Session 11

Lessons for Life:
Learning and Transfer

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I. Key Questions and Learning Objectives

Key Questions

- How do people transfer skills and knowledge from one situation to another?

- How can we teach for transfer?

Learning Objectives

- **Conditions for transfer**—Teachers will understand what conditions are needed for knowledge and skills learned in one context to be retrieved and applied to a new situation.

- **Teaching for transfer**—Teachers will develop ideas about how to facilitate transfer in their own classrooms and how to build bridges for their students between concepts, activities, and lessons.

II. Session Overview

When students go out into the world and encounter new experiences, rarely will they have a manual telling them exactly what to do. They will need to draw on what they have learned before to solve new challenges. How do we teach them to transfer what they have learned from one situation to another? How can we teach them to use their knowledge in new ways? That is the challenge of transfer: How can students use what they have learned by applying it to solve new problems? Given the vast array of knowledge needed in life, the teacher's challenge is to determine what is the *least* amount of material that she can teach really well that will allow students to use that knowledge in the *widest* possible range of situations.

Transfer is the ability to extend what one has learned in one context to new contexts. In some sense, the whole point of school learning is to be able to transfer what is learned to a wide variety of contexts outside of school. Yet the ability to transfer information or ideas is not a given. Quite often, information learned in a specific way, or in a particular context, does not transfer to another. For example, students may memorize vocabulary words for a quiz, but they cannot use the words in their writing. Students may learn mathematical facts, but they do not know how to apply these concepts when they are confronted with a different kind of problem outside of school. Students may conjugate verbs in a second language, but they cannot remember how to use them correctly in conversation.

If the ultimate goal of schooling is to help students transfer what they have learned in school to the everyday settings of home, community, and work, we have much to learn from the nonschool environments where people work. Studies conducted in places like U.S. ships, hospital emergency rooms, and dairy farms have found at least three contrasts between schools and everyday settings:

1. School environments place more emphasis on individual work than most other environments, which tend to emphasize collaboration.

2. School work tends to involve more "mental work," whereas everyday settings invest more in tools and technologies to solve problems.

3. Abstract reasoning is emphasized in school, whereas contextualized reasoning is used more often in everyday settings (Resnick, 1987, cited in Bransford, Brown, & Cocking, 2000, p. 74).

The overall implication is that for effective transfer to take place, learning should be organized around the kinds of authentic problems and projects that are more often encountered in nonschool settings. However, as we discuss below, overly contextualized reasoning can limit an individual's ability to transfer. It is thus important to provide opportunities for students to use knowledge in multiple contexts so that they can see how skills or problem-solving strategies can be generalized.

All new learning involves transfer to some extent; learning can be transferred from one problem to another, from one class to another, between home and school, and between school and the workplace. Specific transfer (also called near transfer) refers to the application of knowledge to a specific, very similar situation. For example, a student can add a string of numbers on a worksheet in the classroom and can also add a similar string of numbers in the grocery store. General transfer (also called far transfer) refers to the application of knowledge or general principles to a more complex, novel situation. An example of general transfer is a student who understands the principles of the scientific method and applies them to design and conduct an experiment, to critique other experiments, and to test competing hypotheses in an area where she has developed content knowledge. General transfer is more broadly useful, and it is also more challenging to develop.

Researchers have found that a number of factors influence a learner's ability to understand or apply new knowledge:

• The nature of the initial learning experience,

• The contexts for both the initial learning and the new situation to which it may apply,

• The ability of learners to see similarities and differences across situations, and

• Learners' metacognitive abilities to reflect on and monitor their own learning.

II. Session Overview, cont'd.

For transfer to occur, learning must involve more than simple memorization or applying a fixed set of procedures (Bransford et al., 2000, p. 55). Learners must understand a concept or have command of a skill in order to be able to use it themselves. They must know how to apply what they have learned to new situations or problems, and they must know *when* it applies. To teach for transfer, teachers must ask, "What is it about what I am teaching now that will be of value, of use, and a source of understanding for my students at some point in the future, when they are in a situation that is not identical to the one they're in now?" Continually asking not just, "Where are my students in the curriculum now?", but also "Where might this learning be going?" is fundamental to teaching for transfer.

The Nature of the Initial Learning Experience

An important point about transfer is that the initial knowledge that is intended for transfer needs to be *well-grounded*. One factor that influences initial learning is whether students have learned something so that they understand it or whether they have simply memorized facts or procedures. Learning with understanding includes grappling with principles and ideas, and structuring facts around these organizing ideas. For example, a student may memorize the properties of veins and arteries, but not understand why these features are important. In *How People Learn,* John Bransford and colleagues illustrate the difference between knowing that arteries are elastic in order to recognize the fact on a test, as opposed to understanding that arteries are elastic and are thicker than veins because they must withstand the force of blood pumping in surges (Bransford et al., 2000). This latter understanding allows learners confronted with the challenge of creating an artificial artery to figure out that there are alternative ways of solving the problem of variable pressure. Students who possess this deeper understanding of the original material—how and why arteries work as they do—are better equipped to transfer this initial knowledge to a new situation and grapple with this more complex problem.

Another factor that influences initial learning is the *time* students are given to explore ideas, offer predictions, process information, and make sense of new tasks and situations. Ideas cannot just be mentioned; they must be examined and pondered in order to be understood. Bransford and colleagues note that "it is important to be realistic about the amount of time it takes to learn complex subject matter. It has been estimated that world-class chess masters require from 50,000 to 100,000 hours of practice to reach that level of expertise" (Bransford et al., 2000, p. 56). That practice involves learning to recognize patterns and to anticipate and execute complex series of moves, among other things.

The development of expertise in any subject area takes a major investment of time. Students need time to understand the meaning of new ideas, to draw connections to other ideas, to apply what they are learning to real tasks, to determine patterns of relationships, and to practice new skills. Bransford and colleagues observe:

> Attempts to cover too many topics too quickly may hinder learning and subsequent transfer because students (a) learn only isolated sets of facts that are not organized and connected or (b) are introduced to organizing principles that they cannot grasp because they lack enough specific knowledge to make them meaningful (Bransford et al., 2000, p. 58).

This same principle causes many educators and learning theorists to argue for a "less is more" curriculum that carefully selects important concepts for students to explore deeply, rather than a "coverage" curriculum that superficially mentions lots of ideas that are never really applied or understood (Bransford et al., 2000; Bruner, 1960; Gardner, 1999).

The way in which teachers *organize ideas and learning experiences* is a third factor that makes a difference in how deeply students understand. Understanding requires drawing connections and seeing how new ideas are related to those already learned—how they are alike and different. One way to facilitate learning with understanding is to offer "contrasting cases":

> Appropriately arranged contrasts can help people notice new features that previously escaped their attention and learn which features are relevant or irrelevant to a particular concept .... For example, the concept of linear function becomes clearer when contrasted with nonlinear functions (Bransford et al., 2000, p. 60).

II. Session Overview, cont'd.

Structuring the learning environment in strategic ways can also foster understanding. For instance, experiential learning can be made even more powerful when coupled with a structured examination of the central ideas to be learned. Creating a simulation or an inquiry experience in which students explore materials or data and then following it with a structured explanation of those ideas through a lecture or guided discussion can produce stronger learning than either experience or explanation alone. For example, three groups of college students were given different kinds of instruction about memory. The first group was given actual data sets from memory experiments to explore and also received a lecture; the second group only read a text and heard a lecture; and the third group worked on the data sets without the lecture. The group that explored actual data sets from memory experiments and then heard a lecture was better able to predict the results of a new memory study than the other two groups (Schwartz et al., 1999, cited in Bransford et al., 2000, p. 59).

A fourth influence on initial learning is *motivation*. Motivation affects the amount of time people are willing to put into learning. Motivation can be seen as a function of how learners see themselves, how they see the task at hand, whether they think they can succeed, and whether teachers help them engage with the material in productive ways (Blumenfeld & Mergendoller, 1992). Motivation is enhanced when learners see themselves as capable. Teachers can support this perception by choosing tasks at appropriate levels of difficulty, carefully supporting each student's learning process, providing multiple entry points into the material, and creating opportunities for students to receive feedback and revise their work. Motivation is also enhanced when learners value a task and find it interesting, something teachers can support by relating material to students' lives and experiences. Allowing choice and assigning tasks that are active, authentic, and challenging can serve to engage students in the work at hand. Interest and value are also enhanced by having an audience for one's work, seeing the usefulness of an activity, and having an opportunity to influence others (Bransford et al., 2000). [See Session 12, Motivation and Learning.]

Applying knowledge in real-life contexts can support deeper initial learning. At the same time, knowledge too closely tied to only one specific situation may not transfer to others unless general principles for its use are also understood. In short, transfer is affected by the context in which the initial learning takes place. If a fact is "learned" by simple memorization in a rote fashion and never applied to an authentic task that provokes understanding, the student may be able to recite the fact when specifically asked, but is unlikely to be able to call upon and use the information in new situations. For this reason, "active" learning in which students are asked to use ideas by writing and talking about them, apply what they have learned to more complex problems, and construct projects that require the integration of many ideas has been found to promote deeper learning and stronger transfer.

Although applying ideas and skills in real-life contexts is important to initial learning, it is also important to learn how to use skills across problems and settings. People may learn a skill in one context, but fail to apply this learning in other contexts. For example, Jean Lave and her colleagues (1988) found that a group of homemakers conducted calculations with ease in the supermarket aisle, but could not perform the same math on similar paper-and-pencil problems. Similarly, researchers found that fifth- and sixth-grade students learned concepts of distance-rate-time in the context of planning for a boat trip, but failed to transfer these understandings to new situations (Cognition and Technology Group at Vanderbilt, 1997). People have to be taught how to transfer their knowledge—that is, they need to understand how it may be relevant to a wide variety of situations.

As educators we need to ask ourselves, "What are those simpler skills that, again and again, turn out to be useful in more complex performances we want students to learn?" We want to make sure students learn those simpler skills well so that when they confront the more complex performances they can put into practice what they already know. We frequently possess some simpler skills or simple kinds of knowledge, but when we confront the new task we do not realize that we already possess what we need to complete that task. Metacognition is important to transfer because it involves being wise enough to know that we already know something and will use it when it is necessary.

II. Session Overview, cont'd.

Transferring Knowledge in and out of Different Contexts

Students transfer knowledge *into* a new learning situation, just as they transfer *out* newly formed understandings to other settings. Transferring knowledge *in* raises a number of challenges for bridging contexts:

> First, students may have knowledge that is relevant to a learning situation that is not activated. By helping activate this knowledge, teachers can build on students' strengths. Second, students may misinterpret new information because of previous knowledge they use to construct new understandings. Third, students may have difficulty with particular school teaching practices that conflict with practices in their community (Bransford et al., 2000, p. 68).

Teachers can build on the knowledge students bring to the classroom by providing opportunities to discuss what they already know about a topic, relating problems to familiar contexts, and working with other teachers to build curricula that build across grade levels. Teachers can also build on students' cultural expectations and knowledge. Researcher and teacher Carol Lee studied how cultural practices outside the classroom can be transferred into the classroom to facilitate learning. She documented how a teacher helped urban, African American students apply the linguistic knowledge they already had about words, rhymes, and symbolism from their lives outside the classroom to academic tasks (Lee, 1995). Her studies show how helping students become more conscious of the ways they were already using language could help them apply this knowledge to literature analysis inside the classroom.

At the same time, teachers should be aware of the many ways a student's prior experiences and understandings may impede new learning. For instance, children's understanding of counting and arithmetic can interfere with their understanding of how the same numbers function in the numerator and denominator of a fraction. If they know that 5 is bigger than 4, they may have trouble understanding that 1/5 is smaller than 1/4 unless they are given the opportunity to work hands-on with materials that allow them to manipulate fractional portions. Similarly, students may overgeneralize what they have already learned, as young children do when they say, "I 'goed' to the store," instead of "I went to the store." They have applied a general rule for past tense verbs that does not work in this irregular case. Students' intuitive but inaccurate understandings of concepts like force and motion in physics or natural selection in biology can also interfere with new learning. It becomes the teacher's role to unearth these misconceptions, explain the differences in the situations under study, and help students to reshape their thinking. Careful observation of language patterns and misconceptions, as well as preassessment tools that offer a snapshot of students' current understandings, can help teachers gain these insights.

Although students can transfer a great deal of knowledge into a learning situation, one of the primary goals of school is to help students transfer knowledge out to new situations. One kind of transfer occurs when we learn the parts of a task and then use those parts to do something much more complicated, just as football players do when they practice specific skills and then put them together into a new play. For instance, in elementary school, students learn addition, subtraction, and multiplication and then at some point they also learn long division. Learning long division requires transfer because students have to take what they already know about adding, subtracting, and multiplying, and apply all three of those processes to learning a new kind of skill called division.

Another kind of transfer occurs when we have to take what we have learned in one situation and apply it to a new situation at roughly the same level of complexity. For instance, we can transfer an idea from one situation and use it in a new, but similar context. If a student has learned about the notion of a revolution while studying U.S. history, she can transfer or apply the notion of revolution to her study of French history. Later, she can apply these understandings to a Russian context when studying the Russian revolution.

We can transfer within a subject matter, as with the concept of revolution, as well as across subject matter areas. For example, when Donald Johnson, featured teacher in this session video, teaches bridge-building to the students, he uses concepts like balance, form, and function to help remind them about what they need to keep in mind as they build their bridge. Students might have already come across these concepts in an art class where they were encouraged to notice the ways in which a painter balances various elements. If students have learned these concepts in art—and if they have learned them well—the teacher can draw on those ideas in a totally different area, such as bridge building or physics, for example. In this way, central concepts can be used and transferred across subject areas.

II. Session Overview, cont'd.

Encouraging the transfer of knowledge out to new, more complex situations might involve asking students to study a particular problem in the classroom and then assigning a project that requires applying these understandings outside the classroom. For instance, students might take what they learn in the classroom about calculation and graphing and go to a nearby intersection to do a traffic flow study to determine whether an extra stop sign or stoplight is needed. Students can apply their understandings of biology by investigating local water to check for pollution levels or by determining what kinds of wildlife live in a particular area. Teachers can show their students how a particular set of ideas they learn in the classroom can be useful in a variety of settings.

Seeing Similarities and Differences Across Contexts

Part of the challenge of transfer is knowing when two situations share a fundamental structure and thus should trigger the use of a previously learned concept or principle. Jerome Bruner (1960) suggests that teachers can help students use their knowledge across dissimilar situations in at least three ways: 1) provide a context for the subject matter, 2) capitalize on general principles, and 3) encourage the understanding of structures that tie subject matter knowledge together. These three instructional principles have all been found to influence learning and transfer.

In school settings, the ways in which teachers present ideas and engage students in working on them have a great deal to do with whether transfer of learning will later occur. Learning discrete, unconnected facts outside of a broader *context* reduces the likelihood that students will be able to remember and apply their knowledge later. Learning information that is never applied or put into practice also reduces the likelihood of later transfer. For instance, students will be less likely to remember the formula for volume if they memorize it than if they derive the formula themselves through the exploration and manipulation of substances encapsulated in different-shaped containers.

It is also important to understand central *principles* that apply across cases: "To understand something as a specific instance of a more general case—which is what understanding a more fundamental principle or structure means—is to have learned not only a specific thing but also a model for understanding other things like it that one may encounter" (Bruner, 1960, p. 25). Researchers have discovered that learners can be taught how to recognize when problems may share certain elements or similarities. Analogies are particularly powerful forms of representation that are instances of transfer in and of themselves since they require applying what one knows about one thing to another.

A well-known study of transfer and the use of analogies was conducted with two groups of college students. Both groups were given a passage about a general who captures a fortress by dividing his army into groups that converge on the fortress simultaneously. The same students were then asked to solve the problem of how to destroy a malignant tumor with rays that cannot be used at very high or very low intensities. More than 90 percent of the students could solve the problem when they were told to use the information about the general and the fortress to solve the problem, but few students could solve the problem when not prompted to use the analogous connection between the two problems (Gick & Holyoak, 1980, cited in Bransford et al., 2000, p. 64).

Two additional ways to increase flexibility entail asking learners to think about alternatives to the original case or having them create general principles that apply to a whole class of related problems:

> For example, instead of planning a single boat trip, students might run a trip planning company that has to advise people on travel times for different regions of the country. Learners are asked to adopt the goal of learning to 'work smart' by creating mathematical models that characterize a variety of travel problems and using these models to create tools, ranging from simple tables and graphs to computer programs. Under these conditions, transfer to novel problems is enhanced (Bransford et al., 2000, p. 63).

The more teachers make clear the fundamental *structure of the subject* and where an idea stands in relation to many others, and the clearer they make the general principles that apply to what is being studied, the more likely that students will be able to understand the idea and use it later. One technique for making these structures visible is generating a visual representation (e.g., a table or diagram) that illustrates the relationships among ideas or classes of problems. An English teacher might use Venn diagrams (i.e., overlapping circles) to demonstrate

II. Session Overview, cont'd.

similarities and differences between genres of literature; a mathematics teacher might use a table that illustrates the similarities and differences between geometric shapes. [See Session 3, Cognitive Processing, and Session 10, The Structure of the Disciplines.]

In addition, if students are asked to apply what they are learning to a particular task or analysis, they are more likely to be able to use their knowledge again later. For example, if teachers teach vocabulary by indicating the logic of standard roots and prefixes for words, students will better understand the structure of the language they are being asked to learn and be able to apply general principles (e.g., "pre-" means before; "post-" means after) when they encounter similar words. If they are asked to use the words they are learning in several writing and speaking contexts, students are more likely to remember the words and understand how to use them in other set-tings. Similarly, if students are taught how to figure out the features of different kinds of problems and to com-pare them with others, they can begin to understand when a certain kind of prior learning may apply to a new problem.

Metacognition and Transfer

Engaging learners in metacognitive activities—helping them become more aware of how to focus on critical ideas or features of problems, generate themes or procedures, and evaluate their own progress—can improve transfer and reduce the need for explicit prompting. Two general metacognitive questions learners can ask them-selves to facilitate transfer are: "How is this problem like others I have solved before?" and "Does anything here remind me of anything I have learned earlier?" (Gage & Berliner, 1998, p. 301). [See Session 9, Metacognition.]

Research on teaching in reading, writing, and mathematics has demonstrated how teaching self-monitoring strategies and helping students practice expert strategies can positively influence their ability to transfer to new situations. Students can be taught to ask themselves, "How is this example or problem similar to or different from others I have encountered?" They can also be taught to apply certain thinking and performance strategies in mul-tiple situations. For instance, Marlene Scardamalia and her colleagues developed a program for teaching written composition. The teacher models expert writing strategies and encourages students to use writing prompts to help them identify goals, generate new ideas, improve and elaborate on existing ideas, and develop coherence in their compositions (Scardamalia, Bereiter, & Steinbach, 1984, cited in Bransford et al., 2000, p. 67). These expert strategies can transfer from one writing project to the next. Having understood and applied the strategies and having written a composition consciously using them, students can now transfer these writing strategies to other situations. This is a different and much more powerful learning process than simply having to recopy a paper in response to a teacher's edits or corrections without understanding the fundamental purposes and strategies that inform the writing process.

Conclusion

John Bransford and Daniel Schwartz propose a conception of transfer that emphasizes individuals' preparation for future learning and takes into account "assessments of people's abilities to learn in knowledge-rich environments" (Bransford & Schwartz, 1999, p. 8). According to this view of transfer, learning is a process that takes place over time, is influenced by learners' past experiences and current dispositions, can be shaped by feedback and active self-monitoring of understanding, and depends on access to resources for continued learning. In other words, transfer in its most powerful general form is the ability to apply a wide range of learning strategies to new learning situations.

II. Session Overview, cont'd.

In considering how your own classroom supports transfer, you might first ask, "How can I assess and facilitate the knowledge, understandings, and skills my students are transferring *into* a task or unit of study?" And "What are my goals for the skills and knowledge I would like my students to be able to transfer *out* to other tasks and situations?" In the process of constructing an activity or task, you might ask, "How can I help my students understand the central principles and underlying structures of knowledge in this topic? How can I help them see the similarities and differences among the concepts and problems we are working with? How can I help them use self-monitoring strategies as they work to appropriately apply what they know across these different problems?" And, finally, "How can I create a learning environment where students apply what they have learned in real-world contexts?" Supporting students' abilities to transfer what they have learned means helping them to actively put knowledge into practice in new and challenging situations.

III. Additional Session Readings

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). Learning and transfer (Chapter 3). In *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press. [Online]. Available: http://books.nap.edu/html/howpeople1.

Perkins, D., & Blythe, T. (1994). Putting understanding up front. *Educational Leadership,* 51(5). [Online]. Available: http://www.ascd.org/readingroom/edlead/9402/perkins.html.

IV. Session Activities

Getting Started

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

1. What does it mean to transfer knowledge or skills from one situation to a new situation?

   Think of a time when you had to apply knowledge or a skill you learned in school to a real-life situation (e.g., at work, while traveling, or in managing the activities of your day-to-day life). What was it about the school experience that helped or hindered you in applying this skill or knowledge?

OR

2. Consider your current teaching situation.

   • In what ways do you attempt to build bridges for students between one concept and another, between one method of problem-solving and another, or between one lesson/unit and the next?

   • What have you found effective in helping students to transfer what they know to new situations or problems?

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

This video shows how powerful learning in one context can transfer to new contexts both in and outside of school. Teachers in this session's video demonstrate how transfer works in two ways: Students' real-world experiences can contribute to their learning process in the classroom. In addition, students take the skills and knowledge they learn in the classroom and apply them in the real world. The ways teachers present ideas and engage students in working on them have a great deal to do with whether transfer of learning will occur later.

Background on Teachers

Julie Helber teaches fourth-grade math and science at Paddock Elementary School in Milan, Michigan, where she is also curriculum coordinator. Ms. Helber is a National Board-certified teacher and recipient of the National Educator Award from the Milken Family Foundation. She received her master's degree in curriculum development from Eastern Michigan University, and her bachelor's degree in kinesiology from the University of Michigan.

In the first video segment, Ms. Helber teaches mathematics so that it connects to the real world. To make her math lesson more meaningful, she asks her students to consider how to divide pieces of candy among friends and how to divide students among buses. Students share their thinking so that they hear many different ways of approaching a problem. These teaching strategies help her students understand fundamental concepts of division with remainders so that they can apply them in new contexts.

IV. Session Activities, cont'd.

Donald Johnson teaches seventh- and eighth-grade science at Christopher Columbus Middle School in southeast Detroit. He is active in the Detroit Area Pre-College Engineering Program (DAPCEP). He holds a master's degree in education from Marygrove College, and a bachelor's degree in biology from University of Tennessee, Knoxville. Mr. Johnson has six years of teaching experience. He is a member of the Board of Directors for the Metro-Detroit Science Teachers Association.

In the second video segment, Mr. Johnson creates a project that draws on his seventh- and eighth-grade students' knowledge of mathematics, physics, and social studies as they apply this knowledge to the complex problem of constructing a bridge. In this lesson, students wear many hats from the outside world, becoming business owners, engineers, and bankers. Students integrate many different kinds of knowledge to solve a problem, giving them practice in transferring their learning to the real world.

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. Pedagogy That "Sticks With" Students for a Lifetime (Julie Helber)

Video Cue: *The Learning Classroom* icon fades out at approximately 9:00 into the program.

Audio Cue: Ms. Helber says, "And that's really my pedagogy of teaching anything. That if I can get the students to explore ideas and make meaning of what they're exploring themselves that's going to stick with them for a lifetime."

• What do you notice about the children's problem-solving strategies in this video segment?

• In your specific content area, can you give an example of a learning problem you could design for your students that would have real-life meaning for them?

2. Thinking Like Mathematicians (Julie Helber)

Video Cue: *The Learning Classroom* icon fades out at approximately 11:15 into the program.

Audio Cue: Ms. Helber says, "I think it's important that, for students to behave like mathematicians, that they need all the materials that they might need in order to solve a particular problem. I offer all different sorts of ways or methods that they might arrive at an answer."

• How might encouraging students to think and behave like mathematicians help them transfer their problem-solving skills to learning in other contexts and subject areas?

• What teaching strategies do you use (or might you use) in your classroom to facilitate students' transfer of their learning?

IV. Session Activities, cont'd.

3. Prior Knowledge (Donald Johnson)

Video Cue: *The Learning Classroom* icon fades out at approximately 18:15 into the program.

Audio Cue: Mr. Johnson says, "Even though we have something that we want to teach, all of the children come with some amount of knowledge about something. So before we start to tell them anything, we want to see what it is they already know, so that we can start to make connections."

- What are some ways Mr. Johnson might be able to assess what students already know as they embark on a new activity?

- What kinds of knowledge and skills do you think Mr. Johnson's students transfer *into* this activity? In other words, what knowledge and skills are they building on?

- What kinds of knowledge and skills do you think these students will be able to transfer *out* or apply to future activities and tasks?

- In your own setting, what are some ways you can assess students' prior knowledge and experiences?

4. Metacognition (Donald Johnson)

Video Cue: *The Learning Classroom* icon fades out at approximately 23:45 into the program.

Audio Cue: Mr. Johnson says, "So again it's not something that is pencil and paper and I'm going to mark off when they get 10% and 20%, it's more of an application in the real world, because in the real world, the proof is that you did it."

- What are some of the ways students monitor their understanding in this video segment?

- How might the ability to monitor your own understanding affect your ability to apply new knowledge or skills?

- In your own setting, what are some of the ways you can help students to assess their own progress as they work?

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
Take some time to imagine how your students might transfer what they learn in your class to their other classes, to their outside activities, and to life beyond their school years. Give an example of how students might build on the knowledge and skills developed in your class and then apply them to another context.

2. Create an Action Plan
Write a short essay on the ways you intend to build a bridge for your students between two concepts, two topics, or two types of problems.

- How will you use their prior knowledge and experiences to build their understanding?

- How will you help them to see similarities or differences between the two concepts or topics?

- What kinds of scaffolding might you provide to assist students in their learning?

- What kinds of metacognitive activities might you design to help students monitor their own learning and reflect on how to transfer what they have learned to the new concept, topic, or problem?

- How will students then apply what they have learned and why is this application important?

Checking for Understanding

1. Short-Answer Questions
a. Describe the difference between "near" and "far" transfer and give an example of each kind of transfer.

b. How does the way teachers organize ideas and learning experiences influence transfer?

c. In what ways can metacognitive activities facilitate transfer?

d. Why do students sometimes fail to transfer what they've learned in school to other settings?

2. Essay Question
Explain what transfer is and why it is important to the learning process. With specific examples, describe how the learning environment, the characteristics of the students, and the way the teacher organizes knowledge can influence transfer.

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

3. Reflective Essay

• What ideas stand out for you as the most useful and helpful?

• How do you think these ideas might impact your own teaching?

• What questions remain for you about these issues?

Long-Term Assignments

Curriculum Case Study

Consider your case study learning problem in terms of how students may transfer what they learn. (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.)

• Consider how your presentation of new information, strategies, or concepts may have built on students' previous work and experiences.

• In what ways has the context of this curriculum affected students' ability to transfer skills and knowledge to the next? For example, is the learning in an authentic context (one that might parallel a real-life activity, rather than an abstract, individual, traditional, pencil-and-paper type task)?

• Are there ways in which students were helped to see how new knowledge and skills can be applied in other contexts?

> **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

Learning Sciences Institute: http://peabody.vanderbilt.edu/ctrs/lsi/

The Learning Sciences Institute, at Vanderbilt University, is a basic and applied research organization that focuses on how people learn, with special emphasis on how learning can be enhanced through technology and innovative teaching practices.

Learning, Research, and Development Center: http://www.lrdc.pitt.edu/default.htm

The Learning, Research and Development Center, at the University of Pittsburgh, is a multidisciplinary research center whose mission is to understand and improve the learning of children and adults where they live and work: schools, workplaces, museums, and other informal learning environments. The Center's Web site includes research project descriptions and publications.

Project BETTER: Building Effective Teaching Through Educational Research: http://www.mdk12.org/practices/good_instruction/projectbetter/

The Project BETTER series, developed by the Maryland State Department of Education, summarizes current research on effective instruction to assist teachers in expanding and refining their repertoire of teaching strategies and to guide instructional planning and decision-making.

The Thinking Classroom: http://learnweb.harvard.edu/alps/thinking/

Developed as part of the Active Learning Practice for School (ALPS) site and Harvard University's Project Zero, the Thinking Classroom Web site provides practical resources, including lesson plans and curriculum design tools, for teaching thinking in the classroom. [See, in particular, "Ways of teaching thinking: Thinking through transfer": http://learnweb.harvard.edu/alps/thinking/gettingready_transfer.cfm.]

VII. References and Recommended Readings

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

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