.48	.34	.49	.74*
Barriers	.51	.37	.56	.66*	.37	.50	.71*
Positive Attitude	.71*	.45	.68*	.57	.39	.87**	.58
Assess Outcomes	.75*	.41	.78*	.61	.33	.57	.70*
Assess Process	.72*	.20	.78*	.58	.67	.37	.76*
Range of Strategies	.70*	.50	.63	.62	.26	.77*	.62
Flexibility	.88**	.40	.79**	.53	.32	.55	.53

$$* \quad = p < .05, n = 9$$
$$** = p < .01, n = 9$$

We found no significant relationships between our ratings of the OJT functions and the Master Gunner's ratings of effectiveness. That is, a trainer's skill on any of the OJT functions did not predict his overall effectiveness as a trainer as judged by the Master Gunner. This may be attributed to the small sample size. The story got more interesting as we probed the Master Gunner further. We also asked him to clarify the factors that he considered when evaluating each trainer. He described five; directly quoted from the Master Gunner they are:

- Professionalism: Are they conducting themselves as NCOs?
- Proficiency: Do they get it right the first time?
- Responsibility: Are they responsible to their men?
- Personal successes: Do they lead the pack?
- Reliability: Can you rely on their personal discipline to complete a training tasking?

These are admirable qualities for trainers and leaders to have, but they are far afield from the functions that we addressed in this research. These factors are very general in nature. They do not address the quality or content of the interaction between student and trainer nor do they address the skill level of the student following training. After reviewing these factors,

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it is clear why the Master Gunner's ratings of overall training effectiveness do not correlate with our ratings of the functions of an OJT provider.

An important implication of these findings is that the Master Gunner did not generate any functions of the OJT provider's job that were not captured by the seven-function model. Certainly this test alone does not constitute validation of the model's comprehensiveness, but, coupled with our other attempts to search for evidence of additional functions, it provides one piece of support for our conclusion.

The Master Gunner's ratings of the key behaviors tell a different story. His ratings were not based on a set of interview data, but on his observations of these people as they provided training to their crews over the years. The correlation between our ratings of the interview data and his ratings based on personal observations was significant ($r = .344$, $p < .05$). This finding was encouraging. Although the unit Master Gunner had not learned about the model of OJT or the seven functions of an OJT provider, he was able to recognize and identify the behaviors that are indicative of good OJT when they are exhibited by his trainers. This suggests that these behaviors are observable, that their observation is reliable among diverse observers, and that what we extracted from the interviews mirrored what occurs during training in the unit.

Analysis of Observational Data

One goal of this study was to determine how OJT occurs in an armor battalion and to describe the practices of good OJT providers in that domain. The first part of this goal is relatively simple. OJT does occur in the ONG and we can describe what we learned through observations and interviews. We used early versions of the OJT model to guide these observations. These early versions were based on our review of the literature and our own experiences. However, as our interviews and observations progressed, our understanding of the model as well as our understanding of OJT in the ONG evolved. Our conclusion is that the seven functions of the model as described in this report represent a comprehensive depiction of how OJT providers do their job in the ONG. That is, there were no cognitive task-analytic elements of the OJT providers' job that we could not account for by coding for awareness and reported performance on these functions.

The second part of the goal is more difficult. Originally, we had hoped to find a highly experienced person in the battalion who would not only be a recognized expert at training other people, but would also be able to elucidate clearly and in detail how he does it. We did not find this person. Therefore, we cannot use this person as a model for describing the prototypical OJT trainer in an armor battalion. The preceding discussion concerning our analyses of the interview data is our best description of the OJT practices of the most experienced trainers in the armor battalion. But, these results did not lead us to that prototypical trainer. What we discovered through our observations was that (a) no single

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person met the criteria for a good trainer as depicted in our model of good OJT, (b) all of the seven OJT functions apply to the armor domain, and (c) there are a number of people who can serve as exemplars of one or two functions, but not for them all.

We would like to use these exemplars as a means of describing how OJT occurs in an armor battalion and as a means of communicating the strengths and pitfalls of their current OJT process. The following paragraphs discuss these points for each of the OJT provider functions.

Our analyses of the interview transcripts provided some insight into the practices of highly experienced trainers. But, these data represented a fairly small and elite sample of the individuals who must provide OJT in the ONG. Our observations and ad hoc interviews reached a broader sample of OJT providers and studied the less experienced trainers as they moved their crews through the training cycle. These observations enabled us to view how many TCs provide training for their crews, and they led us to several interesting findings.

Each of the functions which an OJT provider serves is important in this domain. We observed a number of cases where a specific function was served well and many cases where a function was not served at all. The following paragraphs describe some of these cases for each function.

Instruction

There are two key elements to providing instruction. One is to have a sufficiently large repertoire of strategies and techniques to employ in most of the situations that will be encountered. The second is to be flexible; that is, to know which technique to use in a specific situation and when to switch techniques.

Using the same list of strategies described in the Retail Company Track, we recorded the number of interviewees who reported using a strategy at least once. A total of 57 techniques were reported. Table 4-4 presents those reported most frequently. The table shows how many of the nine interviewees reported using a particular technique. Of the nine interviewees, one reported as many as 18 techniques; the lowest number reported was seven. The median number was 10 techniques. Conclusions drawn from these data in Table 4-4 should be limited because they do not indicate how frequently the interviewee uses the technique. Furthermore, these data do not present an exhaustive list of techniques used by the trainers in that the interview was not designed to elicit that kind of information.

Several interesting points can be drawn from these data, however. We observed many strategies being used appropriately in the ONG. Frequently, one particular strategy may be used to serve more than one OJT function. For example, question asking can be used as an instructional strategy or as a method of assessing, and the way it is done impacts climate and

the trainee's sense of ownership in the training process. In the interviews, the most frequently reported strategies were ones the OJT provider intended to use while providing instruction. Eight of the eleven strategies indicated in Table 4-4 are directly related to providing instruction. Three others (give tests, keep records, and pose open-ended questions) are frequently associated with assessment. Techniques intended to meet the other five functions of OJT were mentioned infrequently.

Table 4-4

Number of Trainers Reporting Use of Each Instructional Technique

Technique	Frequency
Describe procedural steps	9
Use training aids	9
Give tests	9
Keep records about progress	9
Observe performance	8
Provide performance feedback about incorrectness	8
Provide performance feedback about correctness	7
Model (watch me do it)	6
Adapt level and amount of aid to learner's current state	6
Pose open-ended questions	5
Break material into smaller pieces	5

There are a number of techniques that everyone reports using. These are used primarily because they are required by the training system. For example, the unit training program requires the TC to train his crew using aids such as the COFT and flash cards. Similarly, the training program prescribed by the Army requires everyone to take specific tests such as the TCGST and the Tank Crew Proficiency Course (TCPC). These techniques will be used regardless of the quality of the trainer. The issue becomes whether they will be used effectively.

Of more interest may be the techniques that some trainers have found useful, but are not in widespread use. A total of 31 techniques were reported by only one or two of the experienced trainers. For example, two TCs reported having trainees review and evaluate their own performance by use of video and audiotapes. Another TC reported teaching trainees to perform a task by having them instruct others how to perform the task. Clearly, these are techniques that the Army does not prescribe or train, but a few trainers have found them

effective. Where do they learn these techniques? One source of these techniques may be from the trainer's full-time job. Many of these individuals are smart, motivated people. They are able to bring what they have learned in their workplace and apply it to their National Guard duties.

A second issue regarding instruction is the flexibility with which a trainer can apply different techniques. It is not enough to know about alot of different techniques. It is equally important to know when to use them and to be skilled at switching from one to another.

A good example of these skills arose as we observed a TC teaching his crew specific tasks for the TCGST. The task was "Disassembly/Assembly of the Breech Block." The technical manual provides the performance standards for this task (must be completed accurately within 14 minutes), but does not provide a step-by-step guide for how it should be done. The trainer had learned an efficient method for completing the task when he had to do it 30 times during a 2-day period several years earlier. By performing the task many times in one day, the TC learned several procedures that enabled him to do it more quickly without scraping his knuckles or crushing his fingers under the heavy breech.

On this day, the trainer worked with several people sequentially. The first was experienced, had worked with the trainer before, and knew the task fairly well. The trainer allowed the crewman to perform the task from beginning to end without comment or guidance. The crewman completed the task accurately within the specified time limit. The second crewman had less experience, but was somewhat familiar with the task. The trainer allowed the crewman to perform the task on his own, but provided hints when he perceived they were needed. The third crewman was new to the unit and knew very little. The trainer first demonstrated the task, explaining it as he proceeded, answered the crewman's questions, and then provided hands-on guidance as the crewman attempted to perform the task.

In this case, the trainer recognized the expertise that he possessed and attempted to share it with others. In addition, he employed several different techniques to train the same task. Finally, he knew the limitations of each technique and could flexibly move from one to another depending on the abilities of the trainee.

In general, we found that most of the TCs were not aware of very many training techniques, and that they were not very flexible in applying these techniques. That is, they did not possess a large repertoire of strategies and they did not know when or how to switch among them. An anecdote that we heard repeatedly went like this:

> "First, I told him how to do the task. He tried it and couldn't do it
> right. Then I told him how to do it again. He still couldn't do it
> right, so I told him how to do it a third time, but the fool still
> couldn't do it right. Finally, I had to slap him in the back of the
> head."

Clearly, the trainer illustrated in this example did not see that the problem might be with himself rather than the trainee. Perhaps, he did not know another way to approach the problem. Perhaps he did not recognize that his technique was not working. Whatever the cause, the training goal in these kinds of situations is not met. The trainee's performance does not improve.

In summary, the data from our interviews and our observations indicated that a number of instructional techniques are useful and used appropriately in this domain. Some of these techniques are "hard-wired" into the unit's training program, and virtually all trainers use them. However, other techniques are unique to individual trainers and have evolved as a result of personal experiences. There are a variety of techniques that trainers have found appropriate and useful in this domain. These practices can and should be passed on to others.

Assessment

Assessment is an important component of training in the ONG. In fact, the training program has a series of performance evaluations built in. Soldiers cannot move to the next level without passing through a gate created by these assessments of their skills. Training in the COFT is based on a series of performance assessments or gates. COFT training comprises a series of scenarios which must be completed successfully and in a particular order before the trainee can progress on to live-fire gunnery. The COFT automatically measures crew performance based on elapsed time and accuracy standards. If a crew takes too long to complete an engagement or they fail to "kill" a sufficient number of targets, then they must repeat the scenario.

These types of measures assess the outcome of a given task, that is, whether or not the trainee succeeded. They are an effective method for determining whether to progress on to the next stage. However, they do not help with diagnosing why the trainee failed or succeeded.

For example, an outcome measure in the COFT would tell the trainer that the crew took too long for a particular engagement. But, why did the crew take too long? Which skill does the crew need to work on to get their engagement times down to a satisfactory level? In a common example, a gunner/tank commander team takes too long to engage targets in a COFT scenario. In this scenario, it is because they could not acquire the target quickly enough. The gunner uses the wrong strategy to search for the target. Thus, they are never able to find it on the battlefield. The trainer noticed that the gunner uses the wrong sight magnification while searching and that he moves the sight too quickly across the landscape. The crew does not need an instructor to tell them that their engagement time was too long. The COFT will tell them that. The crew needs the instructor to tell them why the time was too long, to tell them which skills they need to work on, and to have a technique for helping them acquire those skills.

Assessments of outcome are an important component of assessment, but they must be coupled with diagnostic assessments of process. The trainer must ask how his student performed the task in addition to how well. Only with such information can the trainer identify what skills the student must work on and develop a plan that will enable the student to acquire those skills.

Setting and Clarifying Goals

Setting goals is another function of providing OJT that is, to some degree, controlled by the ONG's training program. Many of the training goals are established by the training system. For example, all crews must have completed TCPC by the end of a specific drill weekend. Crews have goals already specified when they train in the COFT. They must complete specific tables in a specific order as they build up toward Tank Table VIII. These are examples of goals at a high level over which individual OJT providers have little control.

However, there are other goals that are important for effective OJT. These are the learning goals that come directly from the diagnostic assessments made by the OJT provider. As a trainer assesses performance and determines which skills the trainee needs to work on, he can make specific learning goals for the trainee and design a plan to help the trainee meet those goals. For example, a crew may have trouble completing engagements in the COFT. The trainer may recognize that the problem is the TC's inability to issue fire commands. The trainer may set up several learning goals for the TC where he first memorizes all of the fire commands, then practices saying the fire commands out loud as he commutes to and from work in his car, and then the TC practices shouting the fire commands in the presence of his crew. In this case, the trainer has identified several lower level skills that the TC must work on, and has given him a plan that will enable him to acquire those skills.

Another important issue in setting goals concerns working with the student when developing learning goals and the learning plan. Far too often, trainers develop goals and plans without informing the student that such goals exist or consulting the student during the development process. This reduces their effectiveness in at least two ways. First, it ignores an important source of information, the student. When incorporated into the process, the student can enhance the value of the learning goals and ensure the viability of the plan. In addition, informing the student about the learning goals and plan provides the student with the "big picture" of what s/he needs to learn and how s/he will get there.

We saw little evidence of TCs setting goals in the ONG. Rarely did TCs indicate that they built a training plan that extended over a period of time and that was tailored to the strengths and weaknesses of individual soldiers. Most often, TCs relied on the more global kinds of goals established by the unit training program.

Promoting Ownership

Our observations of the battalion verified the findings from the interviews. Most TCs have little awareness of this function and have little skill at providing it. However, promoting ownership proved to be somewhat more prominent in other tracks. Why would there be this difference among the tracks?

This may be because the TCs perceive ownership as a factor over which they have little or no control. That is, ownership is not something that the TC can give to the trainee, but ownership is something that the trainee must bring with him. This point argues even further for TCs to possess skills in promoting ownership. Owning the learning process is an important advantage for the student. If trainees do not bring with them a sense of ownership, then the TCs should do what they can to help the trainees develop a sense of ownership.

We did discuss ownership with several Platoon Sergeants. They indicated that TCs needed to have a sense of ownership concerning their tanks and their crews. The TCs must feel a sense of personal responsibility for the success and failure of their tanks. But, these TCs did not describe ways to foster a sense of ownership in their crews concerning their learning and performance.

Setting Climate

Most of the TCs recognized the need to set a good learning climate. They recognized it under a variety of names, and it was manifested in as many ways. These efforts fit under the names of interpersonal relationships, morale or unit cohesiveness, and motivation. These are different concepts that overlap to some degree. The common point among them is that they serve to create an open environment in which learning can occur.

TCs frequently referred to the interpersonal relations with their fellow crewmen as the key to success in a tank crew. Good relationships can foster a terrific crew; a bad relationship with any one crewman can destroy the crew. Even though most of the TCs recognize this as fact, few of them offered any proactive steps that they could take to ensure decent relationships. Most of them treated interpersonal issues as immutable. "Some people get along and others don't." "Some people can get along with anybody." "It was just a personality problem." Several of the most experienced trainers offered a couple of techniques for setting the climate. For example, one Platoon Sergeant reported soliciting opinions from each crewman individually. He would encourage his crewmen to share their thoughts about how training was progressing and about what they should be training. Another Platoon Sergeant talked about sharing his expectations with each crewman. He believed that the crewmen should understand what he expected of them, and that sharing these expectations opened a channel of communication between the trainer and the trainee. However, most of the TCs did not

recognize specific practices that they could implement to maximize the effectiveness of their interpersonal relationships.

Another common topic was morale and unit cohesion. Unit morale is often a factor of the larger organization. However, many of the TCs recognized that they can take actions to help improve or maintain morale and unit cohesion. For example, they described efforts to bring crewmen closer together. These included sponsoring social get-togethers (e.g., cookouts) as well as ensuring that crewmen do everything together during weekend drills.

Many of the TCs also take actions to motivate their crews. Most frequently these are relatively simple things like offering a prize or time off for the best performance. However, they can be on a larger scale such as the Top Gun award for the best crew in the battalion.

Sharing Expertise

What does it mean to share expertise? For many of the TCs, it means that they are more experienced and proficient as a tanker than anyone else in their crew, and that they should pass their skills on to their fellow crewmen. This extends beyond the simple explanation or recitation of procedures that can be found in a manual. More experienced tankers have learned various shortcuts and tricks-of-the-trade that they can pass on to others. However, there is considerable variability among the TCs concerning the amount of technical expertise which they hold.

Sometimes, the OJT provider does not have expertise to share. For example, Platoon Leaders do not possess skills at all of the tank's crew stations. They do not progress through the various duty stations. They assume the TC position as a matter of rank, not technical proficiency. Therefore, they do not possess the technical skill necessary to train others. Often, the gunner in the Platoon Leader's tank takes on the training responsibilities for that crew.

In other cases, the TC may not be proficient on a specific task. We observed a number of crews work around this problem. For example, a TC who has not driven a tank in a few years may not feel ready to teach a new driver certain nuances of the task. The TC may solicit a driver or other skilled person from another crew to spend some time helping the new driver learn.

We observed another excellent example of sharing expertise when senior trainers helped their crews by putting the gunnery tasks within the context of what they could expect to see on a battlefield or gunnery range. For example, many of the TCs learn their fire commands through memorization. They do not learn the meaning of the commands, only the text of each command and the set of conditions under which they should use each command. This makes it very difficult for them to generalize to an unfamiliar scenario. That is, they do not know which commands to use. On a number of occasions we observed a senior trainer

helping TCs understand how the commands evolved based on battlefield conditions and the meaning of each command. This exercise helped the TCs select which commands to use rather than regurgitating memorized material.

Our observations were consistent with the analysis of the interview data. TCs are very aware of the need for them to share expertise with their crews and, in most cases, they are aware of where to access the necessary expertise. The limitations with this function occur when trying to impart the expertise. As discussed earlier under "provide instruction," many Tcs have not developed the instructional skills necessary for transmitting what they know to others.

Learning Management

What is learning management? Is it a separate function of the OJT provider or an overall indicator of how well the OJT provider provides the other six functions? Our model of OJT claims that serving as a learning manager is more than the sum of the other six functions. Clearly, a good learning manager must be proficient on all six functions. But there is more to being a good learning manager than simply knowing and performing the other functions well. There is a higher level element of managing the various OJT functions, of knowing when one is needed over the others, of knowing how they interact. This requires the OJT provider to have a deep understanding or mental model of the OJT process. With this model, the OJT provider can understand and provide each function within the context of a big picture of the training process, to perceive when and why there is a problem, and to move among functions easily.

We observed several indicators of skilled performance as a learning manager in the ONG. They are:

- having a clear vision of what success looks like
- helping individuals develop a big picture by articulating intent and demonstrating how training tasks fit into a rational scheme
- working around learning barriers by taking advantage of learning opportunities when they do exist and creating opportunities when they don't exist
- displaying a strong positive attitude toward training; they know proficiency can be achieved and do not allow trainees to blame failure on unsolvable problems
- monitoring training and noticing when it is not going well; articulating what is not going right and developing an alternative course of action to remedy the problem
- demonstrating control over the learning environment and experimenting with different OJT techniques.

Discussion and Conclusions

Several sets of conclusions evolved as we conducted this study. They represent different topic areas, and are presented under separate headings below.

OJT Functions and Training

Clearly, the ONG relies on OJT as a primary means of training delivery. The unit leadership develops and supports the training program, but the TCs must conduct the training. Therefore, the focus of the unit training program is on the interaction between its TCs and the individual members of the crews. Neither the Master Gunner nor the Platoon Sergeants get in a tank to train crews other than their own. This responsibility lies with the TC. However, at this stage of their careers, TCs have mastered only the technical skills of a tank; they have not learned how to train others. The unit places considerable responsibility on these young NCOs to do something for which they have not been trained.

Because training resources are so limited, it is important that the training delivered and the resources expended be as effective and efficient as possible. It is important that trainers have the skills necessary to get the maximum amount of performance out of their crews within a limited amount of time. The first key to maximizing the effectiveness of the training and resources is to ensure that trainers have the skills they need.

The first step in addressing these needs will be to raise the awareness of the armor community concerning these issues. There is a lack of awareness that teaching, particularly in one-on-one settings, requires a specific set of skills. This was borne out when we asked a senior trainer in the unit to rank order the Platoon Sergeants in his unit in terms of their effectiveness in providing OJT. He was able to do this relatively quickly. When asked what he was thinking about when ranking these people he responded with the list of qualities presented in the subsection "Indicators of effective OJT." Again, these are desirable qualities, but they completely miss the functions of OJT providers that have been revealed as important by this research. Therefore, the first step should be to raise the awareness and skills of the unit's senior trainers and leaders. With this preparation, these leaders can then provide support, and perhaps the training, for TCs to develop their OJT skills.

A second step will be to implement a training program designed to help TCs develop their OJT skills. Recognizing the limited resources available to a National Guard unit and the high workload during training drills, it will be difficult to place an additional training requirement on TCs. However, this can be accomplished within the unit. We do not believe that TCs will need to go to another school to learn these skills. In fact, the skills needed to provide OJT are probably best learned *through* OJT. Each of these training drills can be seen as an opportunity for the TC to practice and receive feedback about his OJT skills. This approach would piggyback these requirements onto existing training events, therefore, minimizing the need for additional training resources.

But what would TCs need to learn and how would you train it? We did not meet a "super trainer" who skillfully served all of the functions of an OJT provider, but most of the TCs demonstrated some skills at providing some of the functions. However, our data indicate that all of the functions of an OJT provider are relevant here, that application of these functions can enhance trainee performance, and that these functions can be trained. This training should incorporate segments designed to raise awareness of OJT functions, to develop skills, and to sustain and reinforce those skills over time. The prototype training workshop produced in this project (as described in Section 6) demonstrates that with relatively little time investment of the participants, an effective package can be incorporated into existing unit training programs. In future work, this prototype can serve as a starting point for building a useable, effective training intervention for use in active Army field units as well as National Guard units.

Individual and Collective Training

One original tasking for this project was to study how collective training occurs on the job. We went into this effort looking for differences between collective and individual skills and for differences in how these skills were trained. To our surprise, we found that the ONG does very little, if any, collective training. The ONG does not train in teams beyond the level of the tank crew. That is, they do not train as Sections, Platoons, or Companies. Their ultimate training goal is to achieve success on crew gunnery. They never work with two or more tanks together at one time.

Therefore, we looked at collective training within the tank. How do they train crewmen collectively as a team?

When asked direct questions about team skills and team training, most TCs could not respond. Their answers reverted to individual skills. "The gunner needs to do this when the driver does that." However, they all talk extensively about how the crew must train together to do well. What is it that the crew learns when they train together, and does the TC do anything differently when dealing with the crew as a team?

Clearly, synchronization of tasks is an important issue. Each crewman must perform his individual duties well, but that is not sufficient. He must perform them at the right time relative to everything else going on in the tank. In addition, the crew must communicate with each other so that they know what the crew is attempting to do and so they can anticipate one another's actions. Much of this communication is prescribed by the procedures (e.g., fire commands), but successful communication goes beyond what is prescribed. For example, the fire commands go in only one direction. That is, the TC issues his fire commands to the rest of the crew. How can the crew communicate compliance with the fire commands? Clearly, one way is orally. However, another way may be through the equipment. For example, the TC may determine that the gunner has complied with his fire commands by looking through his sight to see where the gunner is looking. Using these methods of communication effectively requires a significant amount of practice.

Finally, and maybe most important, we heard repeatedly that in a good crew, every crewman knows what the others are thinking and what they will do before it happens. This implies that they have a shared understanding (mental model) of what is happening around them.

How do they get this shared understanding and how do they learn to communicate and coordinate? Crew training remains a private event. Direct observation of the entire crew as they train in the tank is very difficult. There simply is not enough room in the vehicle for an observer. In the ONG, the tank is the only device for training the crew as a team. TCs do take several steps to train their crews as teams. For example, during drills, the crew must do everything together (eat, sleep, work). But when asked about how the TC trains the crew in the tank, the answers revert to providing feedback to individual crewmen about their individual tasks. Furthermore, even though they recognize that a shared understanding is a characteristic of good crews, TCs do not identify this as a training objective.

Clearly, the ONG does not do much collective training when compared to active Army armor battalions. The guard units do not train as Sections, Platoons, or Companies. They never conduct maneuvers involving multiple tanks. However, some collective training does occur inside the tank when the crew trains as a team. What collective skills are trained at this level and how they are trained are important issues which should be investigated further.

Impact of the Training System on OJT Skills

The training program in any Army unit is highly regimented and standardized. Doctrinal and training manuals prescribe what is to be learned, in what order, how it is to be trained, and how it is to be evaluated. This regimented approach serves several good purposes. It ensures standardization across units and across time. In addition, it ensures that anyone who progresses through the training program attains at least a minimum level of proficiency.

Much of the training process is hard-wired into the system. In other domains, an instructor might have considerable freedom to select how to teach a topic or how to evaluate the students' progress. This is not the case in Army training programs. To some degree, this inhibits the development of good, capable instructors. This is not just an issue of motivation of the instructor, but also one of not having the opportunity to develop and practice individual teaching skills.

The Conduct of Fire Trainer (COFT) serves as an example. The COFT is a training simulation of the Gunner and TC stations of an M1 tank. It presents a computer-generated out-the-window scene for both crew stations. The COFT provides an excellent venue for the gunner and TC to practice their gunnery skills without incurring the cost of firing live rounds or driving a tank around the countryside. It enables an instructor to train a gunner and TC within the context of controlled scenarios. The COFT provides the instructor the capability to

assess performance using measures such as target accuracy and engagement time. It presents an automated evaluation of engagement outcome. Did the gunner hit the target and how long did it take? In addition, it enables the instructor to see what the crewmen see. That is, the instructor has monitors to view the scene through the tank's sights. A limitation of the COFT is that it does not provide a training venue for the entire tank crew. Therefore, the crew cannot train as a team in the COFT.

The COFT provides scores for performance and tracks performance through a series of progressively more difficult scenarios. The COFT can tell the trainer how well the gunner and TC did. That is, it provides an assessment of outcomes. Did they pass or not? Anyone can learn to operate the COFT and provide this kind of feedback. "Hey guys, you took too long on that scenario. Let's do it again."

What the COFT cannot do is function as a trainer. It cannot diagnose why the gunner took too long to engage a target or why the round missed wide and to the right. To be sure, knowing that the crewmen did or did not do well is important. This information leads to recognition that a problem exists. But, it is equally important to understand why they did well or not. This information serves as the meat of subsequent training and as the basis for improving performance. This is a basic skill for providing OJT.

Far too many of the young TCs use the COFT as a crutch. Rather than using the opportunity to develop their own skills of assessing performance and providing feedback, they let the machine be the trainer as the human becomes a computer operator. Training devices such as the COFT can be tremendously useful and enhance the effectiveness of training. However, they must be used to support the trainers, not to replace them. Therefore, the Army must still focus on helping individuals develop the effective OJT skills.

SECTION 5: OJT IN THE NEONATAL INTENSIVE CARE UNIT

Goals and Selection of NICU

We had several goals that we believed could be furthered by performing one of the study tracks within the health care sector. A portion of the Phase I study had been carried out with Coronary Care Unit nurses and we have conducted several additional studies of decision making using Neonatal Intensive Care Unit (NICU) nurses. Based on these studies, it seemed to us that the NICU would be a useful and interesting additional testbed for our model of OJT, for several reasons. First, we wanted the domains we selected for study to represent a range of task complexity and skill requirements. The ONG and Retail Company tracks had provided excellent data, but skills in each tended to be middle to low-end. After considering several different areas within health care, we chose to study NICU nurses. The NICU provides care primarily for infants who are low birth weight (less than 2500 grams) and/or those born before 37 weeks gestational age. Preterm infants are at high risk for a variety of neurological, motor, and social-emotional delays which may vary from subtle to profound. They typically require long-term (2-6 months), highly skilled medical and nursing care. The NICU offered a dynamic, high risk, and technologically complex worksetting in which to study OJT. Clearly, NICU nursing represents "high-end" skills.

The NICU also represents a setting in which proficiency can only be acquired via substantial hands-on experience. There is no way to come to the NICU prepared, except to have worked in another NICU. Academic nursing programs do not cover care of preterm, low birth weight infants; nor does nursing experience with critically ill adults or even healthy newborns adequately prepare a nurse to care for premature infants. OJT in the form of orientation to the NICU is the beginning of on-the-job learning and hands-on experience that are essential for eventually attaining expertise. NICU nurses report that it takes two years to become proficient and 3 to 5 years to become truly skilled at their job.

Last, we believed the NICU would provide additional insight into collective training issues. Critical patient care increasingly requires involvement of a health care team. Specialization of function and of medical disciplines means that quality of care depends on communication and coordination across physicians, RNs, LPNs, specialty areas (e.g., occupational therapists, respiratory therapists, radiology technicians), and social workers, etc. The collective nature of hospital care may not be explicit—many hospitals continue to be organized and staffed in a stratified, segregated fashion. Nurses interact with and report to other nurses, physicians to other physicians, and so forth. Interactions across strata are ritualized and highly structured. Nonetheless, particularly in crisis situations, communication and coordination may determine whether a patient lives or does not.

Health care providers acknowledge these interdependencies, even if they do not use terminology like "team" or "collective" skills. Preliminary interviews with Nurse Managers

and Clinical Nurse Specialists confirmed the view that collective skills are important aspects of critical care nursing. We saw this as an opportunity to study how collective functions and the skills required to perform them are taught within an OJT setting. In the NICU, for example, a baby who "crashes" is immediately surrounded by nurses, physicians, and respiratory therapists working smoothly and as a team to restore heart rate, blood pressure, and respiration. How does an experienced nurse help a novice nurse acquire the skills and understanding necessary to step into such a situation and perform effectively?

OJT for NICU Nurses

OJT programs in the form of orientation periods that are overseen and supervised by an experienced nurse are very common in US hospitals. And although the extent of training that hospitals provide to preceptors about their OJT function varies, the OJT provider role is a recognized, formalized function. Orientation to critical care units typically last 6 to 10 weeks. The majority of that time is spent on the unit performing patient care and other bedside nursing tasks under the supervision of a nurse-preceptor (the preceptor, hereafter) who has agreed to oversee the orientation. The preceptor role is a formalized function that carries with it a certain status and recognition by other nurses on the unit as well as by Nurse Managers. Preceptors are typically recruited by Nurse Managers and/or Clinical Nurse Specialists. Discussions with Nurse Managers and Clinical Nurse Specialists suggest that what they seek in preceptors is high-level clinical nursing practice combined with good interpersonal skills and verbal abilities. Whether, and to what extent, nurses receive training in how to be effective preceptors appears to vary considerably from hospital to hospital.

Typical Orientation

Our data reveal a consistent picture of NICU orientation as a graduated sequence of increasingly complex tasks and acuity of care. Nurses typically start with 7 to 10 days of classroom instruction in hospital and unit practices and procedures, and an introduction to neonatal nursing. Toward the end of this initial phase, orientees begin to spend time with their assigned preceptors doing bedside nursing. Orientation within critical care units is typically organized so that orientees are exposed over time to an increasing acuity of care. In NICU orientation, first patients are usually full-term, healthy newborns, and the orientee has the opportunity to become accustomed to handling and providing care for infants who are in good to excellent condition. Next, orientee and preceptor move to the NICU, caring for "stable feeder-growers." These patients are no longer considered acutely ill, are fed by mouth and require few medications or special interventions. They are in good condition but are still too small to be discharged. An initial patient load is typically two feeder-growers, with care shared between preceptor and orientee. Over the course of 3 to 5 days, the patient load increases to four feeder-growers (this is considered a full patient load of non-critical infants), with the orientee able to provide most or all care for those four patients. Only then do the preceptor and orientee move on to more critical patients.

Over the next several weeks the preceptor-orientee dyad will care for premature infants who require respiratory support, tube feedings, who are recovering from surgeries, are intubated, have arterial or other lines, IV sites, whose blood pressure, heart rates, and respiration must be constantly monitored. Their patient load will be increasingly comprised of babies who are very small, very premature, very unstable, very ill. At each step they will begin by sharing care for a single patient, working eventually to providing virtually all nursing care for 2 to 4 critical, similar patients. Over this same period, the preceptor will be on the lookout for opportunities for the orientee to witness and then participate in intubations, critical admissions, codes, and other emergency events. Simultaneously, the orientee will be learning to implement an extensive set of unit and hospital policies and procedures.

With each new class of patient or type of event, the preceptor initially takes a lead role—demonstrating what to do and how to do it, and allowing the orientee to observe experience-in-action. Many (though not all) preceptors simultaneously explain, instruct, answer questions, or provide other learning support while they perform the task. As the orientee gains experience with that particular set of tasks/type of patient, s/he takes over more and more of the task. Concurrently, the preceptor moves into the background, making herself available as a resource and ready to intercede in the event of an emergency. Over the course of 6 to 10 weeks the preceptor-orientee dyad will progress through this sequence again and again, as the orientee is confronted with each new set of skills, class of patient, type of emergency.

Relationship between Preceptor and Orientee

Typical orientation is one-on-one (sometimes one-on-few), personalized, and highly interactive. The preceptor may work back and forth between orientee and unit management to negotiate for additional OJT time, discuss difficulties and report on progress. Preceptors report as their goal that by end of orientation, the new nurse is capable of providing safe, competent, basic patient care. Note that this is considered a minimal level of critical care nursing skill, but it is all preceptors believe they can accomplish or reasonably expect of orientees, given the enormous amount of information to be learned and skill to be acquired in that short time period.

Implicit in the relationship between preceptor and orientee is the recognition that their eventual relationship will be one of colleague and co-worker, rather than manager/supervisor and employee. Although both parties recognize that the preceptor has longevity and a "place" in the unit culture, they also know that she has neither the right nor the responsibility to terminate employment, for example. And once the orientation period has concluded, she does not have input into performance appraisal or salary review processes. As a result, there is a strong quality of preceptor as a facilitator-guide to a less-seasoned peer, rather that a supervisor/manager of an assistant.

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Summary of Findings

- Ratings of nurse-preceptors' awareness of the seven OJT functions and reported skill at performing them offer good support for our model of OJT. As a group, the preceptors were highly aware of the importance of the seven OJT functions and highly skilled at performing those functions. The single exception was the promoting ownership function.

- Specific OJT practices that are typical of the NICU preceptors we studied reflect flexibility, adaptability, and a range of OJT functions. There is some indication that the scope, or repertoire, of OJT practices may be restricted.

- Training for collective tasks is carried out as if the tasks require only individual skills. Despite the recognition that critically ill neonates frequently require care, including emergency intervention provided by a health care team, the collective aspect of performance receives little explicit attention.

- Qualitative analyses of the interview data indicates that preceptors employ all seven functions encompassed by the OJT model and that there are not additional functions beyond those proposed by the model. In combination with empirical data, the findings provide solid support for the OJT model.

The Research

Data Collection

Preparation/Groundwork

A series of preliminary discussions were held with Clinical Nurse Specialists, Nurse Researchers and Nurse Managers associated with NICUs at two hospitals (Miami Valley Hospital, Dayton OH and Columbus Children's Hospital, Columbus OH). These sessions provided a forum for researchers to learn about NICU and hospital approaches to orientation and precepting; and for Nursing staff to learn about the goals of the study. Given our interest in collective tasks and training of collective skills, a portion of each meeting was devoted to discussion of these topics. We sought input on how to focus planned interview sessions on areas of nursing practice where collective skills are relevant, and best ways to facilitate that discussion.

Each hospital also provided us with copies of orientation packets that are given to each preceptor-orientee pair. These materials essentially comprise a NICU "curriculum" for new nurses. They contain a wide variety of materials including checklists and descriptions of tasks that must be completed or skills that must be acquired by end of orientation (e.g., placement

of IVs, memorization of medications and usual dosages used in the NICU). The orientation materials were helpful in giving us a sense of the sheer volume of information and diversity of skills nurses are expected to master during OJT/orientation.

Participants were RNs working in the NICUs at Miami Valley and Columbus Children's Hospitals. Both hospitals are urban referral centers, and their NICUs are licensed as Level III perinatal units, providing specialized care for critically-ill neonates. NICU preceptors were nominated for inclusion in the study by NICU Nurse Managers and Clinical Nurse Specialists on the respective units. Many of our studies of decision making have relied on supervisors and/or peers to identify highly proficient performers in the workplace. We have found co-worker designation a more reliable source of highly skilled participants than such indicators such years of experience or length of employment. In the present study we asked for nominations based on demonstrated nursing expertise and skills and experience serving as a nurse-preceptor. Our own and others' knowledge engineering studies have shown supervisor and/or peer nominations are excellent sources for selecting highly proficient performers in the workplace.

Eight nurses, four from each hospital, agreed to participate. Study participants averaged 8.8 years of NICU nursing experience (range = 4 - 10 years) and had supervised orientation of an average of 20 nurses (range 10 - 30 nurses).

Interviews/Data Collection

Interviews were conducted by a pair of researchers in individual sessions with each participant; each session lasted approximately two hours. In order to generate data for cross-track comparisons, the interview sessions closely duplicated the format and content of those conducted for the Retail Company Track and the ONG Track. The major difference was that a portion of the preceptor interview was devoted to collective training issues. Otherwise, the semi-structured interview format and range of topics was similar across the other two data collection efforts.

Briefly, each preceptor was asked to identify a recent orientee, and to "walk us through" that particular orientation. Once the preceptor had described the orientation from beginning to end, interviewers went back over the account clarifying details and probing for additional information. Next, the interviewers introduced the topic of collective skills, defined the term, and asked the nurse-preceptor for an example of an activity that required collective skills. Once an example had been agreed upon, interviewers asked for a description of how the preceptor typically trained orientees on that task and then probed for additional information and detail. Finally, participants were queried about each OJT function contained in our OJT model, as it pertained to their typical precepting practices. For example, they were asked how they usually assessed what the orientee had learned and what else s/he needed to know; how they set and communicated goals to the orientee; what sort of instructional techniques they

used, and so forth. This portion of the interview was intended to augment and verify information obtained from the initial, specific account regarding OJT practices.

All interviews were audiotaped and comprehensive notes of the interview session were prepared after each session. The notes, with occasional reference to the taped interviews, were the basis for subsequent data coding.

Analysis

Coding and Reliability

Given our goal to generate data that could be compared across tracks, we rated these data on many of the same questions, using similar measures, as had been used for the Retail Company Track. Coding definitions were kept comparable across these two data sets, and the same set of specific OJT practices was used to tally the number of preceptors who reported using them. (The full list of measures can be found in Appendix C.)

The two coders for this study had also coded the Retail Company data and had already established acceptable levels of reliability. To check for rater drift, they independently coded the one interview at which both had been present. Overall reliability remained quite good: average rho = .76 for rated variables. The percent agreement for presence/absence of mention of specific OJT practices was 72%. Given this indication of coder reliability, the remaining seven of the interviews were coded by a single coder.

Empirical Findings

The coded data are of four types: a) **global indices** of OJT provider skill, b) **awareness** of each of the seven OJT provider functions; c) **skill** at preforming each of the OJT provider functions, and d) **additional OJT practices**. Examination of the data suggests that this sample of preceptors is a highly proficient group of OJT providers. As can be seen in Figure 5-1, the preceptors were rated as "medium" to "high" on almost all the indices of OJT-preceptor functioning we coded. The high average ratings and small variances suggest a ceiling effect, one drawback of our efforts to maintain comparability of variables and rating points across study tracks. A description of major findings follows.

Global Indices

Two broad indices of OJT proficiency were rated: 1) our evaluation of the preceptor's overall skill, incorporating all the interview data, and our subjective impressions of the person; and 2) our evaluation of the preceptor's beliefs about her own proficiency at fulfilling the preceptor role. Means for these two variables were 1.4 and 1.1 respectively (where 1 = high) and they were also highly correlated ($r = .88$). Our view of the preceptor sample as

a high performing group matched their own view of their precepting skills as it was communicated to us during the interviews.
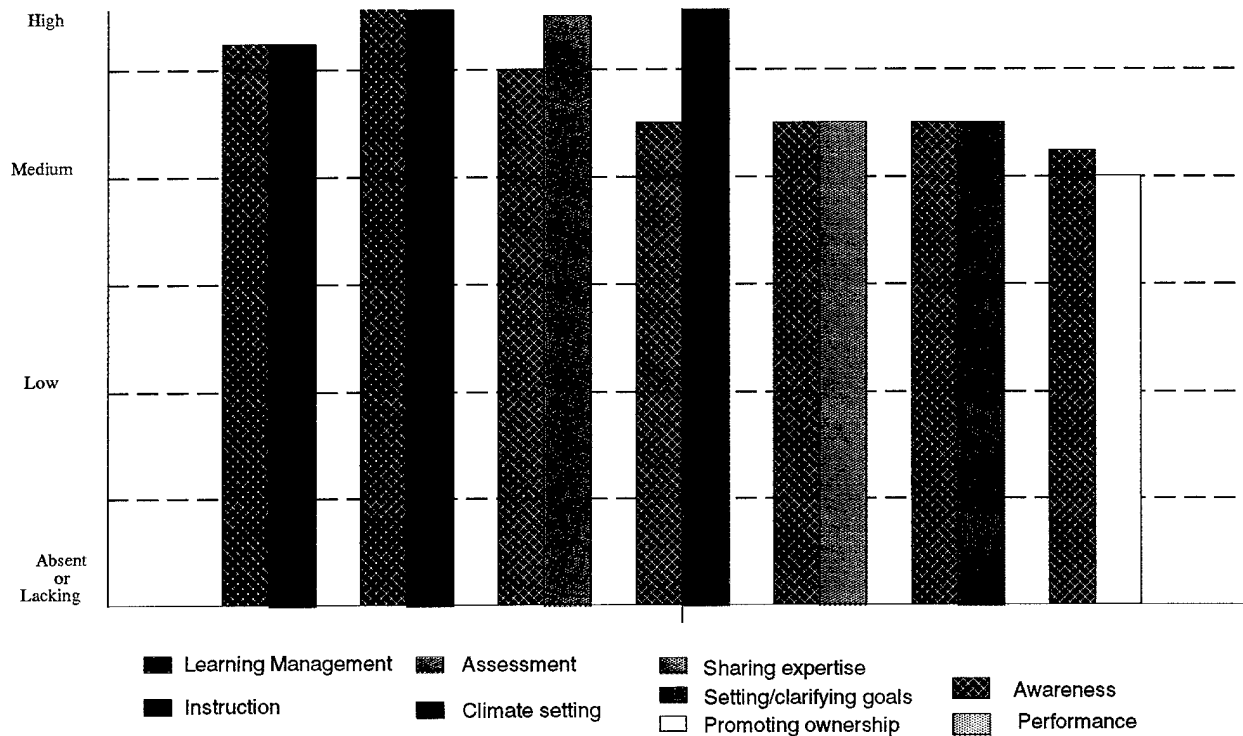
Figure 5-1. Mean awareness and reported performance of OJT functions by OJT Providers in the NICU.

Awareness

Ratings of awareness of the seven OJT functions suggest that as a group, the preceptors were highly cognizant of the importance of each of the seven OJT functions. Inspection of mean ratings across the seven functions reveals that preceptors in this sample were most aware (and uniformly so) of instructional practice as an important aspect of the OJT provider role, and only moderately attuned to promoting ownership of the learning process as an aspect of the OJT provider role. However, differences across the functions are quite small.[2]

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[2] Because of our small sample size, traditional parametric statistical tests were not appropriate for this analysis.

Reported Performance

Average reported skill level at performing each of the OJT functions fell between "medium" and "high." As a group, the eight preceptors were rated as most highly skilled at carrying out the learning manager and climate setting functions and least skilled (although still moderately so) at promoting ownership. By inspection, we can see that preceptors' skill at promoting ownership is considerably lower than both climate setting skill and instructional skill.

Reported Performance versus Awareness

We did not find evidence that preceptors' awareness of important OJT functions consistently exceeded their reported skill in performing those functions. Inspection of means for awareness and reported performance for each function show that in several cases, reported performance exceeded awareness (assessment, setting climate), in others awareness exceeded reported performance (promoting ownership, sharing expertise) and in still others, means were equivalent (learning management, goal setting). In this sample at least, there does not appear to be evidence of a discernable gap between the OJT provider's awareness of what they ought to be doing and their reported skill at performing those functions.

Additional Measures

As a group, the preceptors were rated good to high on a variety of other measures of OJT proficiency. Reliability on this group of measures was mediocre, and they will not be considered further in this report.

<center>Qualitative Analysis and Findings</center>

The global ratings of OJT provider skill, and the ratings of awareness/reported performance of the OJT functions provide a general sense of OJT proficiencies (or lack of them) in this domain. But they do not provide much of a sense of the "how" of precepting. What actions and behaviors are typical of preceptors, and how do they relate to each of the OJT functions? The method and design issues involved in tying discrete behaviors to higher level constructs are complicated, and we have by no means attempted such a study. But it seemed an important enough question that we sought some initial insights. We posed two basic questions:

- What practices and behaviors were reported by many preceptors, and which were mentioned by few or none?

- What links could we discern between specific preceptor behaviors and the OJT functions?

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The findings presented here are based on analysis of the reported use of 57 specific practices, coded for presence/absence of mention in a given interview and then summed across the sample. (The set of practices and how they were derived are described in the Retail Company report.) It is important to note that we did not query each participant about her use or non-use of each of the 57 practices. It is therefore possible that the individual reports we obtained do not represent all of each nurse's behaviors. On the other hand, data obtained from checklists of self-reported behaviors have their own set of methodological issues. Certainly if we had asked each participant about use or non-use of every practice we would have obtained quite a different picture—but not necessarily a more reliable or valid one.

In our view, it seems reasonable that across the sample of preceptors, typical behaviors and common practices would be more likely to be mentioned at some point during the 2-hour interview than would behaviors and practices that occur less often. Across the sample then, frequency of report has some validity as an index of specific behaviors that are more or less common among NICU preceptors. We could find no studies within the nursing research literature that had attempted such an analysis, based either on nurses' self-reported practices or on independent observations of preceptor behaviors with orientees. In the absence of any such studies it seemed that these data could at least provide an initial view of the specific, concrete behaviors characteristic of highly proficient preceptors.

We looked first at how many of the practices individual nurses reported using. We found that nurses in this sample reported an average of 26 separate OJT practices (range 12 - 33) over the course of the interview. Next, we examined relative frequency of mention for each of the practices, across the sample of preceptors in order to identify sets of behaviors and practices that are more versus less typical.

There are several aspects of these data we find interesting:

- The set of frequently mentioned OJT practices—those reported by 75% or more of preceptors—contain a range of techniques that reflect the breadth of the preceptor role. Contained in the set of typical behaviors are techniques for passing along information, for sharing one's own thinking and reasoning, for demonstrating procedure and technique, for assessing how the orientee is doing, for tailoring the learning process, and expressions of concern for orientee's morale and how best to support her continued progress. Clearly, high-performing preceptors do a great deal more than simply telling an orientee what to do and how to do it.

- Nearly 40% of the total set of OJT behaviors were infrequently or never mentioned. Given that the sample is comprised of preceptors recognized by peers and supervisors as high performing, and rated by our coders as such, we found the infrequent mention of this sizeable set of OJT practices surprising. If this is the case among a sample of very skilled preceptors, it seems likely that the range of behaviors and repertoire of OJT practices among less skilled preceptors may be

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considerably more limited. Instructional programs aimed at augmenting the set of OJT practices preceptors typically call upon could markedly enhance the orientation process.

- Some behaviors and practices contained in the total set are never mentioned because they are not pertinent to this domain. For example, "allowing a trainee to make mistakes so s/he can observe consequences" is a sound instructional technique in many jobs, but not when errors have dire consequences for one's patient. And given that the preceptor serves as a "facilitator/guide" and is not in a supervisory position relative to the orientee, behaviors such as "giving tests" or "offering incentives for mastery" would be seen as inappropriate. This is important because it points to the difficulty of devising a single set of prescriptive OJT practices and behaviors that generalize across jobs and work settings.

Table 5-1 presents the preceptor practices and relative frequency of mention across the group of eight preceptors.

Finally, we sought to explore linkages between specific practices and higher level OJT functions. To do so, we performed a category sort, carried out by the two researchers who had been primary interviewers for the NICU track. We approached the category sort task with the notion that any individual practice could (and likely did) serve several functions. Hypothetically, every bit of behavior has multiple impacts and meanings. Each practice was examined for its role in carrying out all seven functions, rather than requiring independence across functions.

Although we discussed each practice in terms of the multiple OJT functions it might serve, the set of practices that we identified as linked to multiple functions was relatively small. Moreover, we noted few instances in which preceptors explicitly acknowledged the multiple impacts their practices might have, in contrast to data obtained in the Retail Company Track. Nurse-preceptors are highly focused on presenting and explaining the NICU environment to the orientee; it may be that they are simply less focused on their own specific behaviors, and have not developed as holistic a view of the precepting process, as compared to OJT providers in the retail environment. This may be the reason why attempted category sorts in the Retail Company Track did not produce clean distinctions among these strategies in terms of the function they primarily serve.

Two separate sweeps were made. First, we sorted the 57 practices and behaviors into discrete stacks representing each of the seven OJT functions. We discussed each practice in detail, sharing examples from the interviews and eventually converging on a description of the function or functions they believed each practice served. At the end of the session, each of the 57 practices had been linked to one or more OJT function, and each OJT function had been assigned a set of specific practices.

Table 5-1

OJT Practices Reported by Nurse Preceptors

Frequently Mentioned Practices (reported by 75—100%)	Moderately Mentioned Practices (reported by 50—62%)	Infrequently Mentioned Practices (reported 12—38%)	Unmentioned Practices (reported by 0%)
• model • tell (describe procedural steps) • correctness feedback • incorrectness feedback • guide trainee through task verbally as they do task • be accessible/not on top of • open-ended questions • elicit questions • give reasons why • direct trainee's attention • use humor • observation • invite trainee to voice worry/stress/fear • set performance goals • evaluate trainee's questions • keep other employees informed about trainee progress • monitor body language for understanding • think out loud while demonstrating • put trainee at ease • adapt amount/level of support to learner's current state	• ask "how it's going" • role play • closed questions • elicit reasons • shadow trainer • assign to in-house experts for periods • be patient • maintain records showing progress • summarize • encourage trainee to summarize • display confidence in trainee's ability to perform target task • encourage trainee exploration—work environment • convey big picture/ context of job	• elicit trainee predictions re: cause-effect • hints/prompting • training aids • offer independent practice opportunities • explain why trainee needs to do it a certain way • allow trainee to make a mistake, observe consequences • scaffolding (hands-on help and taper off) • offer alternatives • elicit trainee suggestions (re: how best to perform task) • use examples, analogues • elicit trainee reflection on learning	• criticism • praise • give "panic button"- what to do when X goes wrong • give what can go wrong • break material into smaller pieces • generate job aid • praise in public • criticize in private • give tests • offer incentives for mastery • pause frequently during verbal explanations • link concepts/skills to trainee's past experiences • expose trainee to peer performance of task

Next we examined each function and the set of practices we had identified as "belonging" to it. The goal of the second pass was to identify aspects of each OJT function that were not contained within the sets of practices. The outcome of the analysis was a series of qualitative descriptions of the seven OJT functions as they are practiced by a sample of experienced, skilled NICU preceptors. Those descriptions follow. They are intended to convey a more detailed picture of the OJT functions as carried out by nurse-preceptors, rather than providing a checklist of "correct" practices and behaviors.

Assessment

Based on the set of 57 specific OJT practices, those that we identified as instrumental to the assessment function included behaviors such as observing the orientee, monitoring her body language and her questions, eliciting her reasons for performing a task a certain way, and asking for the orientee's own assessment of how things are going.

What's missing from the picture above is the totality of the assessment portion. As preceptors described what they do during an orientation period, it became evident that assessment is part of everything within the precepting/orientation task. It infuses every part of the preceptor's thinking, including her own interactions with the orientee, her observations of the orientee's interactions with others (patients, parents, nurses, specialists, physicians) and the orientee's manner—including voice tone, facial expression, what she says, how she looks, how she sounds. We probed for details on many on these parameters, and preceptors could and did describe an array of specific indicators that support their assessment. Indeed, their assessment is so thorough, so central and so constant that it becomes a matter of describing their world. It occurs to us that as critical care nurses, and particularly NICU nurses whose patients are pre-verbal, assessment is a central job skill. It seems likely that preceptors generalize well-honed patient assessment skills to the assessment of orientees' status and progress.

Sharing Expertise

The interview data contained relatively little information about ways in which preceptors share skills and expertise. It surprised us that this facet of OJT seemed relatively less salient. Some preceptors rejected the notion of sharing expertise altogether ("I don't try to do that") while others recognized the function but had little to say about how they accomplished it. Frequently mentioned practices we identified as instrumental to sharing expertise included modeling, and thinking out loud while demonstrating a task. Less frequently mentioned was identifying what can "go wrong."

The nature of nursing expertise is a matter of some controversy within the health care field. Nurses have been taught and many believe that nurses develop an "intuitive" side that accounts for their diagnostic, assessment, and clinical skills, and that intuition only develops

over time and accumulated experience. To the extent that nurse-preceptors ascribe to the view of expertise as intuition-based, they may not believe that it is possible to share their skills.

But it is also possible that sharing expertise is not a priority for nurse-preceptors because they do not see developing expertise in an orientee as a realistic goal. If they can get the orientee to minimal competency so that she can function well and safely with patients, then they have done their jobs as preceptors. They know it takes several years to develop expertise. To get a new nurse to the state of skill and understanding they themselves have is unrealistic.

Instead, they attempt to give the orientee a set of tools and solid foundation from which to gain expertise eventually. For example, preceptors share components of expertise—pieces of particular skill they have developed such as how to listen for a heart murmur or how to get IVs in a vein no bigger than a thread. And they draw on their own clinical experience to infuse present cases and incidents with meaning. Preceptors do a great deal of debriefing—at the end of a shift or after an emergency—as a way of passing along the package of skills, knowledge, and hands-on experience that surrounds a particular type of event.

Setting Climate

Preceptors clearly view the tonal quality of the preceptor-orientee relationship as important to the success of orientation. Their efforts in this area are highly focused on supporting the orientee during a difficult and challenging period. They describe the NICU as an intense and demanding work environment, and orientation as tough and often overwhelming. They see an important aspect of their role as helping the orientee develop a sense of confidence and competence. Frequently mentioned practices in this category include putting the orientee at ease, the use of humor, inviting orientees to voice their worries and fears, being patient and showing confidence that the orientee can perform a target task, eliciting questions and making sure the orientee is comfortable asking them, and delivery of feedback about the correctness or incorrectness of performance of a target task.

Several preceptors noted the importance of establishing a peer relationship, and that certain behaviors that would be appropriate in an instructor-student or employer-employee relationship are not so here. They pointed out that the orientee is not a subordinate, that within weeks they will be colleagues and co-workers and that it is important not to overstep the preceptor role. Several noted that they make a conscious effort to connect with the orientee on a personal level, to establish a friendship or at least to get to know them as a fellow worker. Thus, the emphasis in this function is distinctly different from what we found in the other tracks.

It may be that the effect of climate setting, and particularly the potentially negative impacts of poor interpersonal relations, may be quite different when the OJT provider is also the employer, manager, or supervisor. For example, we heard many examples of preceptors

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giving feedback about correctness/incorrectness. One preceptor told us that a nurse who is unwilling to tell an orientee what she is doing wrong, as well as what she is doing right, has no business serving as a preceptor. But we heard virtually no mention of use of praise or criticism. At first this seemed odd, especially given the motivational functions that praise and criticism serve. Then we realized that preceptors can assume good motivation. They don't have to create it or maintain it—in fact it may be crossing boundaries of what's appropriate between co-workers for them to do so.

Instruction

What struck us about preceptor's reports of how they carry out the instructional function was the "posture" or sense of the role they expressed. Their self descriptions seem less like one-on-one tutors and much more like instructors/classroom teachers. We found only occasional references to the orientee as an active, adult learner, or the importance of helping orientees construct a conceptual framework within which to understand NICU nursing. Instead, we found the instructional approach among preceptors to be fairly consistently unidirectional, and to have as an underlying message: I know what you need to know and how you ought to learn it. Frequent practices in this category included direct instruction ("telling"), summarizing content or events, hints and prompting, providing reasons for performing a task a certain way, directing the orientee's attention, asking the orientee to "shadow" the preceptor, and providing feedback regarding correctness or incorrectness.

We wondered to what extent such practices reflect the nursing role - nurses as "fixers" and people who are used to being in charge and telling others what to do (and how to do it). More than one preceptor described NICU nurses as "strong-willed and opinionated." In addition, we found that the set of frequently used instructional practices was fairly small, suggesting that nurse preceptors would benefit from opportunities to expand their repertoire of instructional techniques.

Promoting Ownership

Preceptors placed considerable emphasis on certain aspects of promoting ownership, while having little to say about other aspects of that function. Frequently mentioned practices include being accessible to (but not "on top of") the orientee, guiding the orientee verbally through the task as she performs it, role playing, and encouraging the orientee to summarize. Practices categorized as serving this function, but infrequently mentioned, include eliciting orientee's cause-effect reasoning, eliciting orientee's suggestions about how best to perform the task, and eliciting her reflections on what and how she's learning.

Preceptors devote a great deal of effort to providing protected opportunities to develop new skills. Preceptors spend much of their time standing to the side or behind an orientee, being physically proximate but not directly at cribside. This proximity allows the orientee to

take the primary nursing role while keeping the preceptor immediately available for coaching or hands-on help if that help as needed. It is a safety net that allows the orientee to try new things—caring for a critically ill baby, learning a new procedure—without concern that she may harm the patient. Preceptors describe this stance of distanced availability as among the most demanding aspects of precepting—as nurses, they are "doers" and the calm restraint required to allow a less skilled nurse to fumble through a task in order to learn it is difficult for many preceptors to master.

Preceptors also appear to be very good at helping orientees establish a sense of control over the orientation process, particularly as regards goal setting and pacing issues. Preceptors report that they hold frequent discussions with the orientee regarding when and how quickly to move ahead. The orientee's "comfort level" is considered a key indicator of the appropriateness of progress, and preceptors encourage orientees to think and talk in terms of their own internal sense of confidence and competence as they confront and master new tasks.

One aspect of promoting ownership about which we heard relatively little concerns efforts to facilitate the orientee's development of a sense of herself as an active learner. Adult learning principles emphasize the importance of learner as information-seeker and constructor of a coherent framework of knowledge and skills. Given the range and complexity of information NICU orientees must learn, it would appear that OJT which places greater emphasis on the orientee's cognitive constructions would be beneficial.

Setting Goals

Preceptors and orientees in both hospitals reported that they rely heavily on materials contained in the orientation packet to define curriculum and set goals. When asked directly about goal-setting activities, a few preceptors reported that the orientation packet contains all the relevant goals—in effect, the function is accomplished for them.

However, preceptors' reports also contain a number of activities that have a distinct goal-setting flavor. For example, most have daily or weekly meetings with orientees to discuss progress and determine next steps. Preceptor and orientee together often discuss and then request particular patient assignments. The preceptor may also go to the unit charge nurse and ask to be alerted if a particular procedure is to be performed, so that the orientee can have a chance to participate. The purposeful selection of patients and procedures has clear goal-setting components, because it establishes the next set of tasks/skills to be acquired.

In addition, some preceptors describe goal setting that occurs at a very high level, encompassing a long view of how basic procedures and skills they are helping the orientee acquire will develop and evolve over time. They think in terms of laying groundwork for eventual skill, competence, and expertise. Some share this view with the orientee, others do not.

Learning Management

Practices categorized as serving this function included adapting the amount or level of support to the learner's current state, keeping other personnel informed about orientee's progress, and arranging for learning opportunities with nurses with special skills. These few practices do not encompass our view of the learning management function, or describe preceptors we believed were particularly skilled at the function.

Our model of OJT posits the learning management function as more than a composite of the other functions. An OJT provider may be good at many or all other functions without necessarily being particularly adept at learning management. The qualities, behaviors, and practices that describe the preceptor as a learning manager and that go beyond the qualities embodied by the other six functions include:

- The preceptor has a mental model of the orientation process, and is able to describe components of the model and how they fit together. For example, in talking about climate, the preceptor will note how it may impact the way the orientee learns; or will describe how assessment information flows into her sense of the orientee's progress and informs her discussions of next steps with the orientee.

- The preceptor is able to stand outside the orientation process and observe how it's working, think about what to do with it, and how to fine tune it to better support the orientee.

- The preceptor knows she is part of the orientation process, but only a part. She is able to see how orientation and learning extend beyond her own input and activities with the orientee. Her ability to view orientation from outside her own role in it means she arranges for a variety of experiences with a range of tutors.

- The preceptor is able to hold a big picture view, to know how orientation activities fit together and how they impact the orientee. The ability to hold this high-level picture leads directly to the preceptor's planning, flexibility, fine tuning, and the ability to recognize and seize opportunities.

Training for Collective Tasks

As noted earlier, we believed the NICU domain would provide data regarding collective training issues, and OJT methods for facilitating development of skills required for collective tasks. Although we were prepared to develop coding methods and to perform analyses on these data, it became clear that they simply did not warrant that level of analysis. The interview data on collective training issues are consistently thin, despite efforts in each

interview session to obtain examples and probe for details. Preceptors recognize that certain tasks require a team or collective approach. There is even good agreement across participants in what those tasks are—"codes," critical admissions, intubations. But there is little flexibility or range in how preceptors handle these events within orientation. In the case of a "code," for example: if the infant is the patient of the preceptor and orientee, the preceptor will step into a lead role while the orientee watches. Later they will debrief on the event, talking in detail about how to handle such an event. If the infant is not the preceptor/orientee's patient they will watch together and then talk over the incident. If the orientee has observed one or more similar incidents, she may be assigned a minor role—to cut tape in the case of an intubation, for example.

Queries about how NICU personnel know what to do, what roles to take, and how to coordinate an emergency such as a "code" were repeatedly answered with "you just know." When asked how an orientee might learn how to step into one or another role, preceptors typically replied, "First she watches and that's how she learns what to do." The dearth of information on this critical aspect of orientation strikes us as noteworthy. Obviously the skills and knowledge necessary for collective tasks are learned somehow, and the issue clearly warrants additional study. It may be that direct observation of teams at work, followed by interviews and knowledge elicitation would be a productive approach.

Discussion and Conclusions

The NICU offered an opportunity to examine OJT for jobs that require high-end, cognitively complex skills; jobs in which the OJT provider role is explicit and formalized, and where collective skills are an important and recognized part of the job function. Interviews conducted with eight highly skilled NICU nurse-preceptors yielded a variety of empirical and qualitative findings that contributed importantly to the overall picture of OJT. Our major findings are discussed next.

Support for the Model

OJT in the NICU has major points of contact with OJT in other domains we studied, offering additional and solid support for our model of OJT. In a sample of preceptors nominated by Nurse-Managers and NICU Clinical Nurse Specialists as highly skilled, ratings of both awareness and reported performance of the seven key functions of OJT providers were uniformly high. Moreover, examination of the interview data revealed no evidence for additional functions beyond those already contained in the present model.

Additional convergent validity for the model was contained in interviews we conducted with four NICU nurses who had all completed orientation within the preceding year. The point of the interviews was to give us a look at the orientation process from the orientee's perspective. All four nurses described their orientation periods as intense and challenging.

Three of the four depicted their orientation experience as positive and their relationships with their preceptors as good to excellent. The fourth described her orientation experience as troubled and her relationship with her preceptor as difficult. Aspects of the orientation that appeared to discriminate among the orientation accounts bear directly on the model: climate setting and the degree of support experienced from the preceptor; communication between preceptor and orientee regarding goals, progress, pacing, and adequacy of reported performance; whether or not the orientee felt a sense of control over events; the preceptor's range of OJT practices, so that she was able to describe and demonstrate using a different approach if the orientee was unable to grasp a procedure the first or second time out.

Given the very small sample, conclusions about the orientation process from the learner's perspective are highly speculative. But as a source of convergent data, the orientee's reports line up nicely with data obtained from NICU preceptors, and offer sound support for the model of OJT presented in this technical report.

Gaps and Disparities

Even in this high-performing sample, we found evidence of skill gaps and disparities between awareness and reported performance that deserve mention. They include:

- Preceptors are most aware of and most skilled at performing an instructional function and least aware and least skilled at promoting ownership among orientees.

- Preceptors seem unaware of the power of fostering active information seeking and of helping the novice to construct her own set of understandings.

- The range and repertoire of OJT practices were smaller, more constrained, and less flexibly applied than expected. We believe that training programs designed to help preceptors augment their OJT skills would be beneficial.

- Training for collective tasks is carried out as if the tasks required only individual skills. Despite the recognition that critically ill neonates frequently require care— including emergency intervention—provided by a health care team, the collective aspect of performance receives little explicit attention.

Situational Effects

Findings reported here suggest there may be pivotal differences across domains in the specific nature of what constitutes "good" OJT. In the NICU, for example, sharing expertise appears to be less salient than other OJT functions. Similarly, some specific practices and behaviors that work well in other domains appear irrelevant or even inappropriately risky in this domain.

Future Products

Although there are a number of studies and reports on precepting within the nursing research literature, we found no studies of what preceptors actually do. To date, the research has concentrated on a variety of attitudinal variables or presentation of prescriptive models of precepting. This study offered a view of OJT and the precepting function that we believe will be a solid contribution to the nursing research literature. We anticipate publishing a shortened version of the findings presented here in a nursing research journal within the coming year.

SECTION 6: OJT Workshop

The discussion in Section 4 paints a picture of how an armor battalion conducts OJT and relates these findings to the model of OJT described in Section 2. Clearly, OJT providers in the National Guard do not perform well on all seven functions described in the model. In fact, reported performance level on any one of the functions is sporadic and idiosyncratic. We believe that this reduces the effectiveness of the training that does occur and increases the demand for training resources. It is important to implement training interventions that will help trainers develop the skills necessary for them to provide effective OJT. Thus, whether trainers can learn these skills and how they can be trained best have become important issues.

To address these issues, we developed and implemented a prototype workshop for the Ohio National Guard (ONG). The workshop focused on the Platoon Sergeants in two companies of the battalion. We did this for two reasons. First, the Platoon Sergeants had significantly more experience than the typical TCs in the unit. This enabled the workshop leaders to focus attention on these experiences and enhance participation. Second, each of the Platoon Sergeants serves as a TC and has three other TCs directly under his control. Therefore, teaching eight Platoon Sergeants provided an avenue for reaching at least 24 other TCs. Our goals for the workshops were:

- to enhance awareness of OJT functions
- to provide opportunity to develop initial OJT skills
- to develop courses of action for workshop participants to pass OJT skills on to TCs in their platoons
- to evaluate effectiveness of workshop techniques
- to evaluate ONG personnel's acceptance of OJT concepts.

Development of the ONG Workshop

Our process for developing the ONG workshop was guided by two factors. First, we had available a number of experienced trainers who were willing to participate in the development effort. Second, we did not have sufficient resources to conduct an extensive evaluation of the resulting workshop. Therefore, we believed it was important to optimize the quality of the prototype to the extent possible. We accomplished this through extensive user involvement throughout the process and through iterative reviews, trials, and revisions to the training materials. These iterative and formative steps served to ensure the success of the workshops without expending considerable resources for a formal training evaluation. This developmental process is described in the following paragraphs.

The ONG workshop evolved from two prototype seminars developed and conducted early in this project. A local power company had recognized several problem areas, and expressed interest in helping their highly experienced employees train less experienced

employees on the job. This proved a perfect opportunity to study OJT in a technical domain and to begin learning about how experienced trainers might enhance their skills in providing OJT. The Dayton Power & Light (DP&L) seminars are described briefly in the following paragraphs. Kyne (1995) provides a complete description of the work; this document is presented as Appendix D.

Our objective with DP&L was to design a seminar that would enhance OJT skills for two different groups of employees. The first group, service center managers, is responsible for controlling and directing human and equipment resources to ensure reliable service to customers. The second group, senior line technicians, is responsible for the technical aspects of getting gas and electric service to DP&L customers.

Our first step in the process was to conduct knowledge elicitation sessions with recognized experts from both groups, managers and line technicians. The knowledge elicitation methods were chosen to obtain information about technical skills and OJT techniques and practices. These methods were far more abbreviated than the ones used in the other three tracks. Therefore, data from this domain were not comparable in terms of level of detail to the other tracks, and were not subjected to the analyses conducted in the other tracks.

We considered the information obtained from the domain experts in concert with the literature review described previously and our understanding of the model of OJT at that time to identify objectives and methods for the seminars. The objectives were the same for the participants in both DP&L seminars:

- for experienced personnel to understand the nature of their expertise
- to help experienced personnel identify skill development objectives that would guide instruction of less experienced employees
- to teach OJT providers strategies that help to advance skill acquisition of less experienced employees through an OJT process

Although the goals for both seminars were the same, we designed different formats for each seminar, for several reasons. First, the managers were available for a longer time period than were the technicians. Second, the two jobs are obviously dissimilar. Different workshop techniques were required to address the different content areas of each job, and to advance participants' OJT skills in the training of that job.

Training for the managers involved two 3-hour sessions. In the first session, the managers focused on three tasks: identifying their own technical expertise that they would want to pass on to trainees, recognizing skill deficiencies in their trainees and identifying specific behaviors indicative of good performance, and recognizing OJT practices that could be used to both pass on their expertise and address trainee deficiencies. This final exercise resulted in a plan for providing OJT to the trainee. As homework, in the interim period

between the two sessions, the managers discussed the planned skill development objectives with their trainees and worked on building a stronger and more explicit OJT relationship with them. In the second session, the managers reviewed the OJT model, reviewed action on their plans, discussed what worked and what didn't, practiced different OJT behaviors through role playing, and revised their original OJT plans.

Because of time constraints, training for the technicians was much more truncated and involved one 2-hour session. The first set of exercises led the technicians into a discussion of the aspects of their own technical expertise and the skill development process of junior line technicians. The second set of exercises used the model of OJT as a framework for discussing concrete examples of OJT techniques.

We used a questionnaire to assess participant reactions to the seminars. Participants completed these surveys immediately following the seminar. Their responses were uniformly positive. The participants reported significant improvement in their skills for each of the functions of an OJT provider. The immediate value of the seminar included: (a) using the information to increase the effectiveness and frequency of communication with the trainee, (b) setting learning goals and monitoring trainee development, and making the trainers more aware of what is required to help junior employees develop.

More important, follow-up interviews conducted three months after the workshops revealed a number of instances where the participants had implemented successfully what they had learned during the seminar. For example, the managers developed training plans with their assistants and followed through on specific learning goals.

The seminar developed for DP&L served as a precursor for the ONG workshops. We incorporated our experiences at DP&L with the data generated from our ONG interviews and observations in order to develop the content and format of the ONG workshops. Several aspects of the DP&L seminar transferred directly into the ONG. First, we focused the participants' attention on the nature of their own expertise. In the case of the ONG, this was not technical expertise, but their expertise in providing OJT. We used the OJT model as a framework for this discussion. Second, we focused them on assessing the skills of others. Again, we turned their attention to skills for providing OJT, rather than technical skills on the tank. Third, we led the participants in their development of plans of action that would help them enhance the OJT skills of their trainees, who are the TCs in their platoon. The following section describes the content of the ONG workshops.

Content of the ONG Workshop

We conducted the workshops in two 3-hour sessions with a total of eight participants. The participants were Platoon Sergeants assigned to two companies in the battalion (four from each company). All but two of the Platoon Sergeants had some active duty experience with an average of 2.9 years in active duty. Bravo Company Platoon Sergeants averaged about 18

years of experience in the ONG; Alpha Company Platoon Sergeants averaged about 12 years in the ONG. Bravo Company had recently realigned its platoons; therefore, its Platoon Sergeants had relatively little experience with their current platoons ($\underline{M}$ = 1.4 years). Conversely, the other participants had an average of 7.8 years experience with their current platoons. All participants had extensive experience as a TC with an average of 5.8 years. The group averaged 4.2 years experience as Platoon Sergeants.

Workshop sessions were held on Friday nights as the Platoon Sergeants arrived for their scheduled weekend drills. Two months elapsed between the two sessions. The period between the two sessions was designed to enable the participants to implement some of the homework activities covered in the first session.

We had several objectives for the first session: to raise the Platoon Sergeants' awareness of the OJT functions, to help them assess their TC's OJT skills, and to develop some interventions designed to help their TCs learn OJT skills. We believed that the most effective method for enhancing the participants' understanding of OJT would be for them to relate the OJT functions to their own experiences. Therefore, our guiding principle for conducting these workshops was to stimulate the participants to talk about their own practices and experiences. Rather than presenting material in a lecture format, the researchers served as facilitators of the discussion, guiding the direction at times. This was accomplished through a series of exercises and discussions between the participants. The participant booklet used during this first session is presented in Appendix E. Table 6-1 presents an outline of the prototype workshop.

The first session was divided into four sections. The first two sections were designed to heighten the participants' awareness of the functions of an OJT provider, to elicit from them examples of the techniques that they use to accomplish these functions, and to identify problems and successes that their peers have with each of these functions. Our goal for these two sections was that the participants would have a better understanding of how they conducted OJT. We accomplished this through a series of discussions about each function.

Our researchers guided these discussions with descriptions of each of the OJT functions. At this time, we explicitly highlighted only four of the functions from the model: assessing, providing instruction, setting and clarifying goals, and setting and maintaining a good learning climate. Sharing expertise was subsumed under the function providing instruction; promoting ownership was subsumed under climate setting. We truncated the model for the purpose of this workshop for two reasons. First, at this point in the project, we had not observed much evidence of promoting ownership among the OJT providers. Lacking adequate numbers of examples, we were unsure how to introduce this function at the workshop level. Second, we had a limited amount of time to conduct the workshop sessions and were concerned that we did not have sufficient time to discuss in detail the entire model of OJT. This, in fact, was a well-founded concern and is discussed later in this report.

Table 6-1

Outline of the Prototype Workshop for the ONG

I. Session 1
- A. Introduction to the workshop
    1. Objectives and agenda
    2. Define OJT and terms
    3. Skill development exercise for assessing

- B. Introduction to the functions of an OJT provider
    1. Discuss definition of each function
    2. Identify techniques for accomplishing each function

- C. Skill development exercises to assess others as OJT providers

- D. Develop a training plan for OJT training of one Tank Commander

II. Session 2
- A. Review functions of an OJT provider
    1. Definitions and discussion of the functions
    2. Identify and discuss practices in the ONG

- B. Develop skills for providing OJT
    1. Review training activities since Session 1
    2. Skill development exercises

- C. Build an implementation plan
    1. Assess each Tank Commander as an OJT provider
    2. Establish learning goals for each Tank Commander
    3. Develop a training plan for OJT training of each Tank Commander

- D. Review and wrap-up

The third section of the first workshop session shifted the focus from understanding how the Platoon Sergeants conduct OJT to assessing how their TCs conduct OJT. This section comprised a series of exercises in which the Platoon Sergeants rated their individual TCs on each of the OJT functions, and then identified specific observable behaviors indicative of performance on each function.

The final section focused on developing a plan of action which the Platoon Sergeants could implement over the next two months (one drill weekend). We first conducted an exercise

in which the participants identified the actions they could take to help their TCs build skills in providing OJT. Next, the participants identified those actions they were willing to implement during the next drill weekend. This commitment then evolved into a "homework assignment."

The second workshop session began with a review of the functions of OJT (see Appendix F). This review concentrated on techniques and practices discussed by the participants during the first session. We took the opportunity to discuss important concepts that had escaped discussion during the first session. This segment served not only as a review, but also as a means of discussing OJT practices of the Platoon Sergeants from the sister company. In the previous session, we tabulated the practices identified for each function. These practices served as a focal point of the review in the opening segment of the second session.

After this review, the participants engaged in a discussion of their homework assignments. As a whole they reported that not much had been accomplished. The Platoon Sergeants had had little if any opportunity to interact with their TCs. During the intervening drill weekend, the Platoon Sergeants had not been with their crews or their platoons. However, the participants had thought about the model of OJT and studied the materials from the previous workshop.

Next, we conducted a skill development exercise involving role play by the participants. The goal was for the participants to gain skills in assessment and providing instruction. During the role play one pair of participants served as trainer and trainee and played out several scenarios which are fairly common during training. The entire group then discussed how the trainer handled the exercise and how it could have been handled differently.

The final section of the workshop had the participants work out a training plan for each TC in their platoon. This exercise required the participants to assess each TC by identifying his strengths and weaknesses, and to establish learning goals for each TC. It also required them to design training activities to help each TC reach these goals. This final section was designed to provide the participants a guide for how they might continue to implement what they had learned during the workshop.

Outcome of the ONG Workshop

One goal of this portion of the project was to determine whether a training intervention could change and improve how people conduct OJT in the ONG. Early in the project we decided that this would not be a formal and in-depth training effectiveness evaluation. This choice was made for two reasons. First, the nature of the ONG unit training program would make it extremely difficult to conduct a formal training effectiveness analysis. Second, we decided that learning about how OJT is conducted in several task domains would be of more value than conducting a detailed training effectiveness analysis in one domain. However, we did collect data that reflect on these issues. These data are presented below as reactions of the participants and reactions of the researchers.

Reactions of the Participants

The participants reacted positively to the materials and the format of the workshops. This is reflected in their responses to an evaluation form which they completed at the end of the workshop. The instrument required the participants to react to ten statements using a 5-point rating scale. Verbal descriptors anchored each point of the scale:

> 1 = Strongly disagree
> 2 = Moderately disagree
> 3 = Don't know or have no opinion
> 4 = Moderately agree
> 5 = Strongly agree

Six of the participants completed the instrument. Table 6-2 presents the instrument's ten items and the mean rating for each. Responses to these items were very positive. All mean ratings were at 4.0 or above; the highest mean was 4.8 for Item 9. That is, the participants believed that the time spent in the workshops was worthwhile and that it would pay off in the future. Clearly, the Platoon Sergeants believed they had developed valuable skills as a result of the workshop and that these skills would be of use to them in the future.

These opinions were substantiated during follow-up interviews conducted by telephone with four of the participants about three months after the workshops. First, the participants remained enthusiastic about what they had learned. They continued to believe it was of value and had had an impact on how they provide OJT with their own crews. However, during this period, the Platoon Sergeants had little direct contact with the other crews in their platoons. The ONG training schedule does not contain ample time for the Platoon Sergeants to interact with other TCs and crews. During the training drills, the Platoon Sergeants had other duties to perform as well as working with their own tank crews.

This lack of time was exacerbated by a lack of command interest. One Platoon Sergeant provided an excellent example. During one weekend drill, as a follow-on to the workshop, he was preparing an exercise to help his TCs learn about the functions of an OJT provider. After telling his company commander about the project, he was told by the commander that he didn't have time for it and to drop it. Thus, while the workshops had a continued impact on how the Platoon Sergeants conducted OJT with their own crews, they had little or no opportunity to have an impact on how other TCs in their platoons conducted training.

Table 6-2

Mean Ratings on Evaluation Items Completed by Workshop Participants

Evaluation Item	Mean Ratings
1. I have a clearer framework for training my crew members and TCs.	4.5
2. I have more ideas about how to train different types of individuals.	4.2
3. I have improved my ability to recognize when one instructional strategy doesn't work and I'm better able to switch to another one.	4.2
4. I have more ideas about how to develop and maintain a good interpersonal climate while conducting training.	4.0
5. I have a clearer picture of what a successful TC looks like.	4.2
6. I am better able to see the gaps between proficient and less proficient Tcs.	4.5
7. I find it easier to explain the duties and tasks of a TC.	4.0
8. As a result of this workshop, I will do things differently when training TCs and crewmen in my unit.	4.2
9. The time that I invested in this workshop has been worthwhile and will pay off.	4.8
10. I will use most of the material covered in this workshop.	4.2

Reactions of Klein Associates' Researchers

We were pleasantly surprised at the level of interest and enthusiasm displayed by the workshop participants. All of the participants actively engaged in the discussions and took an open interest in the material. This was all the more surprising considering the timing of these workshops. All of the sessions were conducted on Friday nights between 1900 and 2300 hours. The Platoon Sergeants had already worked a full week at their full-time jobs. Most had driven several hours to make a 1800 formation at the armory. They had probably missed dinner. They knew that they had to get up early the next morning, and they also knew that their buddies were socializing down the hall while they sat through this workshop. Yet, the Platoon Sergeants found the workshop of interest and important enough to overcome all of these distractors. They remained engaged in the discussions well past the 3-hour period set aside for the workshop, and they returned to the second half of the workshop two months after the first.

The workshops served as a valuable data collection tool for us. Not only did these sessions provide us some interesting insights into an armor battalion, but they provided an excellent opportunity to capture the expertise of people who have considerable experience in

operating tanks and with conducting training. Having the participants relate the OJT functions to their own experiences enabled us to treat the workshop sessions in part as knowledge elicitation sessions. This allowed us to capture a wide variety of anecdotes, problem areas, and training practices in support of our other data collection efforts.

Conducting the workshops also provided us some insights about the relevance of the OJT model for training in an armor battalion. Interestingly, the participants did not argue the relevance of any of the OJT functions presented in the model. In fact, they openly accepted and agreed with the relevance of all of them. They could easily express the concepts within the context of their own experiences in being trained and in training others. From the discussions, it was clear that the Platoon Sergeants had experienced a variety of problems in training, but had never had a framework for understanding or thinking about those problems. Nor had they had a venue for discussing them or for enhancing their OJT skills. The model of OJT provided them a framework for understanding their strengths and weaknesses. Furthermore, it provided for them a framework for assessing the skills of others in providing OJT.

We reached several conclusions about the format of the workshops. First, it is essential to present the OJT concepts within the context of the participants' experiences. All of the participants have experience training other soldiers to perform various tasks. They have all struggled in teaching others, and whether explicitly or not, they have all wrestled with the issues concerning the functions of OJT. A major purpose of the workshops was to make these functions explicit. When framing the OJT functions within the context of their own experiences, the participants found it easy to understand the concepts and could envision how they may perform the various functions in the future.

We realize, however, that a difficulty may arise when teaching OJT skills to less experienced trainers. For example, our approach will not work best for workshop participants who are brand new TCs lacking experience teaching other people. These people will have no personal experience to use as a framework for understanding the OJT concepts. Therefore, future workshops will need to employ an approach that provides that framework for the inexperienced TC.

A second conclusion about the workshop format is that role playing can be an effective technique for this type of workshop if it is used judiciously. In this domain, there are numerous scenarios that are common to many of the trainers. Having a subset of the group role play through these scenarios provides a good opportunity for the other participants to observe and discuss a variety of methods for handling difficult or new situations and to extend their own OJT skill base.

A third format issue is one of timing. We found that two 3-hour sessions did not provide sufficient time to cover the material in the manner we had hoped for. Even when truncating the model to four functions, there was insufficient time to discuss each function in

depth and to ensure that the participants had a firm grasp the concepts and a start on OJT skill acquisition or enhancement. In future versions of the workshop we will need to address this problem. One potential solution is to provide materials in advance of the workshops, so that the participants will come to the sessions more prepared.

The prototype workshop developed here proved to be an effective method for introducing experienced trainers to the functions of an OJT provider. These workshops served three purposes. First, they provided Platoon Sergeants with a framework for understanding their own previous training experiences and for conducting training in the future. Second, the workshop provided a venue for developing basic OJT skills and for learning how to train others to provide OJT. Third, the workshops served to motivate these Platoon Sergeants to examine their role as a trainer in the unit and to be proactive in improving the way that they provide that training.

Recommendations

Teaching OJT skills will require a commitment from the unit leadership as well as an expenditure of already limited training resources. Why would the unit want to do this?

During peacetime, the primary mission of most units is to train. Units expend the majority of their resources to achieve and sustain a specified level of readiness. In armor units, the primary deliverer of this training is the individual TC. The TC assumes responsibility for training his crewmen to perform effectively as a crew. However, the TCs do not possess the skills which they need to train their crews effectively. Typically, tank crewmen rise to the position of TC based on their technical proficiency, judgment, and leadership potential; not on their ability to teach others. Furthermore, they have not reached a point in their careers where they have attended advanced schools. Thus, the TCs are given a responsibility for which they are not prepared.

Providing training for TCs to develop the skills they need to train their crews will enhance the effectiveness of the unit training program by improving the quality of training at the most basic level. This should be reflected in the performance of crews as they will learn their skills faster and attain higher levels of proficiency. Furthermore, improved training should result in more effective expenditure of limited training resources.

For these reasons, we believe it is important for the Army to implement a program designed to enhance OJT skills. The following paragraphs provide an outline of how this might be accomplished within the armor community. However, armor serves only as an example. We believe that a similar type of training is needed in many of the Army's MOSs. In developing this outline, we considered several factors as important; these are listed below.

- It is important to piggyback OJT training onto other training events to conserve resources.
- The focus of the training should be individual TCs.
- TCs will not be able to travel to special schools, so the training must occur within the unit.
- NCO leadership should conduct the training for TCs.
- Command support is needed to make this training a reality.

This study provided a basis for developing training interventions designed to help individuals acquire and sustain the skills they need to provide effective on-the-job training and to teach OJT skills to others. This training will be appropriate for a wide variety of MOSs in both the National Guard and the active Army. However, implementation of such a training program is not as simple as a few workshop sessions.

To be most effective, we must intervene at three different levels. Senior NCOs in the unit will be critical to the success of the training program. Therefore, the first level of training should be designed to ensure that the unit leadership possesses the skills that are expected of TCs. That is, Platoon Sergeants and Master Gunners must learn the functions of OJT providers. Equally important, they must know how to teach these skills to others because the leadership will be responsible for training the TCs. Platoon Sergeants and Master Gunners will not learn these skills in the unit. This level of training would be conducted best at the Armor Center in either the Master Gunner's course or one of the Advanced NCO courses. This will ensure the quality and standardization of OJT training throughout the branch.

The second level of training should be targeted specifically at the TC and should be conducted within the field unit. The objective at this point would be to raise the TCs' awareness of the OJT functions and to begin initial skill development. The workshop developed for this project demonstrated how this training can occur. The workshop format and content proved to be effective for accomplishing both of these goals. The unit's NCO leadership would be responsible for conducting this training. This level of training should occur prior to or shortly after assuming responsibilities as a TC.

The final level of training should occur within each platoon as the various TCs train their respective crews. That is, the TCs should learn to provide OJT on the job. The purpose of this training is to enhance the skill development begun in the workshop and to sustain these skills over a long period of time. To be effective, this cannot be a haphazard process, but must be a program which is guided by the Platoon Sergeant. The Platoon Sergeant and his TCs must identify learning objectives and develop a learning plan built around the scheduled training exercises. That is, the TC must develop skills at providing OJT as he and his crew develop their technical skills. The Platoon Sergeant would be responsible for observing the TCs as they train their crews and for providing feedback and assistance.

SECTION 7: GENERAL CONCLUSIONS

This technical report captures the highlights of our discoveries about how OJT providers in varied domains engage in the act of training someone to do a job, and how they think about and adjust what they are doing. It also describes the functions we believe OJT providers should be aware of and strive to fulfill. Finally, the report describes a prototype training program that was offered to OJT providers in an armor battalion of the Ohio National Guard. This program and the pilot workshops we presented in a non-military domain provide initial evidence that OJT provider skills can be trained in a workshop setting, and that the model of OJT helps to organize thinking about the full role of an OJT provider.

In previous sections, we described our most important findings about how OJT is provided in three different domains. In this section, we compare and contrast these findings as a means to synthesize them. Then, we summarize our progress towards meeting the goals of this Phase II project. Finally, we summarize ways in which the Army might use the research findings and products that resulted from this project.

Synthesizing Across the Tracks

Answers to our Focal Questions

As we said in the Introduction, the two big questions that helped us keep our focus as we studied how OJT occurs in these three domains were: What does a *good* OJT provider look like, and what do the variety of OJT providers we are studying actually do? We will answer these questions in turn.

What does a *good* OJT provider look like? Our working hypothesis is that much of what a good OJT provider looks like remains the same across work settings. However, there are some important differences that may be the result of factors associated with the work setting.

We can capture the similarities of good OJT through the seven functions of OJT described in our model. Good OJT providers are those who are aware of all these functions and who engage in practices that allow them to discharge those functions. By "practices," we mean both overt behaviors and cognitions (e. g., judgments, reflections, creative thinking). Repeated discussions among our research team throughout the data collection process and findings from our data analyses revealed that in every track, what we saw as good OJT could not be captured unless we considered all seven functions. Further, we did not find evidence of practices that were exemplars of another set—a set that lay outside the definition of the seven functions.

But, there are differences across tracks in the practices which good OJT providers employ to accomplish these functions. For example, OJT providers in the NICU domain do not engage in practices like giving tests or offering incentives for mastery, since they are not supervisors of trainees, and will soon be their peers on the unit. Engaging in those practices would produce poor climate in this domain, and would be seen as stepping outside their role. However, in the ONG and the Retail Company Tracks, these practices are not only appropriate but expected.

A second example is allowing a trainee to make mistakes so she or he can observe the consequences. This is an example of a practice that serves several functions: instruction, promoting ownership, and climate setting. As such, it can be a powerful practice to use. Of course, this practice cannot be carried out on all the tasks to be taught because either it would be unsafe or would produce irreversible negative consequences. However, we found in the ONG and the NICU that this practice was less regularly used than in the Retail Company Track. Most likely, this is because there are a greater number of tasks that have safety implications in these first two domains rather than in the retail environment.

A third example is the use of role playing as an instructional and an assessment practice. This was reported as a powerful strategy in the Retail Company Track, because of the need to teach trainees how to interact with customers. In the NICU, there is limited use of this practice. There was virtually no mention of this practice in the ONG.

The point of these examples is that they depict how good OJT providers engage in different practices while working on the same functions. The particular practices they use are ones that are relevant in their work setting.

Another way to answer the question of what a good OJT provider looks like is to describe examples of the training challenges present in each of the domains we studied, and to describe the ways that good OJT providers address those challenges. The examples that follow emphasize the cognitive complexity both of the tasks being taught and of the OJT process.

The Franchise Retail Company: The challenges to the OJT provider in this environment cluster around three difficulties:

1. Training associates quickly, so that profits aren't negatively affected

2. Accepting candidates for hire who may not be ideal for the job

3. Teaching skills that are difficult to train

First, new hires must be trained quickly because sales volumes in the average store cannot support labor hours for backup employees to cover the trainee's position for more than

a few days. In most stores, OJT providers feel they must give assignments to their trainees before they are ready.

For example, trainees may be expected to take customer orders before they are readily able to describe the store's range of services and pricing, both of which the customer asks about during the ordering process. Or, trainees may be expected to lead a transaction with a customer, which includes suggestive selling, before they feel comfortable and competent in that role. And, although OJT providers assume that trainees can ask other staff for help, the reality is that often other staff are very busy themselves, making trainees reluctant to ask for help. Further, even when trainees do ask for help, they often feel inadequate in the eyes of the customer. Customers expect fast service by knowledgeable associates—they don't like to wait while someone else is consulted. This is a company in which excellent customer service is expected.

The best OJT providers we interviewed created easy-to-follow job aids for new hires who hadn't yet learned all the information they needed. Others produced name tags that read "Associate-in-Training" to relieve some of the pressure from customers, and to balance the expectations. Another technique involved spending a small amount of time at the end of each workday (since time was in short supply) going over difficult customer interactions. To do this well requires advanced skills in instruction and assessment as well as in maintaining a good climate and promoting trainee ownership. For example, it requires good skills in question-asking, to probe for relevant information such as what the trainee noticed about the customer when the situation became difficult, how that made the trainee feel, how the trainee reacted to those feelings, etc. And, it requires advanced skills in helping the trainee to generate other ways to handle the situation.

Concerning the second challenge, sometimes new associates are hired even though the OJT provider knows they aren't ideal for the job. Because these are entry-level positions, the company is vulnerable whenever the labor market tightens. Often, new hires are young and relatively immature. They might not have acquired a work ethic, and many do not have the social skills needed to interact well with the public. Nevertheless, the OJT provider must train new hires so they know how to deliver high levels of customer service, and how to contribute to the smooth running of the store through practices like anticipating and preventing printing backups.

Third, several of the skill sets that must be taught are very difficult to train. Some relate to printing from negatives. For example, teaching trainees how to recognize in a negative that they need to make a particular color-balancing correction because of the subject matter (e.g., snow versus water against a bright blue sky) is essential to keeping down the cost of paper waste. If printers cannot recognize these situations in advance, and if they do not learn how to adjust the printing machine accordingly, they will produce prints that must be re-done later. This not only adds to the store's variable costs (i.e., paper waste), but it poses a

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risk to providing excellent customer service: The bad print might slip through the quality checking process and wind up in the hands of a dissatisfied customer.

Some of the best OJT providers we interviewed made up games to teach about color balancing. One game involved comparing to a correct print roughly 25 prints from the same negative that were off balance by varying degrees. Initially, trainees could see all of them at the same time, in a color wheel, and could learn from the set which prints had too much or too little of each of three primary colors used in the printing process. Gradually, the set was reduced in size until trainees were finally taught to recognize the balance problem in each individual print. Similar games were produced for teaching about special handling required with certain photographic subjects under particular lighting conditions (e.g., water, snow, sky, skin tones).

Another skill set that is difficult to train is how to offer excellent customer service. To paraphrase what many OJT providers tell their new hires, "We are not order-takers here. If you want to be an order-taker, go get a job at a fast-food place. What we do here is make our customers really happy. We make shopping here a fun experience. We make them want to come back. And we make sure they know about all our products and services."

This requires the ability to interact in a friendly and helpful manner. Many young people simply do not know how to project themselves as friendly and helpful to the public. OJT providers report that most associates can be easily taught a series of questions to ask the customer, or a series of statements to make. But, teaching trainees how to interact without a "wooden" delivery can be challenging. Moreover, trainees need to learn how to suggest additional services and products in a manner that is helpful to the customer, not overbearing or intrusive.

To help trainees develop a spontaneous manner and an ability to sell, OJT providers often use role-playing sessions. But, they report that following up with feedback after the role play can be difficult. Providers do not want to make the trainee defensive or tense, yet they want to offer suggestions for improvement. The best OJT providers we interviewed were able to articulate how they kept the climate positive while offering suggestions for improvement or inviting the trainee to generate alternatives, as described above.

The NICU: A major challenge to NICU nurses is that in many hospitals, they are on call to attend emergency premature births. These critical admission assignments rotate across the staff. During the final weeks of orientation, the preceptor-orientee pair take that assignment. They may have 5 minutes' notice of a critical admit, often they have less than that. The critical admissions team is comprised of two nurses (one in charge, the other to document) and at least one respiration therapist (RT). Immediately at birth, they must weigh the baby (for med calculations); administer surfactant (to support pulmonary function); dry the baby (stabilize temperature), and oversee intubation. The NICU nurse must perform these

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functions while overseeing overall status of the patient. Helping the orientee learn to juggle and interweave these tasks involves helping her understand the reasons for each and how to judge how much to push the baby and when to "back off."

Intubation is the most difficult of these tasks. The RT performs the actual intubation, but the nurse decides when to intubate, when/whether to back off, and must communicate this information to the RT. The nurse's decision making takes into account an infant who is already badly compromised and a procedure that will cause a major drop in heart rate. If the baby's heart rate is in the range of 80 to 160 it can manage the drop. But if the heart rate is 80 or less, it may be wise to let the baby stabilize before attempting the intubation. On the other hand, if the nurse waits too long the baby may die. The nurse must be ready to handle these issues: how stable or unstable the baby is; how long to wait for heart function to improve enough to tolerate the intubation; whether to risk intubation when it appears the infant is failing; how many times to attempt intubation. The cognitive demand is intense, involving sets of judgments and decisions that must be reached very rapidly; that are complex, interrelated, and that cannot be learned as a set of rules.

How do preceptors help orientees learn how to make these judgments of patient status and timing of intervention? It is a particularly difficult training issue, because the nature of the event means that preceptor and orientee cannot discuss what is going on during the incident— there is simply too much happening, and effort and attention remain focused on the baby. Many preceptors rely on extensive debriefs. Once the critical admission is complete they talk at length about what happened, what didn't happen, what could have happened. Preceptors pose "what-if" questions—if it had happened like this, what would you have done?

The debriefs provide a vicarious experience base. The preceptor provides a case base of similar incidents that are augmented by the preceptor's description of her judgments, assessment, decisions, and associated outcomes. The preceptor's description of what is going on "inside the head" make the case base richer and more meaningful than simple observation of an experienced nurse in action.

The ONG: Much of the tanker's job is procedural in nature. Regardless of the crewstation he occupies, each tanker must learn a set of procedures to operate and maintain the equipment and machinery on the tank. Each tanker must become proficient at the skills needed to operate his individual workstation. Much of the National Guard's training program is designed to help the crewmember acquire and sustain these individual skills, and the TC focuses much of his attention on ensuring that the loader can load, the driver can drive, and the gunner can shoot. Procedural skills are necessary for success. However, proficiency on these individual tasks does not ensure a satisfactory score on crew gunnery.

The TC must also teach his crew a set of decision and judgment skills that go beyond the simple procedures of operating and maintaining the machine. Many of these skills become critical later in the training cycle as the TC begins to meld his individual tankers into a crew, as they begin to work together as a team to employ the tank's weapons systems effectively. · We observed several examples of these cognitive tasks as TCs worked to improve the performance of their crews on the gunnery range.

Having a thorough understanding of the fire commands provides an example. It is easy for the crew to learn by rote memory the fire commands, their responses to the commands, and the various engagements. For example, "This is engagement number three. Therefore, it is fired from a defensive position. The targets will be two stationary BMPs at about 1,500 meters. The TC will yell out a bunch of stuff, I will do these things, and the loader will put a round in and yell when it's ready." This approach to gunnery can be very procedural, but it does not prepare the crew to think about what they are doing or to perform well in a situation where conditions may vary from expectations. The teaching objective for the TC is to infuse these actions with meaning and prepare the crew to not only do well on their crew gunnery, but also to generalize their skills learned for crew gunnery to a wide variety of situations they may encounter on a battlefield. The crew must not only understand the meaning of each of the commands, but they must also understand what they mean for each member of the crew and then use these commands to develop expectations of what they will see in the engagement. A simple example occurs when the gunner is about to fire the main gun and yells "On the way." This alerts the crew that the weapon is about to be fired. If they do not hear a loud noise within a second of this command, a good crew will know something is wrong and begin to take corrective action without anyone saying anything else. Good OJT providers infuse activities with meaning by varying the types of engagment scenarios they practice, by inserting unexpected problems into the equipment, and by providing thorough feedback and instruction to the crew.

Other cognitive tasks that the TC must teach to his crew involve understanding the relationship between what one crewmember is doing with what another crewmember is doing. Examples: the driver must move the tank into a defensive position for the gunner. He must understand what the gunner is simultaneously doing with the gun and the sights to prevent damage to the tube, and provide as stable a platform for the gunner as possible. Another example involves using the loader to help the gunner and TC search for targets. Both the gunner and the TC have electronic sights to aid in their search. Good OJT providers will devise a procedure among the loader, the gunner, and himself to ensure that they maximize the effectiveness of their search patterns. Including the gunner in the search can dramatically inprove their ability to detect targets in a timely manner. However, the loader does not have electronic sights; he must search with his unaided vision. To help, the loader must understand how the other crewmen use their electronic sights, so that he can recognize where the holes in the search pattern exist and cover these holes with his unaided vision. Teaching loaders to perform this task is made difficult by the fact that the loaders are often the least experienced

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members of the crew and they may not have learned much about the tank's weapons systems or its sights. Good OJT providers accomplish this teaching task by ensuring the loader understands what the crew is trying to accomplish with its search pattern and by illustrating each member's area of responsibility.

Another set of cognitive skills that the TC must teach to his crew involve "rangemanship." There are certain tricks for obtaining high scores on crew gunnery that tankers learn with experience. These are elements of the TC's expertise that he can share with the other members of his crew. For example, the crew needs to learn how to relate fire commands to the physical layout of the range. That is, they must carry an image of the range in their head as they progress through the various engagments. With this image of the range, they can set up the tank prior to each engagement in a manner that will ensure they identify the target and minimize their engagement times. For example, the target handover indicates a moving target at 1200 meters. The crew knows that there are only two moving targets on the entire range and only one at that distance indicated by the handover. Since the crew knows where this target is, they can align the weapon in the appropriate direction and set the computer prior to beginning the engagement. The TC must instill an image of the range layout in a way that the crew can relate it to the fire commands they will hear and the engagments they will need to complete.

OJT providers in the ONG must train not only these types of cognitively complex tasks, but also procedural ones. Yet, the TC faces a number of obstacles in reaching these training goals. Some of these obstacles are generated by the organization, some by the soldiers, and some by the nature of the tasks which they are learning. The following paragraphs describe some of these hurdles and problem areas which the effective TC must navigate while training his crew to meet the standards published in the Army's FM17-12.

First, the National Guard has very few opportunities to train and practice. The unit meets for drills only one weekend each month and for two weeks each summer. The unit devotes seven of the weekend drills to training for gunnery tasks. Such infrequent practice holds back the progress of the crew. Perishable skills degrade during the month. Often, the TC spends as much time reviewing what was covered during the previous drill as he spends covering new skills. The TC must devise ways for his crew to retain as much as possible from one drill to the next to maximize the value of every training opportunity. In addition, the TC must train his crew without immediate help from senior NCOs such as his Platoon Sergeant. Frequently, the Platoon Sergeant must devote his attention to working with his own crew; he may not have the time to help other TCs with their crews.

Another critical factor which concerns TCs is the wide variability among individual soldiers regarding their skills, experience, and motivation. One crewman may be brand new to the Army, have no experience, and possess few or no skills. Another crewman may be the exact opposite with twenty years experience in the unit, having combat experience, and

possessing expert skills on the tank. The TC must assess the needs of each of these individuals and sculpt his training methods to each individual. Equally important, the TC must meld these divergent skills and experiences into a functional team.

Even the structure of the weekend drills presents challenges for the TC. After a long day's work at their full-time job, guardsmen may drive several hours to make the evening formation which begins their weekend drill. They have had a long, busy week. Friday evening they participate in classes and other group activities at the armory. Saturday morning they get up bright and early, drive about 20 miles to the training area, and begin the process of securing a tank for the weekend's training activities. The crew spends the next several hours performing maintenance and refueling their tank before they are ready to train gunnery tasks. Because much of the training occurs in the winter, it is often cold.

Often, the soldiers are not particularly motivated to learn. There is considerable down time and they can practice the same task only so many times. Before long, everyone is bored, training stops, and a long bull session begins inside the tank. It is easier to talk about the football game that they are missing than it is to go outside in the cold to boresight the main gun. The crew trains most of the day on Saturday, but they finish up before dark. They need to perform maintenance on the tank and refuel, then take care of themselves. Most of the soldiers will sleep on the tank that night. The next day they again perform maintenance on the tank and perhaps have a short period of time to train gunnery tasks prior to returning the tank to the tank park. The soldiers drive back to the armory around midday on Sunday for formation and unit activities. Thus, the actual training time on a weekend is less than one day. TCs who are effective as OJT providers devise ways to keep the crew's interest and to make the most of the short training period that is available.

In general, good providers of OJT in the ONG help their crews to understand gunnery within the context of the gunnery range and within the context of how they will fight if called. This kind of "big picture" approach helps the crews to understand why they perform a task, as well as how, and enables them to respond creatively to wider range of conditions and threats. To accomplish these training goals, the OJT provider must effecively serve each of the functions of an OJT provider. Particularly important are his abilities to: (a) create a positive learning environment, (b) assess how his crew is performing a task, (c) flexibly employ a variety of instructional techniques, and (d) ensure that his crew members acquire some of the expertise that he has acquired with experience.

We believe that a more complex layer of cognitive skills is added to the crew's tasks when they must learn to operate their tank within the context of other tanks. Sections, platoons, and companies are more than just an assembly of tanks. They are coherent, meaningful units on the battlefield. Tanks do not operate independently; each crew must learn to fight their tank as an integrated part of each of these teams. The cognitive tasks needed to orchestrate this "ballet on the battlefield" are great and place considerable demand on the

gunner and TC of each tank. However, these are tasks that the ONG does not attempt to perform. The ONG strives to instill the basic skills of crew gunnery. Therefore, we were unable to observe tank crews as they develop these more advanced skills.

What do the variety of OJT providers we studied actually do? The answer to this question can be described most clearly in four parts.

The first part of the answer to this question was derived from reviewing OJT providers' average reported performance on the seven functions. By inspecting mean reported performance scores, it appears that there are differences across the three domains concerning which of the functions OJT providers are least and most skilled at performing. When all three domains are considered, only two generalizations are apparent. One is that the group of functions in each domain associated with the lowest reported performance ratings includes promoting ownership. The other is that the group of functions with the highest reported performance ratings includes assessment.

No other pattern is evident when reviewing reported performance data across all three domains. However, it appears that there is a similar pattern of reported performance when looking just at the NICU and the Retail Company, exclusive of the ONG. In both of these settings it appears that reported performance levels cluster in just two categories. Highest reported performance in both domains concerns the four functions of learning management, instruction, assessment, and climate setting. Lowest reported performance levels are found for sharing expertise, setting goals, and promoting ownership.

The above pattern which is common to the NICU and the Retail Company can be contrasted to findings in the ONG, where there appear to be three groupings of reported performance levels. Highest reported performance concerns assessment and sharing expertise. Lowest reported performance is for promoting ownership. In between are reported performance levels for learning management, instruction, climate setting, and goal setting.

The second part of the answer to this question about what the variety of OJT providers we studied actually do, was derived by reviewing findings from the Retail Company Track that were subsetted according to "global" reported ability ratings of high, medium, and low OJT providers. This is perhaps a more sensitive analysis than the above one, because it compares OJT providers within a single domain. The general finding is that reported performance levels across the functions vary considerably for the low OJT providers, and that more consistent reported performance is found for medium and high OJT providers across all the functions. The one function on which OJT providers (of any global reported ability level) perform better is providing instruction. The only other discernable pattern concerns reported performance on promoting ownership. It is the function on which low OJT providers perform best, while medium and high OJT providers received lowest ratings on this function.

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Summarizing both the first and second answers, it appears that there is considerable variation in OJT providers' average reported performance on the functions of OJT, whether looking across domains, or within a single domain when OJT providers are grouped by global ability. Thus, the quality of what they are doing in service of these functions varies by domain and by global reported ability level.

A third way to answer the question of what OJT providers actually do is to review inter-correlations of reported performance scores for each function, by domain. In all three domains, the function with the greatest number of significant correlations is learning management—meaning that the skill level at which learning management is performed is similar to the skill level at which other functions are performed. However, the particular functions with which learning management significantly correlates are different across domains. In the Retail Company, learning management reported performance correlates with all functions except promoting ownership. In the NICU it correlates with instruction, assessment, goal setting, and ownership. In the ONG, it correlates with assessment, climate setting, and ownership. In part, these discrepancies might be due to the smaller sample sizes in the ONG and the NICU compared to the Retail Company. That is, with smaller sample sizes, the correlation coefficient must be higher to reach significance. On the other hand, inspection of the correlation values, irrespective of significance level, does not produce a discernable pattern that is comparable across the domains.

We can conclude from all three above answers that OJT providers are better characterized as different rather than similar across domains in terms of their average reported performance levels on the seven functions. However, OJT providers in the NICU and the Retail Company are very similar in terms of relative mean reported performance on the seven functions; their pattern differs from the one found in the ONG. Across the three domains, the correlational findings show that OJT providers perform the function of learning management at similar skill levels with the majority of the other functions.

A fourth answer to the question of what the various OJT providers we interviewed in each domain actually do, comes from a review of the OJT practices they reported using. Not surprisingly, the proportion of OJT providers who reported using each of the 57 strategies (initially outlined in Section 3) differed by domain. As discussed in the beginning of this subsection, we assume this is because of differences in the domains. For example, domain differences concerning the tasks to be taught, or in the relationship of the OJT provider to the trainee, will make some practices more appropriate than others. Another explanation may lie in the nature of the domain itself. For example, armor is a close-knit community in the Army. Training practices are often handed down from one person to the next. This creates little opportunity for new practices to be learned. It is possible that many of the practices on our list have not been introduced into the armor community.

The range of strategy use per OJT provider in each domain reveals a similarity between the NICU and Retail Company setting compared to the ONG. In the first two, range is 12-33

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and 13-39, respectively. In the ONG, range is much smaller: 7-18. Similarly, the absolute number of strategies reported as used by at least one OJT provider in each domain was higher for the NICU (N = 44) and Retail Company (N = 57) compared to the ONG (N = 38).

We believe this finding is due to the fact that in the retail setting and the NICU, OJT providers are in that position precisely because they have experience managing others or they have skills associated with the ability to teach others. In the ONG, this is not the case. Therefore, OJT providers are less likely to bring a host of skills and practices along with them when they are elevated to that role.

Related to this conclusion is the finding of relatively lower ratings for OJT providers in the ONG than in the NICU and the Retail Company Tracks. We have not dwelled upon this finding because our data collection methodology does not permit this type of analysis across tracks. However, one cannot help but notice this difference. Again, we believe this is because of the lack of teaching or training experience that OJT providers in the ONG bring to their role, compared to those in the other two settings.

We discovered other differences in these domains that are relevant to understanding differences in how OJT is provided in them. These differences are briefly outlined next.

Differences in the Domains

In previous sections, we have alluded to or described characteristics of organizations that are relevant to the role that OJT plays in each setting or to the way that it is handled and received. Here, we attempt to organize these distinctions, as displayed in Table 7-1.

This table's framework can be treated as a way to classify OJT domains. It may prove useful in future research that aims to strengthen existing OJT programs or that investigates the impact of domain characteristics on OJT needs. For example, where trainee motivation is low, OJT providers would need special help developing skills related to promoting ownership and setting an excellent climate that is conducive to learning. As another example, where organizational problems exist (as in weak support for learning opportunities or for the OJT provider role) interventions that just target the OJT provider will likely prove inadequate to effect system-level improvements in training outcomes. In these cases, intervention would need to target organizational commitment to the OJT process as well as the OJT providers themselves. Table 7-1 can serve as a starting point for linking domain characteristics to OJT practices.

Table 7-1

Organizational and Job Characteristics that Impact OJT

Factor	Domain		
	ONG	NICU	Retail Company
Explicitness and support of OJT provider role	Limited. Is a recognized function, but often TC isn't given adequate time with crew to engage in training. Often isn't proficient in skills he's expected to help others attain.	High. Is a formalized, recognized function within a specified orientation process. Is known and recognized that the organization depends on OJT provider to produce highly skilled nurses who can safely handle critically ill patients.	Moderate. Is a recognized function, and organization offers training materials, but there are no directly-observable consequences to producing poorly trained staff. Low sales and high turnover can be attributed to many other functions.
Competing tasks	The only function of the ONG is to train. No other task competes for trainers' time and attention.	Training always occurs in context of real-time tasks.	Training nearly always occurs in context of real-time tasks.
Organization's training goals	Goals are stated and hard-wired into the training system. Use of training materials is required. Much of the course instruction is provided for the TC.	Goals are stated, but there is no regimentation of how or when to teach subtasks. Use of training materials is expected.	Goals are stated, but with minimal detail. Company does not require use of training materials. Cost for high turnover is not calculated.
Task complexity	Low to moderate for crew gunnery tasks. The various crew positions require mixed perceptual-motor skills, skills in executing procedures, some cognitive skills, and coordination to function as a crew.	High. Requires assessment and diagnostic skills, extensive declarative knowledge base, well integrated cognitive-perceptual-motor skills.	Low to moderate. Requires perceptual judgment and time management skills for printing; interpersonal, sales, and problem-solving skills for customer service.
System-supported opportunities to learn and practice	Limited. Guardsmen train only one day each month.	Extensive. OJT is a shared responsibility among unit staff and management— all contribute time, learning opportunities. Hospital provides financial support for orientation period.	Variable, but in the low to moderate range. Sometimes new hires are given practice time, or dedicated on-line coaching, but often it is "sink-or-swim" with limited on-line help or after-action reviews.

Factor	Domain		
	ONG	NICU	Retail Company
Motivation of trainee	Mixed. Some are highly motivated. Others are not highly motivated to seek learning opportunities. For example, trainee assumes that by following direct commands, he is fulfilling his obligations.	Very highly motivated to become proficient. Babies' lives are at stake.	Variable, but in the moderate range. Appears to depend upon trainers' expectations of trainee.
Post-training relationship of trainer to trainee	Supervisor	Peer	Supervisor
Environmental training constraints	Weather extremes. Frequent waiting and lack of variability in tasks lead to trainee boredom. Personal safety hazards. Cramped space.	Workload high. Stakes high (life-and-death). High information density.	Workload high. Stressful customer interactions occur in the OJT setting. Pressure to train staff quickly (profit motive). Low pay.

Goals and Objectives for this Project

We now turn to a summary of progress in meeting the goals and objectives for this project. To review, our goals were to:

- develop training for OJT providers in Armor units
- produce a cognitive model of OJT
- produce dual-use OJT training design concepts and products
- initiate positioning that will lead to follow-on OJT training applications.

To meet these goals, our objectives were to:

- review the literature on OJT
- learn how OJT is performed in varied domains
- learn about differences between individual and collective OJT
- learn whether effective OJT skills can be taught, and if so, how.

We were able to meet all of our goals and objectives except one. The exception concerned our objective of learning about differences between individual and collective OJT.

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In the case of the ONG, we studied crews in which individual skill training was the priority. As discussed in Section 4, the training for collective tasks that may have occurred involved only the crew of an individual tank. We were unable to elicit information during our interviews about what kinds of collective tasks were being trained, or how the TC accomplished the training. Direct observation proved impossible, since we could not accompany crews in the tanks.

In the NICU, although it was clear that collective tasks were performed whenever multiple personnel were caring for a patient simultaneously, we were unable to elicit information during our interviews about how new nurses were trained to engage in these collective tasks. As we described in Section 5, OJT providers maintained that they simply eased trainees into the team little by little, and that they stood by them at all times so that they could jump in if the trainee could not perform as expected. In future research, direct observation with follow-up interviews might permit insight into how collective tasks are trained in this domain.

We were successful in meeting all other Phase II goals and objectives. We will describe these in terms of products that resulted.

— The first product was our report of a literature review which draws together diverse strands of literature about OJT into a single document (Zsambok et. al., 1994). We believe it makes a contribution to the OJT literature because it offers a more comprehensive perspective on OJT models, programs, and processes than what we found in our review.

— A second product is a cognitive model of OJT. We describe this model and the process we used to develop it in Section 2 of this report. We did not find any other models of OJT in the literature that had been derived through an in-depth study of the cognitive and behavioral aspects of the OJT providers' role in varied domains. None of the models we found in the literature were as comprehensive as this one. Some concentrate on the content-saturated elements of OJT as in the Diagnose - Instruct - Evaluate model, or DIE model of Semb, Ellis, Matheson & Parchman (1992). A few describe cognitive apprenticeships and, as such, are closer to the intent of this model than others we encountered (Farmer, Buckmaster, & LeGrand, 1992; Hamilton, 1989; Hamilton & Hamilton, 1992).

Finally, none of the models we found in the literature acknowledge the value added when OJT providers pass on their expertise, gained through hands-on experience, in doing the job they are teaching someone else to master. This struck us as odd, since the OJT format and setting are poised precisely for taking advantage of this knowledge and skill transfer. Injecting expertise into training is one of the most leverageable elements of OJT. And, although we found that in domains where a tremendous amount of learning is expected (as in the NICU) sharing expertise might best be deferred until after the basics are mastered, this function remains an important one for OJT providers.

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In sum, although this model was not subjected to rigorous validation, we believe it makes a valuable contribution to the OJT literature. It has high face validity, since it was derived from in-depth interviews with OJT providers nominated within their organizations as representing their best. In addition, a data coding scheme derived from concepts in the model was found to produce high interrater reliabilities in multiple domains. Finally, participants in training programs designed from this model report that they found it to be a useful framework for understanding their role as an OJT provider and for designing plans to change the way they work with their trainees.

— A third product of this project is a description of how OJT is reportedly performed in varied domains. Three of the domains we studied are described in detail in Sections 3 - 5. The fourth domain was not studied in as much detail as the other three, and served as our pilot testing domain for the prototype training program we developed for the ONG. A brief description of this fourth domain is contained in Section 6.

— A fourth product is the prototype training program we developed for an armor battalion in the Ohio National Guard. We learned that we can train OJT providers how to improve their skills, and how to pass these OJT skills on to others in their unit. As discussed in Section 6, participants found this program enlightening and useable in their OJT provider role. They reported that they have continued to use the knowledge and skills learned through the program in their interactions with trainees. Because of constraints in the domain, we were unable to conduct a formal evaluation of this program. We are hopeful that future research will allow this type of evaluation.

— A fifth product relates to our objective of developing products and concepts with dual-use (in military and civilian sectors). Early in the project, we developed a pilot training program for two different user groups in a utility company (see Section 6). Subsequently, we based our ONG program on similar concepts and training design principles. Participants in the utility company programs reported similarly positive learning outcomes as did ONG participants. They also reported continued use of new skills in follow-up interviews conducted three months after the workshops. Therefore, we have some evidence that our products and concepts have applicability in both the military and the civilian sectors.

— Last is our objective of positioning our Phase II efforts so that there would be a possibility of Phase III follow-on work. We met this objective by conducting some of our research in the retail franchise market. As a result of briefing our findings to executives in this corporation, we have developed a prototype training program for their OJT providers. This training program will target not only OJT for new hires, but it also will target ongoing OJT for skill enhancement of existing store employees. If we are successful with this company, we plan to develop a marketing strategy that targets other retailers in the franchise community.

Recommendations for Future Utilization of Findings

In this section, we summarize our recommendations for ways the Army can leverage its investment in the research and products that resulted from this project.

Our first set of recommendations, detailed in Section 6, concerns training for OJT providers. These recommendations use armor as an example, but we believe that similar training is needed for many of the Army's MOSs.

First, to conserve training resources, OJT training should piggyback onto other training events. Second, training should occur in the unit. This means NCO leaders should conduct the OJT training of TCs in their units. The workshop developed for this project demonstrated how this training can begin. Third, TCs who have been trained to be more effective OJT providers will need ongoing support to sustain their OJT skills over a long period of time. This means that Platoon Sergeants should be made responsible for observing their TCs as they train their crews, and to provide feedback and assistance to the TCs.

But, NCOs will need to acquire the skills of how to teach someone else to be an effective OJT provider, and how to conduct a workshop similar to the prototype developed in this project. That is, NCOs will need access to a train-the-trainer program. To ensure standardization, Platoon Sergeants and Master Gunners could acquire these skills at the Armor Center in either the Master Gunner's course or one of the Advanced NCO courses. That is, the NCO leadership can learn OJT skills in much the same way they learn the skills of Master Gunners and Platoon Sergeants.

This set of recommendations requires command support in order to make them a reality. We are planning a series of briefings to generate interest that will impact appropriate levels in the chain of command.

Our second set of recommendations about how to leverage the investment made in this project concerns future research of the cognitive model of OJT. As we stated in Section 2, it was not the purpose of this project to validate the model. However, such validation would make a significant contribution. If the Army will be relying more and more on OJT as a major form of training, as we have been informed they will, and if specific train-the-trainer programs are developed for OJT providers, it is possible to build a data collection program designed to validate the model.

Our third set of recommendations are really anti-recommendations. We are concerned that in any organization where standardization is essential, as it is in the Army, the temptation arises to oversimplify or to overprescribe. We have seen countless lists of oversimplified "to-dos" for OJT providers that have been generated as job aids in the private sector. One example was a pocket card that read:

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- Plan your demonstration
- Gather all the materials you need
- Be sure your equipment is in working order
- Practice your demonstration
- Execute the demonstration
- Allow trainee to try
- Give feedback to trainee
- Allow adequate practice for trainee
- Evaluate trainee performance
- Repeat the previous three steps until proficiency is achieved

Many of the OJT providers with whom we came in contact would not be able to make use of this list. What they need is help in figuring out how to do the training—how to diagnose why a trainee just isn't getting it, how to switch instructional techniques, how to turn a poor climate into a positive one, and the like.

We have also seen attempts to overprescribe. For example, as we described in our literature review, in a study by French (1979) training was given to tutors who were expected to help learners construct their own understanding of information they were expected to master. The tutors were taught how to give hints to students. But, the students interpreted the tutor's hints as an indication of their failure to resolve the questions on their own. And, help had to be terminated after two or three hints as the situation became intolerable.

By extension, what we do not recommend is a list of particular strategies that OJT providers should be taught to master. Instead, they should be taught about the seven functions of the OJT provider so they learn to monitor the effects of their practices on the climate, the trainee's sense of ownership, the progress the trainee is making towards mastery, etc.

We suspect that there *are* several high-power strategies that can be taught as core competencies for OJT providers. One candidate is asking open-ended rather than closed questions in both instruction and assessment phases of training. In instruction, open-ended questions lead trainees to a more elaborated and useable understanding than closed questions do. In assessment, research has shown that simply asking if a trainee understands (this is a closed question) produces unreliable results (Graesser, 1994). They usually say "yes." Sometimes, they're embarrassed to admit they don't understand; sometimes they aren't aware of their deficit. It is better to ask open-ended questions to assess the trainee's understanding. But, our experiences in our three workshops demonstrated how difficult it is for most people to frame a series of open-ended questions like this, and that participants can improve when given practice. In general, training practices that require trainers to violate some pragmatic rules of polite conversation among adults are difficult to master (Graesser, 1994).

Another high-power strategy is to ask for trainee involvement in goal setting. Again, this is difficult for most OJT providers, but because it impacts several of the OJT functions, it is an important skill. Likewise, asking for trainee feedback about the effectiveness of the

instructional techniques one is using can lead to timesaving breakthroughs, but this requires that the OJT provider have confidence in his ability to switch techniques if necessary. This means that training to increase the size of the repertoire would be advantageous. Being able to think out loud while demonstrating a task, and offering reasons why something needs to be done a certain way is another strategy with powerful consequences. So is the ability to offer constructive criticism, a behavior that most people find difficult and for which they need practice in order to become comfortable and to execute without negative consequences.

So, while we might recommend training that includes (but is not limited to) skill development for certain OJT strategies, this training should not be supplanted by merely providing a checklist of strategies. The fear is that this checklist approach would direct OJT providers' attention in the wrong place—at the strategies themselves rather than the full learning management role. The fear is that this would foster a mechanical, overly procedural and brittle approach to training—the very thing that OJT is especially poised to avoid.

References

Brown, A. L., & Campione, J. C. (1986). Cognitive science principles and work force education. In t. C. Sticht, F. R. Chang, & S. Wood (Eds.), Advances in Reading/Language Research, 4. Greenwich, CT: JAI Press Inc.

Brown, A. L., & Palinscar, A. S. (1982). Inducing strategic learning from texts by means of informed, self-control training. Topics in Learning and Learning Disabilities, 2, 1-17.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship teaching and the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), Knowing, learning, and instruction. Hillsdale, NJ: Lawrence Erlbaum Associates.

Crandall, B. W., Kyne, M., Militello, L., & Klein, G. A. (1992). Describing expertise in one-on-one instruction (Contract MDA903-91-C-0058). For the U.S. Army Research Institute, Alexandria, VA. Fairborn, OH: Klein Associates.

Department of the Army (1992). Tank gunnery training (Abrahms) (FM 17-12-1-1). Washington, DC: Headquarters, Department of the Army.

Farmer, J. A., Jr., Buckmaster, A., & LeGrand, B. (1992). Cognitive aprenticeship: Implications for continuing professional education. New Directions for Adult and Continuing Education, 55, 41-49.

French, S. (April, 1978). Updating of belief in the light of someone else's opinion. University of Manchester.

Graesser, A. C., & Person, N. K. (1994). Question asking during tutoring. American Educational Research Journal, 31, 104-137.

Hamilton, S. F. (1989). Learning on the job: Apprentices in West Germany. Paper presented at the March, 1989 Meeting of the American Educational Research Association, San Francisco, CA.

Hamilton, S. F., & Hamilton, M. A. (1992). Learning at work. In Youth apprenciceship in America: Guidelines for building ana effective system. Washington, DC: Commissin on Work, Family, and Citizenship.

Howell, W. C. (1993). Engineering psychology in a changing world. Annual Reviews of Psychology, 44, 231-263.

Klein, G.A., Calderwood, R., & MacGregor, D. (1989). Critical decision method for eliciting knowledge. IEEE Transactions on Systems, Man, and Cybernetics, 19(3), 462-472.

Knowles, M. S. (1987). Adult learning. In R. L. Craig (Ed.), Training and development handbook, (3rd Edition). New York: McGraw-Hill.

Kyne, M. (1995). Incorporating cognitive requirements into OJT. Unpublished master's thesis, University of Dayton, Dayton, OH.

Means, B. (1993). Cognitive task analysis as a basis for instructional design. In M. Rabinowitz (Ed.), Cognitive science foundations of instruction, (pp. 97-118). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Means, B., & Gott, S. P. (1988). Cognitive task analysis as a basis for tutor development: Articulating abstract knowledge representations. In J. Psotka, L. D. Massey, & S. A. Mutter (Eds.), Intelligent tutoring systems: Lessons learned, (pp. 35-57). Hillsdale, NJ: Erlbaum.

Means, B. & Roth, C. (1988). Some outcomes of a cognitive analysis of troubleshooting. Paper presented at the 1988 Annual Meeting of the American Psychological Association, Atlanta, GA.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and monitoring activities. Cognition and Instruction, 1, 117-175.

Redding, R. E. (1990). Taking cognitive task analysis into the field bridging the gap from research to application. Proceedings of the Human Factors Society 34th Annual Meeting, 2, 1304-1308. Santa Monica, CA: Human Factors Society.

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Roth, E. M., Woods, D. D., & Pople, H. E. Jr. (1992). Cognitive simulation as a tool for cognitive task analysis. Ergonomics, 35(10), 1163-1198.

Semb, G. B., Ellis, J. A., Matheson, C., & Parchman, S. W. (1992). A survey of on-the-job (OJT) training practices. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Wehrenberg, S. B. (1987, April). Supervisors as trainers: The long-term gains of OJT. Personnel Journal, pp. 48-51.

Zsambok, C., Crandall, B., & Militello, L. (1994). OJT: Models, Programs, and Related Issues. Prepared under contract MDA903-93-C-0092 for the U.S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.