Session 8

Watch It, Do It, Know It: Cognitive Apprenticeship

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I. Key Questions and Learning Objectives

Key Questions

- How can students learn to think strategically?
- How can teachers make thinking visible for their students and support more powerful learning?

Learning Objectives

- **Creating cognitive apprenticeships**—Teachers will learn what kinds of tasks and projects are appropriate to a cognitive apprenticeship. They will recognize that tasks should be authentic, representative of the field or domain being pursued, and based on real-world needs and contexts.
- **Making thinking visible**—Teachers will consider how to make expert thinking visible and how to support student learning through modeling, scaffolding, and coaching. They will recognize the need to break down a task, to carefully scaffold, and structure activities to guide a cognitive apprenticeship.
- **Assessing students' learning**—Teachers will understand how to make student thinking visible so they can judge when and how to support students' learning.

II. Session Overview

Traditionally, in many fields, masters of a trade would take novices under their wings and teach them through an apprenticeship. Master blacksmiths, seamstresses, or craftspeople would teach their apprentices through a process of demonstration, assistance, and coaching. In such settings, the learner was able to observe and participate in the process of work from beginning to end. The master's job was to create opportunities for the apprentice to assist in the work and practice new skills under supervision. Teaching and learning in apprenticeship settings revolved around authentic, real-world tasks and products. In this session, we discuss the idea of a "cognitive apprenticeship," which applies this ancient tradition of practical, trade-oriented apprenticeships to the kinds of teaching and learning that take place in modern schools.

Like traditional apprenticeships, the notion of a cognitive apprenticeship includes purposeful demonstration of skills, coupled with assistance and coaching. However, traditional apprenticeships and cognitive apprenticeships differ in a number of ways. First, in school settings the focus is typically on developing conceptual understandings and cognitive skills, rather than the production of a concrete product or craft. Whereas craft production is a hands-on, visible process, the kinds of thinking and reasoning expected in school are often invisible. Therefore, one of the goals of the cognitive apprenticeship model of teaching and learning is to support novice learners in developing their reasoning abilities by making expert thinking in a subject area visible (Collins, Brown, & Holum, 1991).

An example from the modern classroom might include the teacher who introduces her students to a principle in geometry and then asks them to demonstrate their understanding through a geometric proof. The link between the principle and the proof-writing process is often invisible. To make thinking visible, a mathematics teacher might demonstrate how to develop a proof by talking through her own problem-solving process as she completes the task. She might explain the questions she asks herself as well as the decisions she makes along the way as she constructs the proof, reflecting on her reasoning out loud (including mistakes or rejected strategies), thereby providing a model for the students' own problem-solving processes. Over time, teachers can help students become more "expert" at thinking like mathematicians by coaching them in the ways in which these experts practice, rather than just conveying factual knowledge that these experts may possess.

The relationship between a student teacher and her mentor teacher also provides a good example of a cognitive apprenticeship. As a mentor teacher talks aloud about her own planning and teaching, she provides a window into the intellectual work of a teacher. When the mentor teacher observes the student teacher in the classroom, she can provide feedback and coaching to assist him as he develops skills and strategies. In both of these cases, the expert's goal is to make thinking visible by modeling the central aspects of the activity, showing how strategies work in an authentic situation, giving increasing responsibility to the apprentice, and providing feedback as learners practice until they become proficient.

Several key teaching strategies are involved in a cognitive apprenticeship: Throughout the apprenticeship experience, teachers and expert peers *model* or demonstrate how to perform a task. Researchers have found that when teachers explicitly demonstrate and explain specific skills and strategies, students have a better sense of how to approach a task (e.g., Lee, 1995; Palincsar & Brown, 1984; Scardamalia & Bereiter, 1985; Schoenfeld, 1983). The teacher also *scaffolds,* or provides a variety of supports, to help students accomplish their work. These scaffolds can include examples of completed tasks that allow students to see what they are working toward, a series of sequenced steps with assistance and instruction that add up to a completed product, or a variety of aids for students, including materials, techniques, and tutoring on specific concepts or skills. A third kind of teaching strategy—*coaching*—involves observing students as they work and facilitating and providing feedback while they perform a task. Teachers may also work to help students articulate and reflect their own thinking processes in order to build on their strengths and identify gaps in thinking. All of these activities are found in a setting where students are encouraged to explore topics, pose their own questions, and pursue their own investigations. As students develop and learn, these supports are removed, and the teacher *fades* to a less central, but still very involved, presence.

One assumption of a cognitive apprenticeship is that students are engaged in interesting and challenging tasks that motivate them to develop their expertise. In the next section, we discuss in greater depth the particular features of a cognitive apprenticeship learning environment. We then focus on specific teaching strategies for making thinking visible in the classroom. As researchers have discovered, and as we discuss below, authentic, relevant and collaborative tasks, coupled with specific teaching practices, help to create learning environments that foster the development of cognitive skills (Barron, Schwartz, Vye, Moore, Petrosino, Zech, & Bransford, 1998; Bransford, Brown, & Cocking, 2000; Brown & Campione, 1996).

II. Session Overview, cont'd.

Designing Cognitive Apprenticeship Environments

A cognitive apprenticeship is not just an open-ended inquiry. Rather, it is a carefully structured set of activities designed with end goals in mind and with attention to the individual needs of students. Classroom activities are purposeful and goal-oriented, often revolving around the production of substantial, meaningful products. The underlying argument is that students will not develop as skilled readers, writers, and mathematicians without engaging in the real-life practices of experts in these areas. Planning for tasks in a cognitive apprenticeship involves giving careful thought to the skills and understandings necessary to reach those goals.

The context for the cognitive apprenticeship has three key features:

- The work must be situated in realistic tasks that are representative of the field being pursued (e.g., conducting a scientific experiment or a historical inquiry, writing a short story or a school newspaper).
- Tasks are typically carried out within a collaborative learning community where students work together with the teacher to develop ideas, assist and critique each other's work. [See also Session 7, Learning in a Social Context.]
- Tasks are motivating to students due to their real-world value (e.g. performing for an audience outside of the classroom or conducting a poll and analyzing the results to shed light on a community issue) (Brown, Collins, & Duguid, 1989).

Consider, for example, a teacher working with students on the topic of the American Constitutional Convention. He might begin with a discussion of the school's constitution and its provisions for students, linking a historical event with the students' own context. The day-to-day instruction and activities of this unit might lead toward a classroom "congress," where students would play the roles of specific state representatives and debate the merits of various constitutional planks. A critical element is that students are learning to think like historians in the process of researching their roles. That research would involve, for instance, considering the historical context of the convention and practicing "historical empathy" by attempting to understand the perspectives and views of the different delegates.

In planning the social studies unit mentioned above, the teacher would identify the kinds of expertise he wants his students to acquire and design his tasks and activities accordingly. In preparation for the role-play, the teacher might first *model* how historians conduct their research. He might demonstrate how to frame a historical question, what to look for in evaluating primary and secondary sources, and how to evaluate evidence. Each of these expert practices can be made explicit through demonstrations, readings in history, handouts that offer students questions to guide their evaluation of a historical source, and discussions about what makes a well-defended argument, for instance. The teacher would also provide feedback, *scaffolding*, and *coaching* for the novice historians as they conduct their research and practice these historical thinking skills.

Students might also learn how to engage in the rules of legislative debate that operated at that time, and practice debating and reaching consensus so that they have skills and knowledge to apply to the task. The teacher might scaffold the debating process by having the students read participants' actual writings and speeches to understand their concerns and interests in the historical context. He might also set up opportunities for students to practice making oral arguments and receive feedback from their peers. Configuring students in groups representing different political factions can provide opportunities for peer feedback and assistance during the research process and allow the teacher at times to *fade* from a central role.

In their planning, it is important that teachers vary the types of situations, tasks, and skills in which they engage students and help them to see commonalities across situations so they can transfer what they learn. For example, in this social studies project, students should become aware that the skills of studying historical documents and learning what constitutes historical evidence may be applied to other topics beyond the American Constitutional Convention. Similarly, the skills of argument and debate may be applied both in the drama of a role-play as well as in discussions about school and world issues. It is important that students be able to apply what they have learned in ways that are not just specific to the context of the immediate learning situation [See Session 11, Learning and Transfer].

II. Session Overview, cont'd.

Teaching Strategies in a Cognitive Apprenticeship

A cognitive apprenticeship environment allows both teachers and students to demonstrate and share their expertise. In this setting, the teacher's goal is to help students gradually take on more complex forms of reasoning and performance through observation and guided practice. Allan Collins and his colleagues (1991) describe three core teaching methods in a cognitive apprenticeship—modeling, coaching, and scaffolding—designed to support students' emerging skills. In this section, we discuss these approaches as well as several ways teachers can provide opportunities for students to reflect on their own thinking and work together to develop their own expert strategies.

Modeling

Just as in traditional apprenticeships, teachers and advanced students serve as models for novices working to develop skills and understandings. The "apprentices" observe the "masters" as they engage in the essential processes that lead toward a meaningful end product. Different students may assume the role of expert for different elements of the task, depending on the kinds of expertise they have developed. Expert thinking can be modeled in several ways, including providing conceptual models, modeling and explaining expert strategies, and breaking down a task into smaller, more manageable components.

By providing students with one or more *models* of the whole task, rather than working on sets of subskills that teachers hope will add up to the end product, students are guided by what the end product may look like. Collins and his colleagues cite three reasons for giving students a model:

> First, it provides learners with an *advanced organizer* for their initial attempts to execute a complex skill, thus allowing them to concentrate more of their attention on execution than would otherwise be possible. Second, a conceptual model provides an *interpretive structure* for making sense of the feedback, hints, and corrections from the master during interactive coaching sessions. Third, it provides an *internalized guide* for the period when the apprentice is engaged in relatively independent practice (Collins et al., 1991, p. 9; italics added).

For instance, in teaching students how to write a news article, journalism teacher Esther Wojcicki provides an outline of the structure (e.g., start with an engaging lead sentence; say who, what, where, and when, etc.) and also provides a well-written news article (Austin, 2000). The outline serves as an advanced organizer as students plan their writing and provides a structure to refer back to during the composing process and when reading feedback. The model news article provides an example of the structure as well as high-quality news writing. She also puts an article from a professional journalist on an overhead and analyzes its strengths and weaknesses with her students in order to make various writing strategies explicit. Papers or projects done by former students provide another source for good models. In fact, sharing many models provides illustrations of a range of good practice and allows students to examine commonalities and differences. As students practice, receive feedback, and become experts in news writing, they internalize the structure and also develop expertise in reporting events in an interesting and concise manner. Eventually, they no longer need to refer to the outline or sample article—the process becomes automatic.

Teachers may also model *expert strategies.* For example, an expert strategy in reading might involve demonstrating one of the four strategies of reciprocal teaching—summarizing, questioning, clarifying, and making predictions. These are reading comprehension strategies that the teacher first models as she reads and discusses a text with a group and that student leaders later employ (Palincsar & Brown, 1984). [See Session 7, Learning in a Social Context, for further discussion of reciprocal teaching.] Modeling expert strategies in mathematics might involve the teacher thinking aloud as she solves a problem at the board, contemplating different courses of action, considering which mathematical strategies might apply, and evaluating whether or not she is making progress towards a solution (Schoenfeld, 1983, cited in Collins et al., 1991, p. 40). It might also involve students at the board explaining their different solution strategies to a problem, leading to a discussion of the pros and cons of different strategies.

II. Session Overview, cont'd.

A third way of making expert thinking visible is *providing the specific processes of a task* and making them visible to students. Marlene Scardamalia and Carl Bereiter (1983 and 1985) identified key composing processes that expert writers engage in before and during their writing, and then taught these processes to students through a series of prompts. For instance, "planning" was broken down into "(a) generating a new idea, (b) improving an idea, (c) elaborating on an idea, (d) identifying goals, and (e) putting ideas into a cohesive whole" (Collins et al., 1991, p. 38). Demystifying and making these expert processes transparent and offering them to students as guides to thinking and writing supports their development as writers.

An art class focused on papermaking, for example, would use all three types of modeling—providing an exemplary product, offering expert strategies, and breaking down a task. Students would initially have an opportunity to see a number of model products made from various fibers and dyes. They would observe the teacher as she demonstrates and describes aloud different techniques for how to make pulp. After observing this process, they would explore and experiment with making their own products. Modeling does not just occur at the beginning of a unit of study. As students' experiment and create, the teacher might take a moment to model a more sophisticated technique one-on-one with a student or offer another demonstration to the whole class.

Scaffolding

Scaffolding refers to the support structures and steps in the learning process organized by the "master" teacher to help assist the novice in making progress. The teacher organizes the activities to scaffold the work of the entire class, but also needs to think about adaptations for individual learners who have had different prior experiences or who struggle with different parts of the process and therefore need varying kinds and amounts of scaffolding. A key element in scaffolding is that the master must provide just enough support to encourage progress. As novices become more skilled, scaffolding is removed (sometimes referred to as *fading* or *descaffolding*), giving the apprentice more and more responsibility. [See Session 7, Learning in a Social Context, for a more in-depth discussion of scaffolding.]

Scaffolding will take many forms, depending on the needs of the students. An example of a richly scaffolded activity might be a small research task in which the topic is chosen by the teacher and each of the steps toward completion of the activity is well-organized and outlined for the students with small assignments that trigger feedback and assistance as needed. For students with more expertise, less scaffolding may be necessary. One-on-one conferences, ongoing journals, and self-assessments in which students reveal their progress, concerns, and questions can all provide information to help the teacher adjust her instruction to her students' needs. Peers can also provide assistance by demonstrating specific skills to one another (e.g., finding and using sources, choosing a problem-solving strategy, or sketching a still life). Other examples of scaffolds include suggesting the writing prompts mentioned above, providing a sequence of steps for solving a specific kind of problem, or creating a concept map that diagrams the relationships among ideas. [See Session 3, Cognitive Processing.] Each of these expert-provided supports is eventually removed as the skills and ideas become internalized by students.

Coaching

Coaching is another activity that characterizes an apprenticeship. Masters must guide, support, and oversee the work of novices in ways that help to support the development of skills and understandings. Collins and colleagues describe coaching as "the thread running through the entire apprenticeship experience":

> The master coaches the apprentice through a wide range of activities: choosing tasks, providing hints and scaffolding, evaluating the activities of apprentices and diagnosing the kinds of problems they are having, challenging them and offering encouragement, giving feedback, structuring the ways to do things, working on particular weaknesses. In short, coaching is the process of overseeing the student's learning (Collins et al., 1991 p. 9).

Coaching is the work the teacher does as she meets with a small group or circulates around the classroom observing, asking questions, providing partial answers, and addressing students' immediate needs.

II. Session Overview, cont'd.

One of the primary functions of a good coach, on the playing field or in the classroom, is to give constructive feedback on a performance. Just as a football coach helps his players to review the previous game so that they can improve in the next game, a teacher can provide feedback so that her students get clear information on how to improve their performance. Feedback is most productive when:

- It is concrete and specific rather than global or local,
- Strengths are noted before critical suggestions are made, so that students can see what they did right as well as learning what they might do differently,
- It has clear indicators of what the goals of the performance are—like rubrics, models, or guidelines.

The kinds of feedback a coach might offer would depend on where students are in their development. Journalism teacher Esther Wojcicki provides a good example of coaching in action (Austin, 2000). She teaches both a sophomore journalism class that introduces students to the essentials of reporting and an advanced junior/senior class that produces an issue of the school newspaper every three weeks. This journalism program meets the criteria for a cognitive apprenticeship: the work is situated in *realistic tasks* representative of the field of journalism, students work *collaboratively* in their writing and in the production of the newspaper, and students are *motivated* to write for a real audience and be seen by their community. However, coaching and feedback look different in each class.

In the beginner class, Ms. Wojcicki offers extensive feedback on students' articles and encourages them to revise as many as four or five times to improve both their grade and their writing. In fact, she acts more like an editor than a teacher and does not restrict herself to simply writing comments in the margin. She crosses out sentences and whole paragraphs, rewriting sections and suggesting new text that serves as a model for later writing. Ms. Wojcicki also meets one-on-one with her beginner students, providing them individual feedback on their writing, and highlights common problems for the class as a whole. Each of these sources of feedback gives students a clearer idea of the standards for good writing.

Over time, Ms. Wojcicki provides less support and scaffolding for students in terms of ideas for articles, meets less often with individual students, and requires fewer revisions as students develop expertise. When juniors arrive for their first day of advanced journalism, they find not Ms. Wojcicki at the front of the room but four senior editors in charge. Ms. Wojcicki's coaching role is less directive at this point, and student editors become the coaches as they give feedback to staff writers. The staff as a whole also works together to critique each issue. Ms. Wojcicki is still coaching and overseeing her students' learning, but she is playing a different role—assisting the editors-in-chief as they run the program, and reading and commenting on key articles only. As this example illustrates, eventually in a cognitive apprenticeship, peers can coach one another and students can learn to scaffold their own process.

Making Students' Thinking Visible

To this point, we have focused on how a teacher can make expert thinking processes visible to her students. However, the teacher can also help students become aware of their *own* thinking as they develop expertise in a given area—yet another way to develop cognitive skills. Having students elaborate on their thought processes can 1) help them become aware of their own understandings and misconceptions, 2) provide opportunities for students to assist their peers, and 3) give teachers insights to use in scaffolding and assisting students' learning.

For example, teachers can help students make their own thinking visible by helping them *articulate* their reasoning and *reflect* on their problem-solving strategies (Collins et al., 1991). Students might think aloud as they solve a problem in pairs or discuss their different solutions to the same problem in a group. A teacher might ask her students to compare how they approached a particular kind of problem in the beginning of a unit with how they solved a problem later on, by looking back on their work. Students might also give feedback to one another on their writing, share strategies for conducting research, or develop a set of criteria for what makes a good argument. Each of these activities helps to make visible the expert processes students are developing. Creating an awareness of the strategies that students are using intuitively can help them call on these strategies more purposefully. [See Session 9, Metacognition.] Making a variety of strategies visible can also help students build their developing repertoire of skills.

II. Session Overview, cont'd.

A cognitive apprenticeship eventually gives students the opportunity to explore open-ended topics and develop competency by choosing their own paths toward problem solving. Opportunities for exploration encourage students to pose their own problems and frame their own questions. According to Collins and his colleagues:

> Exploration as a method of teaching involves setting general goals for students and then encouraging them to focus on particular subgoals of interest to them, or even to revise the general goals as they come upon something more interesting to pursue (Collins et al., 1991, p. 44).

Students can be encouraged to pursue their own questions through long-term projects or through smaller open-ended assignments. For example, students in a social studies class may "invest" in various stocks and pose their own questions about profits and losses. During smaller assignments, students might generate a set of hypotheses about a set of data or choose a particular audience and stance in writing a political essay. Ultimately, the apprentice learner masters her field by designing her own inquiries and crafting her own products.

Conclusion

Cognitive apprenticeship is not a teaching method that gives a formula for instruction; it is an instructional approach that helps teach complex skills and reasoning, through authentic tasks like those involved in reading, writing, scientific experimentation, artistic production, and mathematical problem solving. Essential to the model is the context in which this apprenticeship takes place; students must see a real purpose for learning and have opportunities to interact with the teacher and other students in the pursuit of expertise.

In designing a cognitive apprenticeship environment, a teacher might ask: What are the central skills and concepts of my subject area that I would like students to master? How can I make visible to my students how I, and other experts, think when we perform these skills and work with these concepts? What kind of unit or class can I design that will require students to understand, practice, and receive feedback on the real-life application of these understandings (both individually and in collaboration with others)? And, finally, what kind of strategies can I use as a teacher to coach and scaffold the development of expertise?

III. Additional Session Reading

Collins, A., Brown, J. S., & Holum, A. (1991, winter). Cognitive apprenticeship: Making thinking visible. *American Educator,* 15(3), 6-11, 38-46. [Online]. Available: http://www.21learn.org/arch/articles/brown_seely.html.

IV. Session Activities

Getting Started

Answer one of the following questions in a free-write, pair-share, or small-group discussion.

To the Facilitator: These activities can be used as session warm-ups or as activities that occur after video viewing.

1. Think about a time you played an apprentice role, learning a particular skill or process from a master. An example might be learning to cook or to play a musical instrument or sport. Describe this experience.
    - What aspects of this experience supported your learning?
    - What might you have changed about this experience to strengthen your learning?
    - Are there aspects of this experience that you can see using in structuring and thinking about your own teaching? Explain.

OR

2. "Making thinking visible"
    - What do you think of when you hear the phrase "making thinking visible"?
    - In your classroom, what are some ways that you make thinking visible?
    - What other ways might you use this idea to inform your teaching and students' learning?

Discussion of Session Readings

To the Facilitator: You may want to select questions from the Other Learning Activities and Assessments section to launch a discussion of the session readings. The questions used for the Checking for Understanding activities may be a particularly helpful resource.

Session Video

Like apprenticeships in the trades, in a cognitive apprenticeship teachers model the skills they want their students to master, they lead their students step by step through the parts of the task by scaffolding and supporting their progress, they coach their individual students as they need help, and they ask students to reflect on their work in relation to high standards for quality. Finally, the teacher gradually fades into the background so that her students can become independent and demonstrate their own expertise. This session's video demonstrates these different aspects of the teacher's and students' roles.

IV. Session Activities, cont'd.

Background on Teachers

Daryl Robbins was teaching fifth- and sixth-grade integrated language arts and social studies at Birmingham Covington School in Bloomfield Hills, Michigan at the time this show was taped. Ms. Robbins has seven years of teaching experience. She received her bachelor's degree in elementary education and her master's degree in curriculum and teaching from Michigan State University. Ms. Robbins is now principal of Bedford Elementary School in Dearborn Heights, Michigan.

In the first segment of this video, Ms. Robbins uses a kind of cognitive apprenticeship to help her students develop literacy skills. To help them become expert readers and book critics, she engages them in book clubs. As they read and critique the books they have chosen, Ms. Robbins models, supports, and coaches her students, helping them learn to read critically, evaluate what they have read, and discuss their ideas respectfully. Students in this video are also assisting one another's learning as they conduct geography research in expert jigsaw groups. Presenting what they learn motivates the students, gives them a sense of the standards for quality work, and increases their sense of investment in the content.

Pete Shaheen teaches ninth- through 12th-grade interdisciplinary language arts and social studies at Seaholm High School in Birmingham, Michigan. A veteran teacher of 25 years, Mr. Shaheen holds a master's degree in speech from Eastern Michigan University and received his bachelor's degree from Michigan State. He is an original member of the Making American Literatures Project, a member of the Michigan Speech Coaches Hall of Fame, and the author of two books, *Making American Literatures* (2000), and *Designing Writing* (2001). He is co-director of the Oakland (Michigan) Writing Project, an affiliate of the National Writing Project in Berkeley, California.

In the second video segment, Mr. Shaheen is teaching writing to 11th and 12th graders. He applies cognitive apprenticeship strategies by modeling the thinking and decision-making processes that writers go through as they create a text. Mr. Shaheen also allows the students to develop their own strategies, using tips and feedback from their peers as a guide—an instructional approach based on how real writers work. He figures out what kind of guidance to give and when to let students struggle on their own by watching and listening closely for clues about what they understand and where they need help. As he steers this process, his role fades and the students take on increasing responsibility until they are leading portions of the class themselves.

Discussion of Session Video

> **To the Facilitator:** You may want to pause the tape at the following points to discuss these questions. If you are watching a real-time broadcast on the Annenberg/CPB Channel, you may want to consider the questions as you watch and discuss some of them afterward.

1. Modeling (Daryl Robbins)

Video Cue: *The Learning Classroom* icon fades out at approximately 6:30 into the program.

Audio Cue: Ms. Robbins says, "You have to go through all of the things that you anticipate might come up within a group and then model those." Boy 1 says, ". . . than I got out of *Lob's Girl,* cause this kind of made more sense." Ms. Robbins says, "But did you like *Lob's Girl* better as a story?" Boy 1 says, "Yeah." Ms. Robbins says, "Me too!"

- What aspects of cognitive apprenticeship is Ms. Robbins using in helping her students learn to discuss books together?
- What strategies did you notice Ms. Robbins using to get students to participate in the groups and to "disagree with each other peacefully"?

IV. Session Activities, cont'd.

2. Students Becoming Experts (Daryl Robbins)

Video Cue: *The Learning Classroom* icon fades out at approximately 9:15 into the program.

Audio Cue: Ms. Robbins says, "And kids know that everyone played a role regardless of ability level or, or other factors everybody helped us get to the point where we are now. And definitely I think that, that is a community."

- What do you think Ms. Robbins means by the phrase, "equalizes learning"?
    - How does using an expert jigsaw strategy accomplish this?
    - What do you see as other advantages of using this kind of strategy?
    - What are some of the challenges you can envision in doing this well?

3. Providing Feedback (Pete Shaheen)

Video Cue: *The Learning Classroom* icon fades out at approximately 16:00 into the program.

Audio Cue: Mr. Shaheen says, "Cognitive apprenticeship is a process that a teacher uses to model learning and to transfer the ownership of that learning style from the teacher to the student. Specifically, cognitive apprenticeship as it might work in writing, for example, is finding a way for students to respond to each other's writing through maybe a systematic approach to looking at a text."

- Why do you think Mr. Shaheen is having students give feedback to each other on their writing?
    - What do you think students are learning as they do this?
- Can you imagine creating (or have you created) a cognitive apprenticeship in a subject you teach in your classroom?
    - What might (or did) it look like?

4. Scaffolding and Descaffolding or Fading (Pete Shaheen)

Video Cue: *The Learning Classroom* icon fades out at approximately 20:30 into the program.

Audio Cue: Mr. Shaheen says, "You're constantly building up the scaffold and reflecting about how you got there. So, it's through that reflection that you're able to build more and solidify your foundations I think. So when I ask them questions about how you get to your decision, I'm asking, I'm really asking them to be reflective."

- How would you describe the different roles Mr. Shaheen plays in his classroom?
- What classroom supports help his students to reach this level of expertise?
- What kinds of tasks can you (or do you) envision your students gradually assuming responsibility for in your classroom? What would you need to do (or what do you do) to make this possible?

V. Other Learning Activities and Assessments

To the Facilitator: These activities and assessments are for you to choose from according to your group's needs and interests. Many of the activities offered here would work equally well as assignments both inside and outside of class. You may want to use class time to prepare for and/or reflect on any activities assigned as homework.

Applications

1. Journal

Focus on a specific subject area and think of an authentic task that is integral to this subject matter and useful outside of school. After identifying a possible task, write your thoughts about the following:

To the Facilitator: This can also be done as a discussion activity in pairs.

- How appropriate would your authentic task be for your particular classroom and students?
- How might you modify this task for your particular classroom?
- What might you do to model, scaffold, and coach students to undertake this task successfully?

2. Create an Action Plan

Identify a task that is authentic to a subject matter you teach.

To the Facilitator: This can be used as a written task or a task for a small-group discussion.

- What might your students bring to this task?
    - What are ways to uncover prior relevant knowledge, skills, and values?
- What kinds of support systems might students need to master this challenge?
    - What resources might help them accomplish this task?
    - How might you know when students need resources and support?
    - What would you look for to know that your students had mastered this task?

After writing about (or discussing) these questions, identify two steps you will take toward incorporating this task into your curriculum. For each step, include a brief rationale.

V. Other Learning Activities and Assessments, cont'd.

Checking for Understanding

1. Short-Answer Questions

a. Explain three key features of cognitive apprenticeship.

b. What are three key teaching strategies involved in a cognitive apprenticeship? Give an example for each strategy.

c. What are at least two characteristics of productive feedback? Give specific examples from your own subject area to illustrate.

2. Essay Question

Think about yourself as an apprentice in the profession of teaching. During this unit on cognitive apprenticeship, what resources and strategies (i.e., scaffolding) did the teacher and curriculum provide to enable you to learn more about teaching?

- What opportunities did you have to reflect and talk about the idea of cognitive apprenticeship?
- How did this affect your learning?
- Did you explore any new ideas about teaching? Explain.
- How might opportunities to reflect, articulate, and explore your ideas and questions help you learn to teach more powerfully?

Long-Term Assignments

Curriculum Case Study

Consider your case study learning problem in terms of cognitive apprenticeships. (Note: If your curriculum case is on a unit you plan to teach in the future, answer in the form of what you project for that unit. You may have to anticipate some of your students' reactions.)

- Discuss your learning goals in relation to a process or skill that is integral to your subject matter.
    - How did your goals fit in with the larger-picture goals of your discipline?
    - When and how might students use this learning outside school?
    - How did you model, assist, or coach your students in acquiring this skill?
    - What activities did you plan to make your thinking visible?
    - What activities did you plan to make student thinking visible?
    - Would you do anything differently when you teach this again?

To the Facilitator: You will find other learning activities on the course Web site at www.learner.org/channel/courses/learning-classroom. You will want to look ahead to assign learners the reading and any homework for the next session.

VI. Web Sites and Organizations

The Buck Institute for Education: Project Based Learning: http://www.bie.org/pbl/

This Web site is a collection of resources about project-based learning, including suggestions from teachers, research articles, Web resources, and teacher training. Included is a special section on problem-based social science (economics, government, geography, and history).

The Center for Problem-Based Learning (CPBL): http://www.imsa.edu/team/cpbl/cpbl.html

The Center for Problem-Based Learning, established by the Illinois Mathematics and Science Academy, engages in problem-based learning research and development, teacher training, and curriculum development for K-16.

George Lucas Educational Foundation: http://glef.org/classrooms.html

The George Lucas Educational Foundation Web site provides feature articles related to project-based learning, interviews with experts, and examples of project-based learning from K-12 schools around the country.

VII. References and Recommended Readings

Note that recommended readings are marked with an asterisk (*).

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VII. References and Recommended Readings, cont'd.

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Schoenfeld, A. (1983). Problem solving in the mathematics curriculum: A report, recommendations and an annotated bibliography, *MAA Notes, Number 1*. Washington DC: The Mathematical Association of America.