Cognitive Apprenticeship

Allan Collins
Northwestern University

Papers available at http://northwestern.academia.edu/AllanCollins
Features of Apprenticeship

- Apprenticeship is the way we learned before schooling.
- Unlike school, apprenticeship embeds learning in the social and functional contexts of its use.
- Lave emphasizes observation, coaching, and practice or in our terms modeling, coaching, scaffolding, and fading.
- Essence of apprenticeship method is to start out providing a highly structured environment and slowly turning over control to the learner.
- Master knows learner well reducing failure.
- Technology makes it possible to realize apprenticeship method much more widely.
Differences between Cognitive and Traditional Apprenticeship

- Tasks chosen to reflect the changing demands of learning rather than what comes in the door
- Learning set in diverse contexts to foster generalization rather than constrained to a particular work setting
- Making thinking visible rather than relying on observation of physical skills
Framework for Designing Cognitive Apprenticeship Environments (1)

**Content:** types of knowledge required for expertise

- **Domain knowledge:** subject matter specific concepts, facts, and procedures
- **Heuristic strategies:** generally applicable techniques for accomplishing tasks
- **Control strategies:** general approaches for directing one’s solution process
- **Learning strategies:** knowledge about how to learn new concepts, facts, and procedures
Framework for Designing Cognitive Apprenticeship Environments (2)

**Method:** ways to promote the development of expertise

- **Modeling:** teacher performs a task so students can observe
- **Coaching:** teacher observes and facilitates while students perform a task
- **Scaffolding:** teacher provides supports to help the student perform a task
- **Articulation:** teacher encourages students to verbalize their knowledge and thinking
- **Reflection:** teacher enables students to compare their performance with others
- **Exploration:** teacher invites students to pose and solve their own problems
Framework for Designing Cognitive Apprenticeship Environments (3)

**Sequence:** keys to ordering learning activities

- **Increasing complexity:** meaningful tasks gradually increasing in difficulty
- **Increasing diversity:** practice in a variety of situations to emphasize broad application
- **Global before local skills:** focus on conceptualizing the whole task before executing the parts
Framework for Designing Cognitive Apprenticeship Environments (4)

**Sociology:** social characteristics of learning environments

- **Situated learning:** students learn in the context of working on realistic tasks
- **Community of practice:** communication about different ways to accomplish meaningful tasks
- **Intrinsic motivation:** students set personal goals to seek skills and solutions
- **Cooperation:** students work together to accomplish their goals
Benefits of Situated Learning

- Learners understand the uses and purpose of what they are learning
- They learn while actively using knowledge rather than passively receiving knowledge
- They learn the different conditions where the knowledge can be applied
- Learning in multiple contexts fosters generalization
Metaphor to Learning Tennis

- School is like having learners practice hitting serves, backhands and forehands, and volleys without playing games or even watching games.
- A tennis coach will teach these skills but *interweave* this practice with playing games.
- The coach will determine what skills you need to work on, provide hints as to strategies to apply, and find challenging opponents to play against.
Model for Cognitive Apprenticeship in a Project-based Curriculum

- **Novice:** Students come in as novices and work on a project of their own with one of the more experienced students mentoring them, as they carry out the project.

- **Apprentice:** As they gain experience, they work on larger projects with other students, where more advanced students serve as project and subproject leaders.

- **Mentor:** After they have worked on a number of different projects, they are ready to serve as a mentor for a new incoming student.

- **Project leader:** After they have done their mentoring successfully, they are ready to begin serving as a project or subproject leader on larger projects.
Benefits of Technology for Creating Apprenticeship Learning Environments

- Situated learning
- Modeling
- Coaching
- Scaffolding
- Articulation
- Reflection
- Intrinsic motivation