CHAPTER ONE

THE INTELLIGENCE DILEMMA

''I don't want to have the territory of a man's mind fenced in. . . . Their best illumination comes from above, through the skylight.''
OLIVER WENDELL HOLMES SR.

I CAN REMEMBER, as a child, seeing a skylight for the first time. The ability to see clouds and blue sky through the roof gave me a thrilling sense of delight. It meant the ceiling did not have the last word. It meant endless possibilities, imagination, vision, dreams. Today, as an educator, I have several skylights in my home that continue to remind me of a world in which there are no limits, only possibilities. That is what this book is about.

As teachers we operate in a world of limits. There are time lines, deadlines, tests that have ceilings, students who have limitations. We desperately need to find the skylights. What exactly are these windows in the roof in relation to our noble profession? I will try to build the case that skylights relate to thinking, learning, assessment, and intelligence.

OPENING THE SKYLIGHT

We underrate our brains and our intelligence. Formal education has become such a complicated and overregulated activity that learning is widely regarded as something difficult that the brain would rather not do. Is it possible that the brain yearns to learn and that good teaching can actually improve the way the brain functions? This is the idea that the skylight represents. This opening in the ceiling implies a lifting of restrictions, unimagined possibilities, a transcending of the predictable. So what do I mean by intelligence?

Intelligence may be best described as an abstract concept, such as beauty or honesty, rather than one that is concrete. The attributes beauty and honesty are measurable, but with greater or lesser objectivity, depending on who is doing the evaluating. And it is certainly agreed that these attributes can change over time. So it is with intelligence.

Intelligence, I would argue, is not a concrete thing, like a house or an egg crate composed of rooms or cells. Nor is it a *trait* of an individual—such as blue eyes—that cannot be changed. Intelligence is better viewed as a *state* that is fully able to be changed under the right conditions (Feuerstein, 2007).

A more complete and compelling definition of intelligence for our purposes as educators is this (Feuerstein, 2002):

Intelligence is more correctly defined as the continuous changing state of a person best reflected in the way that individual is able to use previous experiences to adapt to new situations.

The concept is in fact summed up by the words *the ability to learn from what has been learned.* This propensity for flexibility and dynamic unpredictability is within every learner. This assurance that each individual has the propensity for change becomes the real joy of teaching. In fact, believing in these new possibilities can help us adjust what might be an outdated concept in our own thinking—that intellectual potential is static, unchanging. Let's begin to unwrap some new concepts.

A CONCEPTUAL UNDERSTANDING OF INTELLIGENCE

We hear a lot about intelligence these days. Is it an important concept? What should we as teachers understand about it? Definitions of intelligence are controversial. We have certain beliefs based on prior experience that must be challenged in light of emerging knowledge in the fields of education and psychology. Let's take a closer look.

If I asked you to rate yourself as above average, average, or below the norm in intellectual functioning, where would you place yourself? This is an important question. It has been said that teachers are the most fragile of professionals, often regarding their own intellectual competency as low to moderate. Examining your personal assumptions about intelligence may remove some misconceptions and provide new ways of thinking about yourself and your students.

Our beliefs guide our practice. It is necessary to examine our beliefs about our students, ourselves, and yes, even our own capabilities in light of current theories and research. As we dig a bit deeper into the theories, perhaps we will discover that we and our students are more intelligent than we ever dreamed. Let's probe new insights and explore together the meaning of *intellectual propensity.* Hang in with me here. We are going to set the stage for some amazing discoveries. My strong conviction is that you will not be the same teacher when we have finished our journey together.

DEFINING INTELLIGENCE

How many times have you used the word *smart* to describe students in your classrooms, wondering if they might be just a bit smarter than you or at least may become so sooner than you would like? What do we mean by *smart?* Does it mean intelligent, witty, creative, or just clever? It may well be just the ability to adapt to one's environment as in *street smart.* Does *smart* mean the same thing as *intelligent? Cleverness* may refer to the ability to cleverly adapt to changing circumstances. There seem to be great differences in interpretation among all these words.

There is little consensus among professionals on an operative definition of intelligence. For example, when two dozen prominent theorists from the American Psychological Association were asked to define intelligence, they gave two dozen different definitions (1995). The concept is wide open to interpretation. We who are educators should understand some basics. For the sake of the intellectual rigor that upholds our profession, let's explore the intelligence dilemma together and examine three prominent theories explained by Rafi Feuerstein (1997).

Theory One: Cast Building

It has long been held that there is a measurable general intelligence factor common to all people. Intelligence quotients (IQ's) have been widely used in educational, business, and military settings. This first theory assumes that there is one basic factor responsible for thinking, or a general mental energy known as "g." This one factor "g" is presumed to be related to all thinking abilities. Because of its rigidity, this theory could be referred to as "cast building," as in building a concrete wall. Intelligence is seen as a global capability that causes an individual to respond similarly in all situations, or to all concepts or ideas. Those holding to this theory conclude that intellectual capacity is a relatively easy thing to measure and one that remains fairly consistent across an individual's lifetime. Is this your belief?

Theory Two: Brick Building

A second theory is a bit more flexible. Rather than *cast building,* it could be described as *brick building.* This theory refers to intelligence that has a number of factors responsible for various thinking abilities, and these factors are separate from one another, like bricks in a wall. Separation is due to the content involved in the thinking processes, as in Gardner's (1993) multiple

intelligences theory. This separation of process and content implies different ways of thinking relative to different subject areas. For example, you may have a spatial intelligence that helps you design buildings and find your way in a strange city but not be able to read very well.

A problem, according to Feuerstein, in considering intellectual ability as separate areas, or "bricks," is that one area of intellectual competence presumably has nothing to do with any other areas of cognitive strength or weakness. That is, this second theory presumes that the systems that support the ability to design a building or read a book have no overlap. Nevertheless, it does introduce some flexibility into the intelligence dilemma.

Have you landed on a specific position yet? Can you be supersmart in one area and really dumb in another? Or are there supporting systems such as flexibility of thinking that underlie both?

Theory Three: Mosaic Model

A third theory could be called the *mosaic model.* This model resembles a colorful, creatively designed mosaic tile as opposed to a concrete or brick wall. The theory is more flexible than the cast building theory and more general than the brick building one. The mosaic model integrates the features of the other two by proposing:

- Intelligence is built from many factors within an individual, both cognitive and experiential.
- These many factors are general and can be related to all cognitive behaviors (like designing or reading).
- Intelligence can be described as either fluid or crystallized (Cattell, 1987).

You could picture fluid intelligence as being the background on which the mosaic tiles are placed. Fluid intelligence consists of thinking strategies that are separate from the content being learned. In other words, it is *how* one thinks, not *what*. Crystallized intelligence, in contrast, is the specific knowledge learned by the individual or the content or body of knowledge that the individual has mastered. It is the mosaic tiles themselves that represent functional cognitive systems.

In other words, this theory assumes intelligence that is separate from the knowledge learned or content measured by many IQ tests. Fluid intelligence—the how to learn—can cross over into many content areas and is open to constructive change. For example, strengthening visual processing could contribute to greater fluency in reading, thereby improving comprehension skills. In fact, improvement in fluid intelligence can contribute to content mastery or crystallization of knowledge. This is great news for all educators. It means that limits that were previously set now have a skylight—a window in the ceiling formerly imposed by intelligence predictions.

Let's return to our skylight analogy. According to Holmes (1993), there are one-story intellects, two-story intellects, and three-story intellects with skylights. Those who only collect facts are one-story individuals. Two-story individuals compare, reason, and generalize, based on the facts of the fact collectors. Three-story individuals idealize, imagine, and predict. Their best illumination comes from above, through the skylight. If we can begin to understand that intelligence is wonderfully open to change throughout a lifetime and that, as teachers, we can influence intellectual development though our teaching, then the *how* to learn will take new priority over the *what.*

In one sentence, write what you believe about intelligence.

Now, apply your belief to your own intelligence and the way you function cognitively. Do you think the *way in which you learn* has an impact on *what* you learn or master? In other words, does your fluid intelligence, your basic cognitive functioning, provide for the acquisition of knowledge?

Let's take an example. Suppose you are having difficulty finding your way in a strange town. You have a map but cannot seem to orient yourself to the street directions. In fact, you are confused about left and right. Based on past experience, you know that stopping to ask for directions may confuse you even more. Then you remember a strategy to deal with this problem. You stop the car and turn the map in the direction that you are traveling. All turns then can be handled easily, because you have oriented yourself in space.

This same remedy, reorienting either yourself or the material, can apply in other contexts. This is an example of fluid intelligence because it crosses categories. In other words, the correct orientation of visual information is useful

in other tasks, such as reading, regardless of their content. If good teaching can contribute to structural changes in fluid intelligence, then the content to be learned will become crystallized more easily whatever the subject area.

Are you with me so far? We will add meat to these bones in succeeding chapters.

Let's get practical for a moment. All theories must be tested in the classroom. Engage students in an activity that will affect fluid intelligence in the realm of visual processing.

CLASSROOM ACTIVITY

First, copy a series of pictures onto a transparency.

- Tell students you are going to show them the series for five seconds and they are to remember the pictures in that order. Then you will show them the same pictures but in a different order with numbers under them. Your students must put the pictures back into the order of the first transparency.
- Project the first set of pictures on the screen, hold for five seconds (or more if you sense they need it).
- Give a few seconds for processing, then put up the second set of the pictures, which are now in a different order. Have your students write the pictures' numbers on their papers in the order in which they first appeared.
- Discuss strategies to use for remembering. This is the most important part of the activity. Some may say they made a sentence to remember. Some will say they just kept saying them over and over. Some will have tried to remember just by their using their visual memory. But all should understand the importance of giving the pictures a label (that is, naming the picture mentally: moose, ball, clock, and so on).

Language is key to making connections; it is the DNA of fluid intelligence. If we can improve language, both inner and spoken, then we can affect intellectual functioning. This activity not only builds processing skills through strengthening visual memory but also contributes to strategic thinking and fluid intelligence, the *how* to learn. Let's continue to explore the intelligence dilemma.

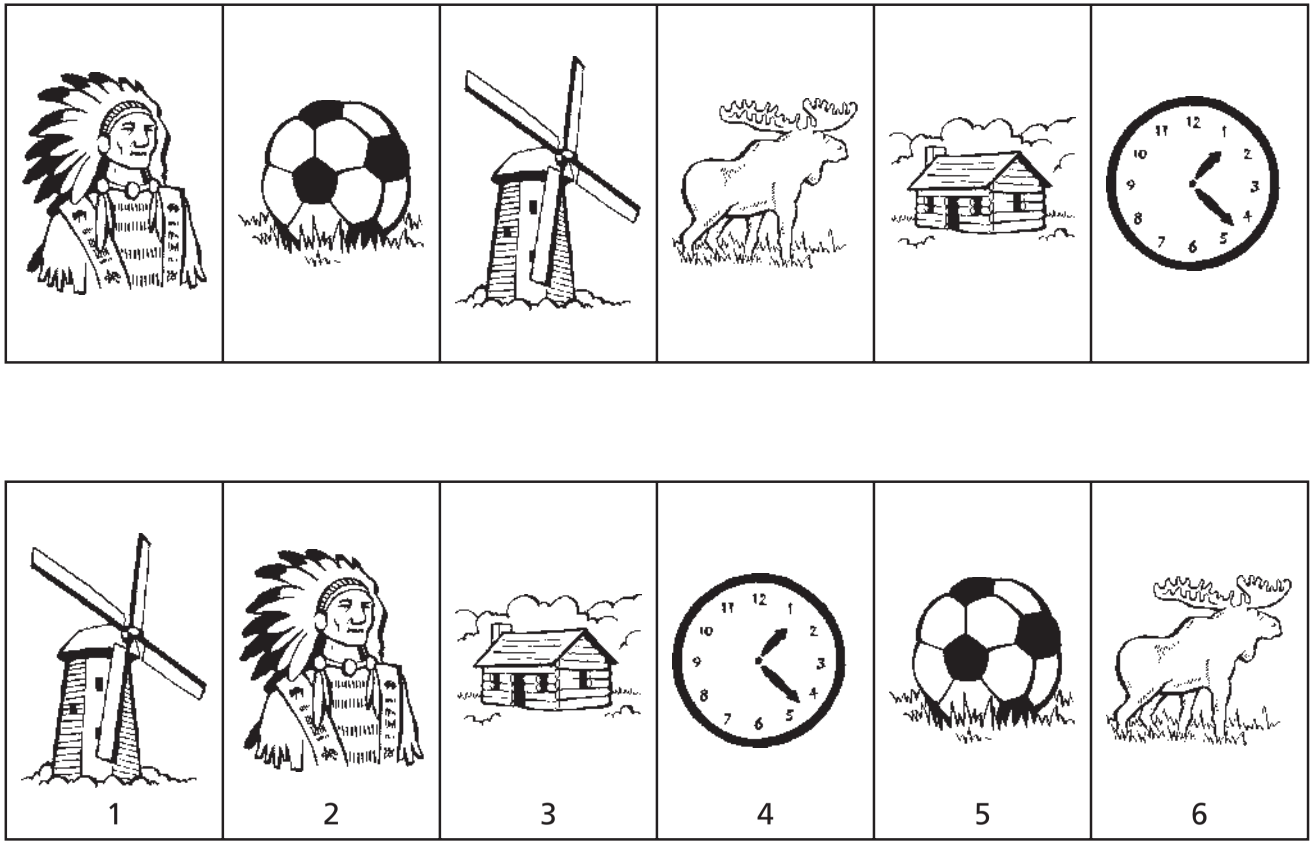


FIGURE 1.1. Visual Memory Stimulation

THE ROOT OF INTELLIGENCE

To define intelligence we must first consider the theories and the research done by the individuals who proposed the theories. We have already examined three prominent ones. In addition, the word itself should be analyzed. The root of the word intelligence is *intellegere,* Latin for "to understand." *Intelligence* implies a general mental capacity that varies from person to person and fluctuates over a lifespan. Different individuals have particular propensities or deficits in the areas of reasoning, planning, problem solving, comprehending abstract ideas, and learning from experience. Innate abilities or disabilities in these areas, however, should never be seen as permanent or unmodifiable. All learners can improve their ability to recognize connections as well as develop the capacity to think strategically, thereby laying the groundwork for new knowledge.

Clearly, individuals vary in their ability to understand complex ideas, to adapt effectively to their environments, to engage in different kinds of reasoning, and to overcome obstacles by creative thought. In addition, a given individual's intellectual performance will vary greatly on any given day and when judged by different criteria. Here is one simple definition that incorporates many of the qualities mentioned:

Intelligence is the ability to recognize and make connections.

This simple definition is extremely relevant to us as we explore learning how to learn in a classroom setting. It may even represent a benchmark for you and your students. How well do you recognize and make connections? Can you teach this skill to your students to enhance their intellectual competency?

Intellectual Potential?

If you ever took an IQ test, you were placed in a category that perhaps "boxed you in" for life. You may have believed that your intellectual potential was measured, when actually your score was merely a predictor of how well you would do in school. The inventors of IQ tests reportedly never believed they were measuring fixed intelligence, yet in practice many educators have translated the scores into biological realities that can never change. Binet, the author of one of the first intelligence tests, is reported to have said, "If it were not

possible to change intelligence, why measure it in the first place?" (cited in Campioni, 1989, p. 155).

For example, one look at a child with Down's syndrome assures many that any attempt to improve on this child's intellectual functioning would be futile. Yet how many enlightened teachers would declare, "Chromosomes do not have the last word" (Feuerstein, 2006). Many children who have Down's syndrome today are achieving far more than anyone believed they could fifty years ago. Perhaps the most important quality of intelligence that Feuerstein's mosaic theory presents is *modifiability*—that is, the belief that intelligence is not constant or static, but wonderfully open to constructive change for all learners throughout a lifetime.

Mediated Learning

As we enter the arena of intellectual dynamic unpredictability, or the realization that learning is not a lockstep, highly predictable process, we learn to expect change in our students. Embracing the "mosaic model" means that the teacher should believe in the reversibility of poor academic performance, not doubt it. Intellectual skills can be developed by both teachers and students. However, such change does not happen by chance or without understanding the mediator's role in the process.

STOPANDTHINK

Do you believe good teaching can actually change the intellectual capacity of a child?

The good news for teachers is that all minds can be stretched, inherent abilities unmasked, and thought processes developed—even our own! The secret lies in unwrapping the amazing concept of *mediated learning*. Mediated learning, in brief, relies on the guidance of an adult, whose role is to help interpret the complex world of input from the environment so that the child can focus, frame, and consider relationships. An extra bonus is that in the process of teaching a child to learn, the teacher too becomes better able to learn and think and make those all important connections. We will discuss mediated learning in more detail in the next chapter.

LET'S GET PERSONAL

Consider your classroom:

- Do you see your students in categories?
- Are the bright ones in the front row (literally or figuratively)?
- In contrast, are the slower ones in the back?
- What about those average learners? You may be really surprised to learn that some in the back row actually have an ability to think more abstractly and make more meaningful connections than those who succeed so well in memorizing the school subjects.

Consider your teaching style:

- Do you tend to lower your expectations to a student's current level of functioning?
- Do you call on the first hand that is up to keep the lesson moving?
- Do you do most of the talking during a school day? Do you consider memorization the goal for mastery of a concept?

Consider your personal level of confidence and competence:

- Do you think you are a good teacher?
- Are you confident that all students in your class are learning?
- Do you give preferential treatment to the bright students who learn easily?
- Are struggling learners a chore or a welcome challenge?
- Do you believe your own thinking and learning are modifiable?

STOPANDTHINK

Discuss these questions with a colleague. Reflect on your beliefs about thinking and learning. They are deeply imbedded. Be open to some new ideas.

As we confront the very roots of our beliefs about ability and intelligence let's recall our first school experiences. This is my story.

STARTING SCHOOL

The year was 1949, and my father had just received military orders to Lakenheath Air Force Base in central England following World War II. Postwar England was a sad and dreary place. It seemed the hearts of the people had been damaged beyond the devastation of the countryside. Ration cards restricted the purchase of many staples, including sugar, butter, and eggs. The war had taken a terrible toll on the country. When we arrived there from America, we could feel the misery. We had come to help.

From my five-year-old perspective, the long, dark days, damp woolen uniforms, meager rations, and never-ending split pea soup for lunch had only a minimal negative impact on my first school experiences. For *I was going to school,* an event I had yearned for since my earliest memories. I was, as my mother said, ''wired for it.'' From the first I was clamorous to learn and could hardly contain the wonder of books and desks and teachers.

I began my formal schooling in a very strict parochial school in a little village called Bury St. Edmonds. The nuns were unbending in their discipline. There was certainly no foolishness allowed and definitely no fun. I have few memories of lessons learned or favorite teachers, yet it was here, I believe, that my desire to become a teacher was formed. Maybe it had something to do with the discipline and work ethic or the childlike wonder of learning for its own sake without the frills. Learning to read was one of my greatest joys because it opened to my curious mind whole new worlds. My natural quest for adventure found an outlet in learning, and I soaked it in like a sponge.

However, my curiosity and adventurous spirit got the better of me one day when I climbed up on the altar in the church to see if Jesus really was under that draped chalice as the nuns said he was. I did not see him. Even the severe discipline of Sister Paul Mary did not deter my quest for knowledge. Was I intelligent? I think intellectually curious would be a better description. In any case, my first three years of schooling in England set me on a course of learning for life and helped form many of my beliefs about education. The formation of my intellectual curiosity happened despite the hardships. I did not need worksheets, colorful pages, stars for performance, or grades that affirmed my competence. I had an innate joy in learning for its own sake. As I reflect on the model of the three-story intellect, I see that I yearned for more than just the facts. Staying on the first floor held no appeal. I wanted the skylight.

Reflect for a moment on your early school experiences. Those events helped shape your perceptions of your abilities and aptitudes. They define for you the beginning understandings of your intellectual abilities, your desire to learn, and your attitudes toward other learners. In fact, they may help explain why you became a teacher. As educators, it is helpful for us to examine the circumstances of our lives that led us into this profession. Each of us comes to it with a belief system shaped through personal experiences.

Take a moment to jot down or discuss your own early educational experiences with a spouse or friend and discuss what you believe today about teaching and learning because of those early experiences.

Some, like me, became teachers because they found learning to be an adventure and wanted to experience every bit of it. Others found learning difficult and became teachers to try to change the system that was so frustrating for them. Still others followed the profession of their parents. For many, the "call" to teach was loud and clear, sometimes coming in spite of a strong desire *not* to be an educator. Perhaps the motivation for some was proving to others that they *could* teach.

Parents play a strategic role in shaping our beliefs about our own intelligence. We are often compared, positively or negatively, to siblings. In fact, these beliefs generally stay with us throughout our lifetimes. A simple statement such as "You must have been last in line when the brains were handed out" can relegate us to the back row not just in school but in any intellectual pursuit. By the same token, hearing how smart we are can be a positive reinforcement. An important question is how smart you feel or think you are today. Has anything changed for you from those early childhood beliefs?

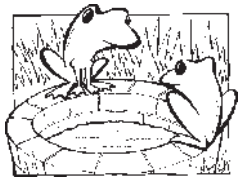
I hope that by now you are beginning to challenge the concept that intelligence is fixed from birth. It is time to put to rest the idea that intellectual capacity is determined by genetics and therefore unchangeable. Instead, try to picture a continuum of propensity—an openness to change—that develops over a lifetime. Now, see the linear continuum rise into a trajectory of ever-increasing abilities. This is your legacy and mine. More importantly, it must be transmitted to the students we teach. Both competence and confidence can be powerfully enhanced. It all begins with what you, the teacher, believe about thinking and learning. For, as I will share later, I was not the most brilliant bulb in the box! My own journey to intellectual competence took many turns in the road.

PRACTICAL APPLICATION

Let's bring our theory into classroom practice. For in order to make an impact on fluid intelligence through our teaching, we must learn how. I have chosen to use the fables of Aesop (Ashliman, 2003) throughout this book to illustrate "how-to-learn" principles. These stories are oral traditions handed down to us through many generations. The mind of man seeks instruction and delights in telling stories that illustrate life principles. Fables, proverbs, and riddles are meant to inspire intellectual curiosity and draw us into their challenges. I hope you will see that these fables' principles can apply to any grade level or subject matter and interface with any curriculum.

The First Fable

The Frogs and the Well



Two frogs lived together in a marsh. But one hot summer the marsh dried up, and they left it to look for another place to live, for frogs like damp places if they can get them. By and by they came to a deep well, and one of them looked down into it and said to the other, "This looks like a nice cool place.

> Let us jump in and settle here." But the other who had a wiser head on his shoulders, replied, "Not so fast, my friend. Supposing this well dried up like the marsh; how shall we get out again?"

This tale is brimming with intelligence-enhancing opportunities. Specifically, let's apply the three theories of intelligence in this chapter to the fable in order to crystallize them for you. Let's first think of the cast building theory or the *g* factor. In this model a teacher would have different expectations for responses from her students, having already mentally assigned them to "groups." Therefore, following the introduction of this fable, she would ask the easier questions to the lower group and the more complex questions to the higher group. A teacher who subscribed to the brick building theory would teach to the specific learning styles of the students. She might have the artists in her class visualize the scene and the kinesthetic learners construct it. A teacher who understood the mosaic theory would assume that all learners could achieve a high level of abstraction in deciding the meaning of the fable while building connections to past experiences, as illustrated in the following paragraphs.

Let's assume you have used this fable in a reading lesson or as part of a science or history unit. You could project the text on the wall for whole-class viewing, then develop some specific questions to promote class involvement.

Prepare the Lesson

But before revealing the text on the screen ask, "Jan, what do you know about frogs?" Don't wait for a hand; ask a specific student and then another. "Ed, do you have more you could add?" "Can you share a personal experience you have had with a frog?" "Describe a frog. In what scientific category could you put a frog? Why? What else would go in that category? What would not?" Explore knowledge through oral language. You are helping students make connections through your questioning.

Project the Text of the Fable

After projecting the text ask, "What do you see here?" Many will want to get right into the content, but focus them with a question such as, "Can you describe the page?" Enlist the response, "A title and a short paragraph." Ask, "Is the author listed?" "Do you think you might know who the author is?" Aesop should be part of a student's vocabulary of cultural literacy. Then, "What is a

fable?" Lead students by helping them restate their answers to reach a clear, concise definition. Check a dictionary prior to the lesson for clear, specific terminology.

Depending on your class, have the passage read silently or orally and then begin a group discussion on what lesson the fable teaches. You may need to provide some hints. As a class, see if you can come up with ideas. Some examples might be:

- Look before you leap.
- Haste makes waste.
- Think before you rush into something new.

Build Intelligence

Select one of the options and write it on the board after developing it collaboratively as a whole group. This is high-level abstract reasoning. Getting students to talk about the lesson of the fable challenges them to stretch their intellectual powers. And yours. Tell them that.

Ask: "What does this passage teach us about intelligence? How intelligent was the first frog? The second? Were they both able to learn from past experiences? What behavior of the second frog made you think he was intelligent? Can you think of an example from your own life when you were doing something similar to what the frogs did?" Be prepared to share an example from your childhood experience. Students love to hear your stories. This personalization of the fable stretches the learning into a different context, developing cognitive strengths that transfer to other learning.

These suggestions are specifically designed to build intellectual competency, and because they are intended to be answered orally by students, they have the power to direct meaningful thought processes. The power of oral language will be explored later.

Develop Cognitive Competence

As you probe student thinking through open-ended questions, you will begin to see new cognitive skills emerge. Connecting to students' prior experience is always a great place to start. Engage them immediately with what they already know or have personally experienced. Keep the dialogue fun, light, and entertaining. This is a great time for you to share your frog experiences!

Having your students describe the layout or format of the page in clear and precise language helps direct efficient thinking processes and evolves into the great skill of being able to predict tasks by the layout of the page, even before reading the directions. When students begin to anticipate the task based on the page format, it means they are being trained in observation skills that will eventually become internalized and automatic. So, for any new task begin with the question, "What do you see on this page?" Work toward a clear, succinct verbal response. For example: "There are no blanks on this page and no explicit instructions, so I am going to have to infer some things based on the content of the paragraph."

The ability to put words into categories is an important cognitive skill. Noting likenesses and differences refines intellectual and verbal abilities. In addition, students benefit greatly by hearing their peers express their knowledge.

Even more intellectually challenging is the ability to summarize and state a lesson the fable teaches. Have your students work in pairs in future sessions to encourage oral exploration of possibilities. Select a sentence and write it on the board to crystallize the activity. For example, you or a student may write:

> *Being intelligent and wise means being able to think both backwards to what happened before and forward to what might happen.*

Again, the skill of a master teacher in the learning process provides the structure your students need to direct their own learning. Through your questioning, you are teaching them how to learn. Then the "what," or content, will come more easily. You are building fluid, intellectual competence.

As you purpose to raise your expectations above your students' actual levels of performance, you will be amazed at the hidden propensities that emerge. Begin by:

- Engaging the quiet ones
- Not calling on the first hand you see
- Moving strategically around the room
- Helping students restate their weak verbal responses
- Being one of the learners
- Setting appropriate challenges

- Modeling your own love of learning
- Building respect for all sincere responses.

REFLECTION

We have begun to infuse some new ideas into the intelligence dilemma. Are you beginning to wonder in your mind and heart if in your classroom in this year you might actually be able to change your students' abilities to think, reason, remember, and reflect? And to do the same with your own? As teachers, we are not called to simply build fact upon fact; instead, we have the great privilege of renovating the mind's architecture—in particular, constructing a skylight, a window in those man-made ceilings.

Teaching is both art and science. As you become more confident and competent in your ability to get students talking in meaningful ways to you and to each other, you will begin to equip them with tools that will keep getting better and better. The secret will be unwrapped in the concepts of *cognitive modifiability* and *mediated learning.* We will examine both in the next chapter.