Lifelong Learning Companion: Pedagogical Requirements

Millie Abell
US Army Headquarters Training & Doctrine Command
millie.abell@us.army.mil
3 Oct 08

ICT Workshop on Intelligent Lifelong Learning Companions
Overview

• TRADOC’s Learning Sciences Mission
• TRADOC’s Constraint & Challenge
• Meeting the Challenge
• Instructional Design: First Principles
• Learning Strategies: Mental Processes
• Final Considerations
TRADOC’s Learning Sciences Mission

• Investigate research in adult learning & instruction, &

• Recommend evidence-based practices to ensure Soldiers are competent to perform within a dynamic environment.
TRADOC’s Constraint & Challenge

**Constraint:**
- Time

**Challenge:** Educate leaders faster with no loss in performance.

- More powerful learning strategies
- Instructional design models for efficient learning
- More technology-based instruction (TBI)

**Army Requires Less Time in School**

**Impacts Learning Environment**
## Meeting the Challenge

<table>
<thead>
<tr>
<th>TRADOC will...</th>
<th>By ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Determine when to use:</td>
<td>Using f2f if TBI won’t allow:</td>
</tr>
<tr>
<td>• face-to-face (f2f), or</td>
<td>• Sensory information</td>
</tr>
<tr>
<td>• TBI</td>
<td>• Or complex environment</td>
</tr>
<tr>
<td>• Design efficient &amp; effective TBI &amp; f2f instruction</td>
<td>• Or on-the-spot observation &amp; feedback of complex performance</td>
</tr>
<tr>
<td>• Strengthen learning skills/mental processes</td>
<td>Training designers in <em>First Principles</em></td>
</tr>
<tr>
<td></td>
<td>• Job-relevant problem</td>
</tr>
<tr>
<td></td>
<td>• Activate prior knowledge</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate, <em>then</em> practice</td>
</tr>
<tr>
<td></td>
<td>• Transfer</td>
</tr>
<tr>
<td></td>
<td>Teaching learners to:</td>
</tr>
<tr>
<td></td>
<td>• Take multiple perspectives</td>
</tr>
<tr>
<td></td>
<td>• Question</td>
</tr>
<tr>
<td></td>
<td>• Self-explain</td>
</tr>
<tr>
<td></td>
<td>• Think analogically</td>
</tr>
<tr>
<td></td>
<td>• Prepare to teach</td>
</tr>
</tbody>
</table>

“The Primer” contains knowledge of:
- how humans acquire new knowledge, &
- how to explain & teach
Instructional Design: First Principles

- Faster to train
- Fewer test errors

(University of New South Wales)

Job-Relevant Task
Demo -- Practice – Transfer

- Activate prior knowledge
- Demonstrate, then practice
- Transfer to new instances

High S-E Learners:
- Set challenging goals
- Visualize success
- Discard faulty strategies
- Rework problems
- Like content

Stanford
### Asking Deeper Questions

(California State, San Marcos)

- What is a new example of...?
- How would you use ... to ...?
- Compare ... with regard to ...
- What would happen if...?
- Why is ... important?
- What is the best ..., & why?

### Self-explaining

(Pittsburgh)

<table>
<thead>
<tr>
<th>Self-explanations</th>
<th>Correct Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many</td>
<td>86%</td>
</tr>
<tr>
<td>Few</td>
<td>42%</td>
</tr>
</tbody>
</table>

### Preparing to Teach Rather Than Test

(Vanderbilt)

- Consider larger context
- Don't memorize details
- Question purpose
- Identify flaws
- Generate alternatives

<table>
<thead>
<tr>
<th>Teach</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>92%</td>
<td>33%</td>
</tr>
<tr>
<td>83%</td>
<td>17%</td>
</tr>
<tr>
<td>50%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Thinking Analogically

(Michigan)

Bridging previously unconnected knowledge (e.g. Duncker’s problem)

### Learning Strategies: Mental Processes

- Greater transfer when learners solve problems w/in context of scenarios (Vanderbilt)
- IMI (Harvard)
  - “In most cases...”
  - “May include...”
  - “Is probably...”
  - “Of course, there are other ways...”

- Teachable Agents

- IMI (California State, San Marcos)
Final Considerations

• Pass on evidence-based instructional strategies:
  • Learning to learn
  • Instructional design
  • Teaching

• Consider learner affect – e.g.:
  • Cooperating
  • Demonstrating sensitivity to others
  • Listening
  • Responding w/ honesty/authenticity
  • Applying what is studied

• Learning on-the-job is significant

“…research requires about …20 years to find its way into practice.”
Clark & Estes (2002)
Sources


Questions?