Apprentice Learners, Difficult Concepts, Creative Teaching Strategies:

Using 21st century learning science as a platform for teaching differently

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Traditional View
21st Century Learning
21st Century Learner

- Deep conceptual understanding
- Integrated, usable knowledge
- Think creatively, generate new ideas
- Critically evaluate new information
- Work collaboratively
- Continue lifelong learning
Science of Learning

How People Learn

Brain, Mind, Experience, and School

Expanded Edition

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Knowledge of facts and procedures is only useful when people know when and where to apply it.
Good teaching is not enough; students must actively participate in their own learning.
Learning must build on students’ existing knowledge.
Articulating--putting thoughts into words--and learning go hand in hand.
Students learn more deeply when they engage in activities similar to the everyday activities of professionals.
Students learn best when they reflect on what they’ve learned.
Where we are now

New demands on learning for 20\textsuperscript{th} century

+ New discoveries about how people learn

= New approach to learning environments, teaching and learning
Expertise: Expert-Novice studies
Expertise: Sociocultural studies
Expertise: Distributed tasks
Expertise: What we’ve learned

- More than subject matter knowledge
- Experts attend to features of performance that novices miss
- Learning is social; expertise develops in interaction with people and objects
- There are many paths to expertise
- Ways that people learn outside of school differ from traditional instruction
Traditional Apprenticeship

- Physical skills/processes (trades)
- Learner is guided in work by a master
- Tasks arise from everyday, real world context
- Tasks increase in difficulty and complexity
- Learner given increasing independence
Cognitive Apprenticeship

- Cognitive skills/processes
- Learner is guided in work by a master
- Focus on teaching knowledge and thinking skills of expert in solving complex tasks
- Tasks arise from pedagogical considerations, though focus is on real-world problems in a variety of contexts
Instructional Strategies
Modeling

- Instructor/expert models target activity while student observes
- Instructor/expert articulates his or her thinking process along the way

“I’m going to start by…”

“Here are some questions I typically ask as I…”
Coaching

- Student performs the target activity
- Instructor/mentor offers questions, hints, guided feedback, or additional tasks

“How might you draw on ______ to help you here?”

“Now what happens if …”
Scaffolding

- Instructor/mentor provides student with something tangible to support success on a task
- Instructor may or may not be present

Examples: flowchart of steps; suggested strategies; worksheet or graphic organizer; assigned roles
Articulation

- Student explicitly states his or her knowledge, reasoning, or problem solving strategies
- May be oral or written statement
- Often references a learning artifact
Reflection

- Students compare their own thinking processes or performance to that of an expert or another student.
- Helpful to be able to record and play back performances, highlight critical features of student and expert thinking.
- Offer opportunities to revise.

Example: Video Traces; rubrics & samples.
I think this is a good look for him, kinda grungy facial hair, but a crazy 15th century Prada suit that says loud and clear, "I certainly could shave if I wanted!"
Integrated Example

- How might Cognitive Apprenticeship methods be applied?
Example: Historical Thinking

Novice view:
- History = collection of names and dates to memorize
- “Truth” is summarized in textbook

Expert view:
- No one “truth”
- History = making argument for plausible account based on available evidence
Example: Historical Thinking

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<thead>
<tr>
<th>Activity</th>
<th>Strategies</th>
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<tr>
<td>Task: Order documents according to trustworthiness; justify decisions.</td>
<td>Scaffolding</td>
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<td>Articulation</td>
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<tr>
<td>Watch expert complete same task; compare thinking.</td>
<td>Modeling</td>
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<td>Reflection</td>
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<td>Identify thinking strategies of expert; practice these in separate</td>
<td>Coaching</td>
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<td>exercises.</td>
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<td>Task: As curators of an exhibit for new event, decide what will be</td>
<td>Scaffolding</td>
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<td>included and why.</td>
<td>Articulation</td>
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Workshop

- Groups of 4-5
- Teach similar courses or subject matter
# Technologies and Cognitive Apprenticeship

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Technology</th>
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<tbody>
<tr>
<td><strong>Modeling</strong></td>
<td>Via video/audio recording and screen capture</td>
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<tr>
<td><strong>Coaching</strong></td>
<td>Via online office hours</td>
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<td></td>
<td>Via aural feedback with screen capture</td>
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<tr>
<td>Strategy</td>
<td>Technology</td>
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<tr>
<td><strong>Scaffolding</strong></td>
<td>Via sequenced lessons or activities</td>
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<tr>
<td><strong>Articulation</strong></td>
<td>Via annotated submissions</td>
</tr>
<tr>
<td><strong>Reflection</strong></td>
<td>View expert performance, compare to own performance</td>
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Teaching as Design

- Work of teaching = designing and sequencing learning experiences
- Focus is on interactions with materials, peers, expert(s)
- Goal is to move students from novice to more expert thinking
Questions?