ISPI PerformanceXpress, June, 2006

TrendSpotters:
The Cognitive Task Analysis Model

by Carol Haig, CPT, and Roger Addison, CPT, EdD

This month we are pleased to share the highlights of a far-ranging conversation we had with Rob Foshay, CPT, PhD, and Member for Life of ISPI. Always a sought-after speaker at ISPI conferences and a respected author, he consults on learning and performance strategies, e-learning, and certification at The Foshay Group, based in Dallas, Texas. We are adding Rob's *Cognitive Task Analysis Model* to the TrendSpotters Open Toolkit to show how a combination of Job Task Analysis and Cognitive Task Analysis can efficiently yield critical performance information of great value to client organizations.

Genesis of the Cognitive Task Analysis Model

As many HPT practitioners are aware, there is an entire family of models and tools for task analysis that continue to evolve. Rob developed the Cognitive Task Analysis Model to help his clients:

- Distinguish between Job Task Analysis and Cognitive Task Analysis
- Understand the relationship between the two types of task analyses
- Know when and why to conduct both

Model Description

Job Task Analysis (JTA) is done to discover the *task or subtask structure of a job*. Cognitive Task Analysis (CTA) is done to discover the *decision-making processes* and *mental models* that are embedded in job tasks. This makes CTA an optional extension of JTA. A CTA conducted at a global marketing company, for example, might yield decision rules for how to extract recommendations from customer purchasing data.

	JTA	**CTA**
Focus of the analysis	Observable Behavior	Thought Processes and Knowledge
What is analyzed	Actions	Decisions
What is described	Conditions, Actions, Criteria	Inputs, Processes, Outputs, Decision Rules, Cognitive Strategies, Metacognition

Underlying knowledge analysis	KSAO: Knowledge, Skills, Aptitudes, Other	Mental Models

Figure 1. Cognitive Task Analysis Model.

Both types of task analysis can be used for a variety of applications ranging from gap analysis, performance measurement, and career planning to designing compensation structures, certification processes, and selection systems. The difference is in the results produced.

Generally, JTA is based on what the analyst can *see,* a set of step-by-step procedures. CTA is based on *heuristics*—a problem-solving method for which no formula exists, which an exemplary performer invents to solve a novel problem. Examples of these problems are found in design, planning, management, technical problem solving and troubleshooting, and customer service—at every level of the organization.

How to Use This Model

To maximize the benefits of task analysis, start with the results and work backward, using both JTA and CTA. When you interview an exemplar, you will find that he or she gets results in two ways: step-by-step for the routine, known tasks and through an implicit decision-making process based on knowledge and experience. You will then have both the steps and the decision-making rules that your exemplar uses to make decisions.

There are four situations that are well-served by CTA:

- Analyzing *ill-structured problems:* that is, problems that are not well defined because one or more of these elements—inputs, process, or outputs—is not known.
- For *far transfer:* when no one can predict what processes will be needed for a new product, enterprise, or service with which there is no experience.
- Teaching lots of information around a common core: as when a company uses 50 to 60 different systems and must train new service representatives to work with all of them by teaching core information common to all the systems and then practicing the application of this knowledge to the variations.
- Finding misconceptions: errors are not random, but are made because people have misconceptions that they apply to perform work tasks, and CTA can identify them.

Success Story

Some years ago, Rob was working with a large software company that was about to launch a communications system to compete with Lotus Notes. The challenge was to train a large, global field engineering force to install and troubleshoot the new system.

A JTA identified more than 300 potential error conditions. Every installation of the system was configured differently, and no one could draw all the permutations of all the needed flowcharts. In addition, management allotted just three days to convene and train all the field engineers, which was not nearly enough time.

By partnering with several expert engineers and using structured interviewing techniques to complete a CTA, Rob was able, in about four hours, to draw a *mental model* of the seven core inter-communicating modules common to all the system installations. Then the group provided samples from the possible error conditions and Rob used the mental model to correctly diagnose each one—without ever having seen the actual system, and with less technical training than the field engineers had. Although the group thought that Rob's success came from his engineering experience (he has none), we can attribute it to his *systems thinking* skills.

Ultimately, the field engineers' training plan consisted of a half-day to teach the mental model followed by a series of practice problems to gain skill in diagnosing the source of each one. Teaching the core commonalities enabled the engineers to successfully configure and troubleshoot at any installation.

Advice to Users of the CTA Model

JTA only provides half the story in a task analysis. In today's organizations, employees are asked to make decisions, and it is the quality of those decisions that adds value for the organization. If you are responsible for the design and delivery of training in your organization, the CTA Model will change your priorities for training.

To learn more about cognition, consult Ruth Clark's book, *Building Expertise: Cognitive Methods for Training and Performance Improvement*, or visit www.ctaresource.com. In addition, The Foshay Group has posted several related articles at www.foshay.org.

Link to the Performance Technology Landscape

The Cognitive Task Analysis Model supports these principles of Performance Technology:

R	Focus on **Results**: by targeting thought processes and knowledge
S	Take a **System(s)** viewpoint: as in Rob's success story
V	Add **Value**: save time, save money, and provide significant breakthroughs (aha's)
P	Establish **Partnerships** and work collaboratively: with expert performers

Application Exercise

organizational levels—performer (worker), process (work), organization, to find out how she or he makes decisions.

Remember that the Cognitive Task Analysis Model helps you when problems are not well defined and are the very opposite of the kinds of *well-structured problems* we typically solve every day. Happy sleuthing!