ShadowBox® Approach to Cognitive Skills Training

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Gap

Completion of training

Diploma

Credible practitioner
Present complex scenarios
Insert Decision Points with a small set of multiple choice options
  Actions to take, priorities, information to track, etc.
Trainees rank the alternatives and record their rationale
Trainees compare responses and rationale to a panel of SMEs
Trainees identify what the experts were seeing and thinking that they (the trainees) weren’t
Mission Statement for ShadowBox LLC

- Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA)
- Use an *electronic* version of ShadowBox so that *individuals* can learn on their own time
- Success is the trainees’ *match to the expert rankings*
- Achieve *quality control* of the ShadowBox scenarios by carefully reviewing all materials generated by the customers
Mission Statement for ShadowBox LLC

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

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Cognitive: Textbook chapters

- Language acquisition
- Language production
- Language comprehension
- Working Memory
- Long Term Memory
- Intelligence
- Connectionism
- Logical reasoning
- Cognitive neuroscience
- Sensation and perception
- Face recognition
- Attention and consciousness
- Procedural versus declarative knowledge
- Deductive, inductive and abductive reasoning
Cognitive Skills

- Physical skills
- Technical knowledge
- Procedures
  - Compile experience — Best Practices
  - Essential to build a playbook of procedures
  - Procedures are necessary but not sufficient
- [Cognitive skills]
Strengths of Procedures

- They are training tools for novices.
- They are memory aids.
- They can safeguard against interruptions.
- They reduce workload.
- They compile experience and historical information.
- The help teams coordinate by imposing consistency.
Procedures Aren’t Sufficient: The boundary conditions for procedures

- Procedures are advisable for well-ordered situations
- They become brittle in complex situations
  - They may be insensitive to context, and can mislead us
- They rarely apply to anomalies
- They are hard to keep updated
Cognitive Training Outcomes

- Make better decisions
- Make sense of situations more quickly and accurately
- Prioritize goals better
- Manage attention: prioritize cues to monitor, info to seek
- Manage uncertainty
- Anticipate future states, consequences of actions, problems
- Detect and diagnose problems more quickly and accurately
- Perform workarounds and recoveries
- Shift to more powerful mindsets
Cognitive

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

• Lesson: Unpack “cognitive” as quickly as possible, or don’t even use the term
Skills

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

- Sounds procedural
- Suggests a laundry list of skills and sub-skills — leading to stovepiped training
- Paradox of precision

**Lesson**: Find ways to improve tradecraft strengthen mental models and shift mindsets
Training

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

- Interpreted as conveying the procedures, putting on courses, having instructors, lesson plans

- **Lesson:** We are interested in triggering insights and revising mental models and mindsets, not in conveying rules and procedures

- **Lesson:** Don’t try to use the same exercises to train and to evaluate at the same time
Expert

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

- Trainees can bristle when they don’t match the experts. And experts are uncomfortable with that label.

Lesson: We are still searching. One client used “wizards.” Other possibilities are: highly respected practitioners, veterans, etc.

Lesson: Don’t automatically believe in the skills of people nominated as experts
Cognitive Task Analysis

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

- R&D organizations can sponsor front end CTA work. But training departments don’t have this kind of budget.

**Lesson:** Fold the CTA into the scenario building. The Applied CTA toolkit includes a simulation interview strategy

**Lesson:** Explore other streamlined CTA strategies — e.g., Borders & Klein (2017) on Critical Decision Audit.
Improve Performance

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

- This objective can excite people in the short-term, but what really matters is reducing pain and worries.

Lesson: We need to identify problems the clients are experiencing and need to address

Lesson: Some clients worry more about organizational calibration than individual performance
Electronic ShadowBox for Individuals

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance.

Use an electronic version of ShadowBox so that individuals can learn on their own time

- However, many clients prefer the small group discussions

**Lesson**: We had to develop a Facilitator training workshop

**Lesson**: Need for careful vetting of facilitators
Evaluating Success

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance*. Use an *electronic* version of ShadowBox so that *individuals* can learn on their own time.

Success is the trainees’ *match to the expert rankings*.

**Lesson**: Transfer to job performance is the gold standard, but is usually unrealistic — customers aren’t able to judge job performance and decision making very well. A surrogate is to use supervisor ratings.
Scenario Quality Control

Use the ShadowBox strategy to provide cognitive skills training, using expert feedback, and by building scenarios based on a front-end Cognitive Task Analysis (CTA), in order to improve performance. Use an electronic version of ShadowBox so that individuals can learn on their own time. Success is the trainees’ match to the expert rankings.

Achieve quality control of the scenarios by carefully reviewing all materials generated by the clients.

- This strategy made sense at a conceptual level, but clients disliked it, potential clients were turned off, and we were unable to keep up.

Lesson: Encourage clients to create their own scenarios. And that means developing a training program in scenario development.
Initial Mission Statement

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance*. Use an *electronic* version of ShadowBox so that *individuals* can learn on their own time. Success is the trainees’ *match to the expert rankings*. Achieve *quality control* of the scenarios by carefully reviewing all materials generated by the clients.

Current Mission Statement

Use ShadowBox to shift mindsets using ‘aha’ moments by presenting scenarios based on tough cases.
Getting up to speed faster

Letting trainees see the world through the eyes of experts — without the experts having to be there
ShadowBox Variations

• **Decision Points**
  • Actions to take
  • Goals
  • Information to gather
  • Cues to monitor
  • Expectations
  • Worries
  • Sensemaking: What’s happening in this incident?
ShadowBox Versatility

- **Scalability**
  - Paper & Pencil
  - Desktop/Mobile
  - Integration into existing technologies

- **Training Formats**
  - Decision Point: text, images, audio, video
  - Cue Detect: interactive video
ShadowBox Cue Training
ShadowBox Effectiveness

• **Firefighters.** Hintze (2008): 18% improvement in performance over 4 SBox scenarios, in 1 day of training, with facilitated discussions, experimental v. control conditions. $p < .001$.

• **Warfighters**
  - Klein and Borders (2014): 28% improvement in performance over 4 SBox scenarios, in 3 training hours, providing expert feedback but no facilitated discussion, from Time #1 (T1) to Time #4 (T4). $p < .05$.
  - Also a 28% improvement, Exp Group over controls, $p < .05$.
  - Klein and Borders (2014): 20.5% improvement in performance over 4 SBox scenarios, presented individually on an Android tablet, avg time = 47 minutes, from T1 to T4. $p < .05$.

• **Nurses.** H. A. Klein & team: 27% improvement in ½ day in the match to experts, 56% match on T1 to 71% match on T4.

• **Petrochemical plant operators.** Klein, Borders and Polander (2015): In ½ day, a 26% improvement in accuracy of recognizing the problem (.68 to .85), and a 32% reduction in time needed, 47m to 32m.
ShadowBox Projects

- Military/Police DARPA Good Strangers project (2011-2015)
- Petrochemical industry (2013-ongoing); Marathon, Nova Chemicals, Citgo, Chevron Phillips
- Child Protection Services (2014-ongoing); Annie E. Casey Foundation
- Healthcare – Nurse training (2014-2015); Baylor
- Helicopter rescue (2017) Air Force Research Laboratory
- Emergency response: Singapore Civil Service College
ShadowBox Objectives

Accelerating expertise = Getting novices up to speed faster

• Augmenting on-the-job experiences with the virtual experiences
• Presenting a wide range of situations – building experiences and adding repetitions
• Presenting challenging situations — tough cases
• Promoting individual discovery and correcting flawed mental models and immature mindsets
ShadowBox Applications

- Leadership
- Personnel Evaluation
- Emergent Challenges
- Training
- Distance Learning
- Team Calibration
- Knowledge Management
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