CHAPTER THREE

Educating Teachers for Developmentally Appropriate Practice

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Good teachers understand what students everywhere can confirm: teaching is not just talking, and learning is not just listening. Effective teachers are able to figure out not only what they want to teach, but also how to do so in a way that students can understand and use the new information and skills. Furthermore, they know what students are ready for and need to learn, so they choose tasks that are productive, and they organize these tasks in a way that builds understanding. Finally, they monitor students' growth and progress so they can address specific needs and keep students engaged in school, learning productively, and growing as cooperative and thoughtful citizens who will be able to participate in society. To do all of these things, teachers need to understand children's development and how it influences, and is influenced by, their learning. A foundation of knowledge about child development is essential for planning curriculum; designing, sequencing, and pacing activities; diagnosing student learning needs; organizing the classroom; and teaching social and academic skills.

Anyone who has spent time in classrooms knows that a teacher cannot make headway without engaging students in the learning process, and this is not as straightforward as it might appear. As just one example, an observer in a successful primary classroom will see children intently and purposefully engaged in a variety of different learning tasks: measuring water at the water table, listening to a big book in the reading center, counting out manipulatives to solve an arithmetic problem, and writing or dictating a story about the recent classroom

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trip to the zoo. With all of this activity, the teacher knows what each child is doing, what the child understands in that domain, and what he needs to work on next to progress in his understanding. While the classroom activities may appear seamless, developing this kind of practice takes a great deal of knowledge and skill not immediately apparent to the casual observer or novice.

One first-year teacher, previously a successful lawyer, who was placed in a low-performing, urban middle school following a short summer preparation program, pinpointed the problem many new recruits encounter: when asked what he had found most challenging in that first year, the teacher said, "getting the children to sit still and pay attention." He did not return for a second year of teaching. Another midcareer teaching recruit who had not had the benefit of education training resigned on her second day. "The kids were nice enough," she said, "but they were running all over the place. There was no way I could teach them anything if I couldn't get them to sit down. I didn't know what to do" (Hegarty, 2001). Understanding where a child is developmentally is one of the most important keys to shaping appropriate learning tasks that are engaging for students—tasks that are both interesting and appropriately challenging. Tasks that are developmentally inappropriate not only breed academic failure for students, they also undermine motivation and encourage disruptive behavior.

A teacher who has a good understanding of child development and learning is more likely to be effective in the classroom; recent data show that new teachers who have had coursework in learning and development are also more than twice as likely to stay in teaching (National Commission on Teaching and America's Future, 2003, p. 84). This is probably because greater success follows from the ability to fashion developmentally appropriate instructional materials and lessons that meet students' needs. These abilities are critical factors in whether the teacher is able to manage a classroom. The challenge for the lawyer turned teacher was "how to keep the children still." When a teacher cannot create tasks that engage students at their developmental level, the result is a chaotic classroom environment where little learning can go on, and little success is achieved.

Teachers who understand development and how to support it encourage dramatically different results from those who do not. (See "Learning to Hate Mathematics and Developing a Classroom of Mathematicians.") This chapter describes how teachers' knowledge of development enables them to be effective in selecting and developing appropriate tasks, guiding the learning process, and maintaining children's motivation to learn.

Learning to Hate Mathematics

She was in first grade and already she was learning to hate mathematics. It was the one subject in which she was not successful. In fact, the class made her cry. Her parents, both successful professionals, heard for the first time the news about their

daughter doing poorly in math at a meeting with her teacher at the end of the first two months of school. The teacher commented that the child had really earned a "D" but she had given her a "C" because the child had initially placed in the top math group. The teacher wondered if it might not be wise to move the child down to a lower-level math group.

The mother, a well-known and highly accomplished African American scientist, objected, realizing that failure in math and feeling incompetent in this subject was a recipe for severely curtailed options ten years hence. The parents said they would work with the child and see what they could do. This was a Thursday. By the following Monday afternoon when the mother visited the school for American Education week, the teacher reported that the child, who had not previously finished her math work, had not only completed it early but had done almost all of it correctly. This child had gone from failing work to "A" work in the space of four days.

The teacher wanted to know what the mother had done. The mother replied: "I figured it out. There were only a few things that could account for her poor showing in mathematics: she didn't know her facts; she didn't know how to express the facts in the way in which they were presented; or she didn't know how to express them in the time given." The mother discovered that her daughter was not connecting the amount of time she was allotted for the task to what she had to accomplish. So, the mother used a timer to help her daughter learn about the relationship between time allotted and completing the task at hand.

An eavesdropping teacher, upon hearing the mother's explanation, said, "Of course, many children at the age of first grade have not yet developed a sense of time and distance." The mother, reflecting on this incident years later, wondered if perhaps the teacher's failure to reach for this explanation and apply it correctively was due to an inadequate understanding of the developmental factors that could account for the child's failure, to expectations about learning abilities in African American children, to a lack of motivation or ability to do the diagnostic analysis that would reveal the learning problem the child was experiencing, or some combination of these things.

This true story provides a small window into what an effective teacher needs to know about child development, and how she should be able to apply that knowledge to help children learn and to grow. In addition to understanding stages of development, an effective teacher needs to understand the components of tasks she assigns and what they require, and she must be able to observe students carefully to evaluate not only what they know but how they learn and perform. With that knowledge, teachers can help young children continue to feel successful and inspired to learn. Without it, they can stymie children's immediate learning and endanger their future success. A teacher who does not understand development may conclude, as this teacher did at first, that a student who encounters difficulties is not learning or, perhaps, not even able to learn.

In contrast, here is a story of a new teacher who understands development, demonstrating how that understanding can make a difference for students' lives in school.

Developing a Classroom of Mathematicians

On a spring morning just before the last week of school, when many students are just biding time, Jean Jahr's classroom of twenty-eight second- and third-grade students is intently engaged in a mathematical investigation. A first-year teacher and graduate of Bank Street College, Jean teaches at P.S. 234, a New York City public elementary school. The multiracial, multilingual class of students is working in small groups on a single problem. Some children use calculators; others do not. Some have drawn clusters of numbers; others have developed a graphic display for their problem. As they finish, everyone takes their solutions with them as they sit on the carpeted meeting area facing the board. Jean begins by reading the problem with the group: In September, each person in classroom 113 brought one ream (one package) of Xerox paper. There are 500 sheets of paper in one ream. There are twenty-eight children in class 113. How many pieces of paper were there altogether?

She opens the discussion with an invitation, "Let's talk about how different people solved the problem, and why you decided to solve it that way." Over the next twenty minutes, students show, draw, and discuss seven different strategies they have used to solve the problem. Jane questions them to draw out details about their solution strategies and frequently recaps what students say. With patience and careful choice of words, she helps each member of the group understand the thought processes of the others. As the session nears its end, she asks if everyone understands the different solutions. Three children from one group seem in doubt and raise their hands. Jean asks one of the girls to come up and show "her way." Teacher and the other children observe patiently, obviously pondering the girls' thought process. Suddenly, Jean's face lights up as she sees what they have done. Her response clarifies their work: "That's how you did it! I was wondering if you had used tens groupings, but you had a totally different pattern. You started as if there were 30 children and then you subtracted the 1,000 sheets that would have been brought by the additional two children from the total number. You rounded to a higher number and then you subtracted. Wow. I get it. Let me see if I can show it to the others."

The young girl is pleased when the teacher shows the group "her" system. When everyone seems clear, Jean asks, "Does anyone remember where this problem came from?" A girl raises her hand and says: "That was my problem a long time ago."

"You're right," her teacher responds. "You asked that problem during the first week of school when all of you were asked to each bring a ream of paper for the year. You saw all those reams of paper stacked up in front of the room, and you wanted to know how many sheets of paper we had. I told you that we would find out some day but that at that point in the year it was hard to figure it out because you had to learn a lot about grouping, and adding large numbers. But now you all can do it and in many different ways."

Another child recaps by noting, "That means that we used 14,000 sheets of paper this year." Jean says, "You got it!" The problem stays on the board for the day, along with the students' multiple solutions.

This first-year teacher's practice demonstrates that she understands how to organize a developmentally supportive classroom so that young children are

productively engaged in meaningful work. She creates a task that is grounded in the children's own experience, and she helps them use a variety of concrete tools—from manipulatives and drawings to graphic displays and calculators—to support their problem solving. Through careful observation and diagnosis, she has figured out what different tools and kinds of assistance will help different students make progress on the task. She has organized the task so that students can find a variety of entry points, and she creates a classroom dialogue showing a variety of solutions to make sure all students understand the answer and the process. She scaffolds the children's learning through structures for activities, access to peers, questions to guide students' thinking, and opportunities for children to learn social skills as well as cognitive ones. She listens and observes carefully to understand students' thinking, and she supports students in taking risks in sharing their ideas so that she will be able to move their understanding along. She also makes sure that students are affirmed in their efforts, thus stimulating self-confidence and ongoing motivation. Later we will see how her preparation in child development, as well as in pedagogical content knowledge, enabled her to do these things.

As we describe in this chapter, child development is tightly tied to learning in many ways. Novice teachers should understand that knowing about development is central to being an effective teacher, and being an effective teacher is central to whether children will make significant progress in the pathways necessary to healthy development and to becoming a fully educated person in a democratic society. Five major topics are discussed in this chapter:

1. **The importance of taking *a developmental perspective*:** When student development is the focus of teaching decisions, teachers plan in light of their students' needs and to support their progression along several developmental pathways—physical, social, emotional, cognitive, linguistic, and psychological. They understand that these dimensions interact with one another, and further, that students will have different developmental needs. Although there are many common aspects of the developmental process, milestones along each of these dimensions do not necessarily occur at the same age for all children nor does development in different arenas occur evenly within the same child. Although American schools are organized by grade, and to some extent by age, both age and grade are very imprecise indicators of development. At any grade level, there is usually a two- or three-year span of ages with an even wider span of skills, abilities, and developmental stages. Understanding developmental pathways and progressions is extremely important for teaching in ways that are optimal for each child.

2. **The inevitability of *individual differences* in development:** It is important for teachers to understand in considerable depth the diverse ways in which a child's development can evolve and even appear "splintered," departing from the norm in some areas but still within or close to the range of normal development. As noted in Chapter Two, effective teachers are learner-centered as well as knowledge-centered, and they use assessment to understand what their students need. The better they understand the ranges of variability in development and the areas where additional support is needed, the better prepared teachers are to help their students learn.
3. **The interactions among *development, knowledge, and learning*:** In contrast to earlier views of development as a set of biologically related stages clearly determining what students can do, current research shows that development, knowledge, and learning are related to one another. The older belief that development proceeds at a fixed pace that determines children's "readiness" for learning is no longer accepted by current developmental theorists. Instead, research demonstrates how learning can affect development, as well as the reverse. Newer studies show that, in addition to their age or apparent "stage," people's prior knowledge and experience with specific content affects the sophistication of their thinking. Hence the same person may think abstractly about one area of knowledge and much more concretely about another. Relationships between development and new learning are also important to understand. Vygotsky's concept of the zone of proximal development (ZPD) provides a framework for thinking about how to support learning and development for each child.
4. **The centrality of *cultural contexts* for development:** The fact that learning affects development (and vice versa), and that both learning and development are deeply embedded in cultural contexts, means that teachers must understand and appreciate the variety of ways children's experiences can differ, and be able to see and build upon cultural strengths if they are to help all students succeed.
5. **Strategies for helping prospective teachers acquire developmental expertise:** We noted in Chapter Two on Learning that "knowing" about an area, that is, being able to state facts about it, is not the same as being able to use this knowledge to solve important problems in the real world. This is as true for teachers as it is for students. Teacher educators have discovered a number of ways to help prospective teachers learn to go beyond simply "thinking about" development to being able to "think and act developmentally" as they teach.

THE IMPORTANCE OF TAKING A DEVELOPMENTAL PERSPECTIVE

To understand and support students' learning, a teacher must be able to take a "developmental perspective." This includes an understanding that development occurs along a number of different dimensions—physical, social, emotional, cognitive, and linguistic, among others—and that development along these dimensions, though following some common progressions, does not necessarily occur at the same age for each child or even at the same time within the same person. A useful metaphor for thinking about the course of development is in terms of "pathways" of development, which conveys the notion of movement along these several dimensions toward a set of important goals.

Progression Along the Developmental Pathways

At the core of effective practice is a teacher's ability to identify where a child is in his development and how to support his learning within the zone of proximal development (discussed in the next section). To do this, a teacher must understand general progressions in development as well as individual learning. Stage theories like Piaget's that posited large shifts in development at specific ages have been challenged by those who have found development to be more continuous and more individual, as well as more specific to particular contexts and content areas (Flavell, 1994; Siegler, 1998). It is increasingly clear that education can support development: Children can *become* ready to think and perform more complex tasks if they are given opportunities and guidance to develop these skills. Within some parameters, the teacher need not simply *wait* for children to "get ready." She can create a classroom that meets children where they are, takes advantage of what they want and need to learn, and moves them along the developmental pathways.

The idea of pathways encompasses the dynamic processes of physical, social-interactive, emotional, cognitive, linguistic, and moral-ethical development that interact to support the growth of the child. As James Comer and colleagues (1996) explain, "Balanced development, or maturity, is characterized by strong linkages among all of the developmental pathways. This metaphor of linkages among pathways enables us to explain simultaneously the complexity of development and the urgency of paying attention to all aspects of development" (p. 18).

As with all systems, any underdevelopment along one pathway has an impact on the whole system. This means that teachers need to attend to development along all of the pathways and look for opportunities to support growth in areas where attention is needed. In addition, it is important to understand that each one of these pathways develops within the child's particular social and cultural context, which can also contribute to individual differences among children.

Understanding development requires not only a sense of the "whole child" but also a consideration of the "whole child developing in particular social contexts."

A teacher who is developmentally aware will know, for example, how the child's prior knowledge and cultural experiences will inform what the child knows and how he may approach new ideas and tasks. Such a teacher will also understand the value of allowing children to explore the physical world with the use of their senses and to develop physical abilities, like balance, body, and space perception; rhythm and temporal awareness; and fine muscle activities, both for their own sake and because these abilities support other academic skills, including reading, writing, and the understanding of how physical principles work in the world, a foundation of mathematics and science. This teacher will know that a curriculum that encourages children to learn actively and concretely—by observing, collecting information, describing, counting, manipulating, and using what they have studied—will later support abstract thinking that relies on these concrete understandings.

A developmentally aware teacher will know that, for most students, teaching early reading skills in kindergarten (for example, helping students clarify the concept of words and letters and exploring sound-symbol relationships) will differ from teaching reading in later elementary grades (for example, using metacognitive strategies to enhance comprehension, integrating more extended reading and writing, extending knowledge of spelling and writing conventions). She will also understand that some students still need to learn skills others have mastered earlier, and will know how to diagnose these needs and target teaching and assistance accordingly. A developmentally aware teacher will know that as students progress in their understanding within a domain, they will be increasingly able to look for patterns, to think abstractly and contingently, and to manage multiple variables in more complicated ways. This teacher will be prepared to help students engage in this progression toward more systematic reasoning and symbolic thinking.

Pathways Interact. Different pathways of development *interact* with and influence one another; and these pathways and interactions have important implications for instruction. For example, understanding the general progression of *cognitive development* and the variations exhibited by individual children helps a teacher to structure, sequence, and pace instruction and choose instructional strategies that are likely to be effective. Understanding *language development*, including the ways in which language acquisition is related to cognitive development and cultural contexts, helps a teacher choose materials and teaching strategies that will support children's language proficiency and growing use of academic language. (Chapter Four explores language development in detail.) Understanding *social development*, including the development of social skills,

is essential if a teacher is to develop a classroom in which students can work together and remain motivated. These skills need to be taught through modeling, coaching, and reinforcement. They do not always emerge spontaneously.

A teacher's understanding of the *psychological* and *emotional* pathways enables her to structure classroom experiences so as to maximize both the learning of subject matter and the development of positive self-concept, not with empty praise but by supporting and noting the development of competence, thus reinforcing the belief that putting forth effort will result in increased proficiency. This is critical because research indicates that if a student develops a poor academic self-concept (believing, for instance, that even with effort, he cannot succeed at schoolwork), he may de-emphasize effort in this domain to protect his overall self-esteem, developing a disengaged or oppositional stance to school (Harter, 1990; Tatum, 1999). A child who is socially insecure may be unwilling to risk engaging in classroom discussions for fear of being ridiculed, and may consequently fail to gain experience expressing his thoughts or securing feedback that would help him develop his ideas. The teacher may need to offer feedback in ways that reassure the student and help him learn strategies to support risk-taking (for example, writing down ideas before saying them aloud; preparing ideas ahead of time) so he can overcome his fears and benefit from other learning opportunities.

An important part of social development also includes the development of *moral* thought and action: the ability to respect the rights of others and to act in the interests of others as well as oneself. Teachers need to understand the developmental patterns that are associated with the development of concepts of justice and social welfare and the ways in which teaching can help support the development of character and the capacity to participate in a classroom community and, ultimately, a democratic society.

An understanding of different developmental pathways, and their interactions, is not only essential to the effective teaching of individual children but is critical to employing sound classroom management. In addition to the fact that children must be taught how to be members of a social community, children who are bored or who are presented with tasks at which they cannot succeed are the ingredients for out-of-control classrooms—the kinds of classrooms in which little learning takes place. The teaching that creates a constructive classroom environment in which children can work well with each other and in which tasks are appropriate and supportive of learning depends heavily on knowledge of development. An example of such an environment was illustrated in the earlier vignette about our new teacher, Jean Jahr.

Macro and Micro Elements of Pathways. The term *pathways* conveys the notion of movements toward a set of important goals. At a general (macro) level, children progress from point A to B to C. However, at a more micro level

we know that development is not always characterized by linear progress and quantitative progressions. At various points in development there are spirals where the child's behavior appears to dip back before going forward. There are also qualitative transitions that involve a reorganization or new integration of functional abilities after which the individual operates at a qualitatively different level (Cole and Cole, 1993). Recognizing these micro processes while also understanding the general pathways and progressions of development is very important for effective teaching. For example, teachers who do not realize that a gain at one level can involve "backsliding" at another might think that their instruction has been ineffective, when in fact, it may be right on track. (See "Macro-Level Gains Can Produce Micro-Level Backslides.")

Macro-Level Gains Can Produce Micro-Level Backslides

At some point in their linguistic development, children learn how to speak in the past tense by adding a linguistic marker such as "ed' (for example, "We 'looked' at that book yesterday."). This is a definite advance over saying, "We look yesterday." However, progress at this level also often includes overgeneralizations that cause children to use a rule where it doesn't apply, thus appearing to make mistakes that they did not make previously. For example, they may begin to say, "We 'goed' yesterday," despite previously having used the word *went*. There are many examples of what appears to be "backsliding" that occur as children learn and develop. Teachers need to recognize when errors are simply momentary overgeneralizations that are actually healthy signs of new learning, and when they signal that children are truly misunderstanding and need help getting back on track.

Issues of Readiness. An understanding of developmental progression and of how different developmental pathways progress and interact is particularly important for helping teachers gauge children's "readiness" for new learning. For example, learning to read involves biological as well as cognitive development. Children's visual abilities (including binocularity and tracking) must mature before they can comfortably focus on and track relatively small print. This generally occurs sometime between the ages of four and eight, usually around the age of six or seven. At that point they typically also have a well-developed sense of one-to-one correspondence and can comprehend abstract symbols, which makes decoding of text easier (Cole and Cole, 1993, p. 476).

Developmentally prepared teachers further understand that children's development along various pathways can interact in many ways that affect readiness for specific tasks. For instance, a seven-year-old child with delayed small motor development will have difficulty writing. He may also have difficulty with certain visual and spatial concepts until the teacher engages him in small motor tasks that help him develop his physical skills. This will also enable him to engage in other kinds of academic learning. If the difficulties

are severe, a developmentally aware teacher may encourage such a child to use a computer instead of a pencil when writing, so as not to slow the development of expressive written language skills while the child struggles with fine motor skills.

Neurodevelopmental differences, both within and beyond the ranges of what is considered "normal" development, are also important for gauging readiness. Individual children may process information most efficiently through different modalities (for example, visual, auditory, and kinesthetic), and some with more distinctive processing differences need teaching adaptations to learn content effectively. An effective teacher will ensure that a child with auditory processing difficulties has key information in written form so that the child can continue to learn content well while also developing her abilities to make sense of aural input. In the end, the goal of effective teaching is to move each child along each of the developmental pathways as far as possible at that point in time, with the ultimate goal of helping the individual achieve the levels of adult competence and functioning expected in our society.

Individual Differences

In traversing these developmental pathways, there is an enormous amount of normal variability among children of the same age. Teachers need to appreciate the range of normal differences that exists across children in classrooms even though they are all of the same age. In addition, teachers must be aware of within-child variability. For some children, development can be quite uneven—more advanced in one area, less so in another. Understanding these variations between and within children is critical to enabling a teacher to shape developmentally appropriate learning experiences for each child.

Unique Paths to Development

Studies of development show that people have much in common as they grow. Nevertheless, in a group of normally developing children who are of similar age, the teacher needs to realize that each child will have arrived at his or her age via a unique path of development influenced by biological factors, socioeconomic circumstances, and social and educational experiences. In a classroom where the backgrounds of the children vary considerably, it is obvious that one should expect great variability in the different domains of development. Even in classrooms where the backgrounds of the children are relatively homogenous, there will be considerable variability in development among the children, including individual differences in learning styles, attention spans, emotional reactions to success and failure, self-confidence, temperament, socialization, and prior experiences. For example, there is a two- to five-year range of ages during which just 50 percent of children can demonstrate Piaget's conservation tasks: six- to nine-year-olds demonstrate conservation of mass, four- to

nine-year-olds can demonstrate conservation of length, seven- to nine-year-olds conservation of area, and eight- to ten-year-olds conservation of weight (Sroufe, Cooper, DeHart, and Bronfenbrenner, 1992).

Although variability in normal development is generally understood by teachers in the early grades, it is at least as great—but often less appreciated—in the adolescent years, offering special challenges to those teaching in middle and high schools. Wide variability in physical development and in the development of sexual characteristics is most obvious, but there are also major differences in cognitive and social development among twelve- to sixteen-year-olds. Differences in height and physical maturation, along with the cultural meanings attached to these characteristics, have consequences for self-concept, self-esteem, and self-confidence. Differences in the development of cognitive and social skills have consequences for academic progress when students confront more departmentalized, impersonal school environments with more rigid expectations for what is learned and how it is to be mastered and displayed (Eccles and others, 1993). These different developmental trajectories intersect with the developmental tasks of adolescents in American society—expectations with respect to independence, competence, and identity construction in relation to gender, sexuality, race, and culture, among other factors. The mix of these developmental trajectories in a class of adolescents means that the teachers in middle school and high school classrooms will necessarily be confronted with dealing with a large range of developmental needs.

The novice teacher needs to understand how individual differences manifest themselves and how individual differences can be employed to greatest effect in the service of learning. For example, children with short attention spans will need different pacing of tasks and activities than children with more enduring attention spans. Children with weak self-esteem may be more emotionally impacted by task failure and low evaluations than children with more robust self-esteem. The child who is less confident may learn more effectively in an instructional context designed to have a slower progression of small, supported steps so as to ensure successful performance, whereas the more confident child, even at the same skill level, may become bored by such an instructional strategy. The teacher may provide different kinds of feedback to children with different levels of self-confidence.

Overall, it is not unusual for development in one domain to be ahead of or behind development in other domains. For example, a child's language development may be somewhat advanced over the level of motor development at a particular age. A student may be able to solve a mathematical problem in the classroom with ease, but display less skill solving an interpersonal problem on the playground. Individuals display uneven growth across the developmental pathways. Just as gardeners understand that the plants in a healthy garden do not bloom simultaneously or even in the same season, teachers need to learn

to see their children as multidimensional individuals—not "smart," or "slow," or "shy," but as complex individuals demonstrating varying levels of growth (Sprinthall, 1989, p. 136).

Splintered Development

The concept of *splintered development* refers to conditions where uneven development across domains is quite marked and exceeds normal variation. Splintered development is a special challenge for effective teaching because arrangements for learning experiences in one developmental area may need to be at a very different level than in another developmental level. For example, a child with advanced numeracy skills may lag significantly in language skills. A child who has advanced verbal language skills may have more difficulty with reading or written language production. Some of these sharp differences can signal learning disabilities that require diagnosis and special assistance. Whether or not this is the case, students will require attentive, focused instruction in the area where development is lagging. Teachers who have diagnostic skills and the capacity to individualize may be able to use changing groupings of students and individualized supports for different tasks to assure that students get the instruction they need without the negative effects of self-labeling.

Among the more challenging cases of splintered development are those in which a child has significantly advanced cognitive skills but whose emotional or social development is that which would be expected of a much younger child. In this case, the teacher needs to know how to foster the needed emotional or social development. The teacher needs to understand the possible strategies that can be employed to help the child learn to manage emotions, to behave in socially accepted ways, and to understand the perspectives and feelings of others.

Another very challenging case of splintered development is when a child with normal physical development is cognitively delayed. In many but not all cases, such children may be identified for special educational services. Whether identified or not, with the advent of mainstreaming, most such children will be educated in the regular classroom. In order for the student to continue to progress, the teacher needs to know how to adapt tasks so that the student can experience success and continue to learn along his own developmental trajectory. There is not nearly as much research or tested practice in dealing with sharply splintered development to guide a novice teacher as there is in developing effective teaching practices that reflect an understanding of normal individual differences. In these circumstances consultation with experts can be helpful. The well-prepared novice teacher should understand when consultation is needed and how to access that expertise.

An example of splintered development and its implications for making educational decisions about a student is discussed in "Splintered Development and

Educational Decisions." This example shows how assumptions about the productive instructional approaches for students should be examined in terms of the actual cognitive and other demands a setting makes as well as the supports that it offers for learning.

Splintered Development and Educational Decisions

A middle school student was having difficulty in school. Tests revealed that she had a language-processing problem that exceeded the ranges of typical variability. In particular, her ability to repeat sentences from short-term memory after hearing them was a problem: she could remember sentences that were only about one-half as long as those of typically developing children. However, her short-term memory for visual information was above normal.

Because of her learning problems, school officials decided to put her in basic courses rather than more enriched ones. For example, there was an enriched biology course that involved lots of hands-on experimentation and laboratory work in addition to the typical content of the basic course. The school officials were convinced that the basic course was all she could handle and enrolled her there.

A friend of the child's family was a leading learning scientist and immediately saw problems with this decision. The basic course was almost all verbal—students read texts and listened to lectures. This was precisely the area where the girl had processing problems. The "enriched" course provided an array of visual and tactile experiences and, because of that, played to the girl's strength.

The decision was finally made to put the girl in the enriched course and she did well, passing with a "C." There was no possibility of creating a control group and comparing the girl's performances in the two different environments. But the reasoning of the learning scientist is valuable to consider when trying to match students' strengths to particular ways in which courses are taught. Just because something is "enriched" doesn't necessarily mean that it makes learning harder. Opportunities for experiential, hands-on learning that are aimed at greater conceptual understanding often make learning more meaningful, and in that sense "easier," for students who have learning difficulties, as well as for those who are developing more typically.

Interactions Among Development, Knowledge, And Learning

Issues of students' "readiness" to learn certain kinds of information in certain ways highlights a topic that is especially important for teachers to understand; namely, what are the relationships among development, knowledge, and learning? Contrary to the earlier views of development—that is, that teachers just need to wait for it to "happen" at particular ages or stages—there is growing evidence that as children experience different contexts and learn about new content, their developmental capacities are enhanced. And as teaching supports children's development, their ability to learn in new ways is supported.

HOW PRIOR KNOWLEDGE AND EXPERIENCE SUPPORT DEVELOPMENT

A model of development that emerged from the early work of Piaget is that there are particular developmental stages that determine how people generally think about any kind of subject matter. Piaget's work (discussed briefly in Chapter Two) has had a profound and important influence on thinking about children's development. He developed well-structured clinical interviews that probed how students think about everyday events and how their reasoning changes. An illustration is shown in "An Example of Piaget's Work on Development and Thinking."

An Example of Piaget's Work on Development and Thinking

A child sees an adult take two identical pitchers, each filled with the same amount of water. One pitcher is used to fill one of the glasses (a tall, narrow glass); the other pitcher is used to fill the shorter, thicker glass. Do both glasses contain the same amount of water? Adults will say yes. Children around the age of five often say no and pick the glass where the water level is higher. But a few months later, that same child may begin to respond like an adult. What happened to cause this change?

Piaget's research findings led him to develop a "stage theory" that posited important qualitative shifts in development as children matured. The earliest stage involves sensorimotor development, followed by preoperational thinking, then concrete operational thinking when children are able to understand concepts like the conservation of matter, and finally, formal operational or abstract thought.

Piaget's stage theory has often been interpreted to assume that a person's current developmental level determines how he or she thinks about any subject matter. Newer studies show that people's knowledge of subject matter also affects the sophistication of their thinking; thus the same person may think abstractly about one area of knowledge and much more concretely about another. Overall, children's abilities to think and reason have been shown to *depend on the extent to which they are familiar with the content being reasoned about and have had a range of experiences upon which to draw* (Donaldson, 1978; Flavell, 1994; Siegler, 1998).

As an illustration, researchers have found that children as young as four can understand conservation if they can manipulate materials and discuss their reasoning with someone who already understands the concept (Field, 1987; Mayer, 1992). Older elementary-age students can learn to solve logical problems involving hypothetical ideas if they are taught the appropriate problem-solving strategies (S. Lee, 1985) and can separate and control variables if they are given instruction about how to do so (Metz, 1995). Conversely, adolescents and adults may think concretely about areas in which they are inexperienced (Byrnes, 1988; Kuhn, Garcia-Mila, Zohar, and Anderson, 1995; Pascarella and Terenzini,

1991) and yet be able to use higher-order thinking in areas where they have more knowledge (Girotto and Light, 1993; Schliemann and Carraher, 1993). De Lisi and Staudt (1980), for example, found that college students were more likely to show formal operational reasoning on tasks related to their majors but not on other tasks. Ormrod (2003) notes that, "Students may demonstrate formal operational thought in one content domain while thinking more concretely in another" (p. 33).

At a macro level, Piaget's general characterizations of development hold true. Generally, development follows a progression from egocentric thinking to thinking that takes account of multiple perspectives, from more reflexive behavior to more goal-directed activity, from reasoning based on rules to more contingent, multifaceted reasoning. Over time and with support, children develop abilities to generalize from and manipulate information, to act on their environment, and to learn from it in increasingly purposeful ways. However, as we have described, earlier beliefs about the details of what children could and could not do at various ages appear to have been overgeneralized. Given the chance to think about familiar content and experiences, preschool children can exhibit thinking that is not entirely egocentric, and they can reflect on their own thinking to at least some degree. Furthermore, formal operations do not appear to be solely the province of the adolescent years (Case, 1992; Feldman, 1980; Siegler and Richards, 1982). And the ability to use higher-order cognitive skills depends on the experiences children have had as well as their biological age or stage.

Studies of adolescents' abilities to engage in thinking that requires them to control variables in experiments provide an illustration of the interactions between knowledge and developmental "levels." In one study, thirteen-year-old students were shown a picture of four children fishing in four different ways (Pulos and Linn, 1981). Each child in the picture displays a different posture, a different manner of holding his fishing rod, and uses different types of bait, among other variables. Students were told, "These four children go fishing every week, and one child, Herb, always catches the most fish. The other children wonder why." Students who had experience fishing were better able to separate and control the multiple variables in this situation than those without fishing experience. Similarly, evidence of formal operations typically emerges in the physical sciences earlier than in such subjects as history and geography; students often have difficulty thinking about abstract and hypothetical ideas in history and geography until well into the high school years (Lovell, 1979; Tamburrini, 1982). These differences are likely related to the extent to which students have concrete experiences on which to build as well as to developmental maturation.

A major role of instruction is to build students' storehouse of experiences so that they can build their cognitive capacity. A skilled teacher understands that when she poses a task for students she should think about whether they have an experience base to draw upon in their thinking and reasoning. If some do

not, she should be prepared to demonstrate, explain, or provide other opportunities for students to acquire the experiential knowledge they need in order to succeed. Many excellent teachers, like Jean Jahr in our earlier example, choose problems that come out of their children's experience, so that they can use what they know to picture the problem and think about solutions. Teaching strategies such as these have a great deal to do with whether and how higher-order thinking skills develop. Children need to have had many opportunities for exploration and practice that help them understand numerical concepts, physical phenomena, and the use of language, and they need to have been challenged with problems that encourage and support logical reasoning and contingent thinking (National Research Council, 2000; Kamii and Housman, 2000). When education that supports this kind of exploration is absent, many people do not develop these more sophisticated thinking abilities.

How Teaching Can Support Development

We have seen how students' abilities to think at different "developmental levels of sophistication" are affected by their prior knowledge of the topics being explored. It is also possible for teachers to organize knowledge so as to support developmental progress in thinking. The Russian teacher and psychologist Lev Vygotsky focused especially on ways that new instruction (rather than only previously existing knowledge) could actually encourage development. In one set of studies, Vygotsky and colleagues conducted experiments with students' storytelling. In general, students' ability to tell complex, well-structured stories improved with age. However, the studies found that story complexity also depended strongly on the nature of the knowledge that students were helped to *acquire* about the stories they were telling. For example, in one set of tasks, students were helped to organize a set of scientific concepts and then tell a story using these concepts. The stories they created were more coherent and complex than stories where they were asked to talk about a set of naturally occurring concepts that the children would have encountered outside of school but not necessarily been helped to organize in an optimal manner. Based on this study and others, Vygotsky conjectured that the adult structuring of a task could help people achieve at levels that were not possible without these supports. We noted in Chapter Two that the concept of the zone of proximal development (ZPD) provides important insights into the issue of "readiness" and its relationship to effective teaching. "The difference between what a child can do on her own and what she can do with some mentoring is the zone of proximal development" (Gage and Berliner, 1998, p. 112). Effective learning occurs when the distance between where the learner is developmentally (in terms of understanding and knowledge) and the understanding that is required for new learning is small enough to foster the new learning when assistance is provided, yet large enough to be challenging rather than boring. A teacher who teaches outside a student's

ZPD in a particular domain will provoke little new learning either because the lesson provides too little challenge or because it is so complex for the child that it is wholly out of reach.

Vygotsky argued that choosing tasks that meet children where they are—and appropriately stretching their performance—stimulates cognitive *development* as well as learning. "Tasks that children cannot do individually but that they can do with help from others invoke mental functions that are currently in the process of developing" (Berk and Winsler, 1995, p. 26). Vygotsky (1978) emphasized that cognitive development is supported through language, cultural symbols, and tools, as well as the nurturing of learning by teachers and caregivers. He encouraged teachers to assess where students are in a particular domain, what they understand, the experiences they have had, and to determine how, with assistance, students can be helped to advance to another level within their zone of proximal development. This assistance, when carefully offered to provide just enough support to allow steady progress in understanding, is often called "scaffolding." The analogy is to scaffolds that are erected around a building to allow workers, by working from these platforms, to reach heights and achieve goals that otherwise would be impossible or difficult to attain.

Working in the Zone of Proximal Development. A teacher who understands the zone of proximal development appreciates how to assess and support readiness for learning, how to use that readiness to challenge a child to learn, and, as a result, how to enable a child to make developmental progress. Recognizing a child's readiness to learn requires that the teacher understand the kinds of prior experiences a child has had with the ideas, concepts, or skills involved; these experiences and the child's current level of performance determine what kinds of learning opportunities the child will be most able to use and profit from next. Teachers need to be able to both watch a child for developmental signs of readiness and help the child become more ready for new accomplishments in each developmental pathway and domain. This is the full meaning of what it means to teach in a "developmentally appropriate" manner. It involves being cognizant of where students are in the process of their development and taking advantage of their readiness. It is also about teaching to enable developmental readiness, not just waiting for students to be ready.

The zone of proximal development has proved to be an intuitively attractive concept for helping teachers understand the proper sequencing of learning experiences and the appropriate distance to try to cover between where a child is and what it is reasonable to expect the child to learn next. The notion of ZPD helps teachers understand the size of the step a child can take in guided learning tasks to make developmental progress. For example, if a child knows how to add numbers, it is not too large a step to then teach subtraction, but it can be too large a step to go straight from knowledge of simple addition to trying to

teach division. In addition to identifying the appropriate concept to teach next, teachers also need to provide just the right amount of assistance or scaffolding in the learning process, offering enough guidance to enable a student to see how he can reason through a problem without offering so much help that the student is not working on his own to try to solve the problem.

Accounting for Individual Differences in Readiness. Much of the knowledge incorporated in curriculum development and in the sequencing of tasks in the basic academic subjects, especially in the lower grades, has been developed to take into account the role of normal developmental progressions and of ZPD in effective instruction. The availability of standard and tried curricula materials that embody these principles can be very helpful to the novice teacher. However, not all curricula are as effectively organized for development as they should be. In addition, even well-developed teaching materials are no substitute for the individualized assessment a teacher must do in a classroom if she is to select appropriate curriculum materials and use them appropriately and effectively with individual children.

It is especially important to realize that the zone of proximal development can vary widely among a group of similarly aged and similarly skilled children. The size of a student's ZPD for a particular kind of learning—that is, the "bandwidth" of the strides a student can take from what he now knows about a domain to a new set of understandings—will vary depending on where the child is developmentally, as well as on what he has had the opportunity to learn previously and on the cognitive structures and schemas available to the child (Brown and Reeve, 1987). Individual differences, including emotional factors related to self-esteem and self-confidence, cognitive factors related to learning styles, and characteristics involving attention span, are only some of the individual differences that impact ZPD and need to be taken into account by the teacher determined to be effective with all the children in a class.

Adjusting Scaffolds to the Child. We noted that the term *scaffolding* is often used to describe support that can help people reach the upper bounds of their ZPDs. Scaffolding can be adjusted to the child in at least two ways: (1) by structuring tasks and learning environments so that demands are appropriately challenging, and (2) by adjusting the amount of adult intervention in response to the child's current needs and abilities (Berk and Winsler, 1995). Tasks may be structured in terms of the choices children are given, the guidelines provided, and the sequences into which problems may be segmented and defined. Adult intervention can be seen as a teacher circulates around the room, providing just-in-time assistance to individuals, or as she discovers a classwide misconception and leads a discussion to address the problem. An important goal of scaffolding is to foster self-regulation by gradually relinquishing control and

assistance. This means giving children time to grapple with problems and intervening when the child cannot make progress. Learning and self-regulation are maximized when teachers ask open-ended questions that encourage children to participate in the problem-solving process in a meaningful way (Diaz, Neal, and Amaya-Williams, 1990; Roberts and Barnes, 1992; Gonzalez, 1994).

Examples of teachers' different sensitivities to children's zones of proximal development occurred at the beginning of this chapter where we began with two scenarios about teaching. The first scenario showed what happens when a teacher is not sensitive to the child's learning process and unaware of important scaffolds needed to support development—for example, assistance to understand how to evaluate time in conducting timed exercises. The second scenario provided an illustration of a teacher's sensitivity to multiple ZPDs among her students. When Jean Jahr encouraged her students to use help from one another and a variety of tools (drawing, manipulatives, calculators, graphic displays) to solve the mathematics problem they were working on, she used a strategy that allowed students at different zones of proximal development to gain access to the various kinds of assistance they needed to make sense of a new situation. When she asked students to share seven different solutions to the problem, explaining their reasoning, she further supported their cognitive development by allowing them to talk about their thinking, thus building conceptual understanding in both the presenters and the listeners. An additional example of a teacher's sensitivity to a student's ZPD was provided in Chapter Two (Becoming Aware of Different Learning Trajectories) when a teacher enthusiastically applauded the contributions of a student who had not before been confident enough to contribute in class, thus differentiating his feedback to support the student where he was in his development of this ability.

In Chapter Two we noted that teachers can also use children's experiences strategically in encouraging their further development. For example, if a student already knows a great deal about a particular topic because it is part of his home or community experience, this prior knowledge can be the basis of a writing assignment so that the development of writing skills can be fostered by the ready availability of "funds of knowledge" about the subject at hand (Moll and Greenberg, 1990). The teacher might help the student develop his thinking and ability to record details by asking questions about the topic that prompt the student to write an elaborated narrative. Thus experience and development in one area can be used strategically to foster development in another.

Teachers can also foster development by carefully watching students to see what they can do without assistance and then supplying strategic help to help them reach the next level of a skill—for example, seeing that a student has a grasp of basic linear measurement and then helping him learn to measure and calculate different object perimeters. For another student with a different zone of proximal development in this domain, the kind of assistance needed might be to learn

basic measurement before moving on. Teachers can construct experiences for their students that fill in the necessary foundations for more abstract understanding. For example, when seventh graders express their confusion about why two-thirds, four-sixths, and eight-twelfths are all equivalent, a teacher might use concrete objects like sliced pizzas, pies, or linked beads to demonstrate how fractions with different denominators can be equal (Ormrod, 2003, p. 35).

Shaping Scaffolds to the Subject. By understanding the fundamental structures and key ideas of the disciplines *and* by understanding development, teachers can support learning more effectively. Bruner's (1960/1977) concept of a "spiral curriculum" is based on the idea that "any subject can be taught effectively in some intellectually honest form to any child at any stage of development" (p. 33). A fundamental concept can be taught at one age and then revisited in greater depth later. For example, even though most students are not generally ready to manipulate multiple variables until later childhood or early adolescence, a teacher can introduce some beginning concepts of algebra in the early grades using concrete objects rather than abstract representations of numbers like "x" and "y." Researchers have found that when teachers appropriately simplify the instructions and approach to a task, it can be completed by younger students (see, for example, Case, 1998; Siegler, 1998; Gelman, 1979) and that the success rate for students on a task can be related to the complexity of the instructions (Boden, 1980). Teachers can help students become ready to comprehend more complex ideas by providing a grounding that is appropriate to the students' level of developmental readiness.

There are many examples of how teachers can support the development of children's and adolescents' thinking. For example, analogies and models drawing on students' existing experience can be powerful vehicles for building bridges to complex concepts. Researcher and teacher Deborah Ball helps her students understand the concept of negative numbers by introducing a model of a building. Positive numbers are represented by the floors above ground; negative numbers are represented by the floors below ground. The model is used to introduce conventions of addition and subtraction involving integers and allows students to make observations such as "any number below zero plus that same number above zero equals zero" (Ball, 1993, p. 381 in National Research Council, 2000, p. 168). Ball asks her students to consider questions like, "How many ways are there for a person to get to the third floor?" Choosing effective ways of introducing and grappling with sophisticated concepts is part of what it means to teach in a developmentally appropriate manner.

Teachers can help students compose essays by providing writing prompts that work as scaffolds to support more sophisticated writing forms: "My main point is . . ." "An example of this would be . . ." "The reason I think so is because . . ." "I can tie this together by . . ." (Scardamalia and Bereiter, 1985; Ormrod, 2003).

By providing examples and guides for how to accomplish certain kinds of thinking and performance, teachers can support students in developing more sophisticated skills. Over time, these become internalized and students are able to regulate their own thinking about their work. Jean Jahr's classroom provided many such examples. (See "Using Scaffolds to Guide Student Work in Classrooms.")

Using Scaffolds to Guide Student Work in Classrooms

In Jean Jahr's room, children's work is displayed on walls, bulletin boards, and shelves, along with teacher-made charts listing information related to work that is underway. Near the book collections and writing materials, for example, three different charts pose guiding questions to help students meet the expected writing standards for content, mechanics, and personal goals as a writer.

The content standards ask:

- Does the beginning tell what my piece is about?
- Does the order in which I wrote it make sense?
- Did I use examples and details to create a picture in the reader's mind?
- Does my story make sense?

The chart on standards for mechanics asks:

- Have I checked for correct spelling?
- Have I used upper- and lowercase letters in the right places?

The chart on Being a Writer in a Community of Writers asks:

- Am I willing to share my writing?
- Do I listen to others, share, and give helpful feedback?
- Am I willing to revise my work?
- Can I say why I selected this piece for publication and what do I like best about it?

These reminders provide models of social interaction as well as guidance for learning and performance. It is clear in watching Jane at work that she cares equally about the quality of her students' work and about the quality of their experience as learners in a developmentally supportive classroom.

Capitalizing on Students' Developmental Interests. Teachers can also tap into students' developmental interests as a way of enhancing motivation in school tasks. For example, because children between the ages of about eight and twelve like to simulate things that adults do, such as playing at being firefighters, doctors, and so on, teachers can organize aspects of the curriculum around these interests and use them as a springboard for areas of skill development. In adolescence, students are particularly interested in both philosophical issues and issues of social justice. These interests and budding abilities can be tapped in the classroom. For example, in social studies, students can engage in structured debates that take advantage of their need to sort out and argue their opinions and can push them to learn systematic ways of assembling and organizing evidence and make a logical argument.

The following example ("Using Knowledge of Adolescent Development in Teaching History") shows how high school teacher Elizabeth Jensen prepares her students to understand the debates between the Federalists and the anti-Federalists. Because she understands adolescent development, she knows that she can build on their interests in trying on and debating ideas. She also knows that her students are unlikely to understand these debates unless she creates experiences that will allow them first to struggle with their philosophical underpinnings, so she plans her teaching to accomplish this.

Using Knowledge of Adolescent Development in Teaching History

[Elizabeth Jensen] knows that her 15- and 16-year-olds cannot begin to grasp the complexities of the federalist debates without first understanding that these disagreements were rooted in fundamentally different conceptions of human nature—a point glossed over in two paragraphs in the history textbook. Rather than beginning the year with a unit on European discovery and exploration, as her text dictates, she begins with a conference on the nature of man. Students in her eleventh-grade history class read excerpts from the writings of philosophers (Hume, Locke, Plato, and Aristotle), leaders of state and revolutionaries (Jefferson, Lenin, Gandhi), and tyrants (Hitler, Mussolini), presenting and advocating these views before their classmates. Six weeks later, when it is time to study the ratification of the Constitution, these now familiar figures—Plato, Aristotle, and others—are reconvened to be courted by impassioned groups of Federalists and anti-Federalists. It is Elizabeth Jensen's understanding of what she wants to teach and what adolescents already know that allows her to craft an activity that helps students get a feel for the domain that awaits them: decisions about rebellion, the Constitution, federalism, slavery, and the nature of government.

Source: Wineberg and Wilson (1991). Adapted from National Research Council, 2000. *How people learn: Brain, mind, experience, and school*, p. 163.

These developmental strategies require different approaches to teacher education. For example, researchers have found that teachers had to learn to think in a different way during text discussions in order to engage in responsive questioning techniques, using questions designed to help their students make connections and see relationships. Rather than simply deciding whether a response was right or wrong, teachers had to reflect on the meaning of what the child said and consider how to provide assistance when a child didn't understand or was having trouble making a connection (Gallimore, Dalton, and Tharp, 1986). This responsiveness to children's thinking is developed through close observation and a knowledge of teaching strategies for provoking more sophisticated thinking.

Understanding and Expanding "Readiness"

Research focused on issues raised by Piaget and Vygotsky has provided greater insight about the issues of readiness. Within some parameters, readiness can be encouraged, but stages of learning and growth necessary to consolidate

understanding should not be skipped. For example, research has found that children who work with manipulatives and concrete objects to develop number sense and an understanding of scientific principles make stronger gains in advanced understanding than those who are asked to memorize information or learn algorithms without a solid grounding in concrete operations (Kamii and Housman, 2000).

Similarly, the value of play, which offers concrete learning opportunities in early childhood, has been confirmed in large-scale longitudinal studies as supporting academic achievement as well as social and emotional growth. One study compared fifty traditional-play kindergartens with fifty newly formed, academic kindergartens in the province of North Rhein-Westphalia in Germany. Teams of researchers from two different universities found that at the age of ten, children from the play kindergarten programs significantly outperformed those in the early-learning programs. Children who had attended play kindergartens were not only better adjusted socially and emotionally in school but were also more cognitively advanced in reading, mathematics, and other subjects tested, as well as excelling in creativity and intelligence, "industry," and "oral expression." In play or experience-based learning environments, students are busy with active, hands-on exploration, discovery, and social interaction—including the discussion and testing of ideas that build a foundation for later learning (Ewart and Brawn, 1978; Tietz, 1987; Winkelman, Hollaender, Schmerkotte, and Schmalohr, 1979).

Supporting Social and Emotional Development. An understanding of "readiness" and how it can be expanded is also important for social, emotional, and moral development. With appropriate social guidance, children can to begin to adopt another's perspective and consider intentions. With modeling, explicit teaching, and opportunities to explore the consequences of different behaviors and social systems, they become more able to cooperate with others and understand concepts like fairness and reciprocity. Teachers need to understand that *these abilities are learned* and must often be explicitly taught rather than assumed. For example, when children's behavior differs from classroom norms or expectations, it is important for teachers to explain and model the desired behavior rather than merely punishing students without explanation. This social teaching, far from deflecting from classroom goals, will translate into greater academic success as children are more able to work together and learn from each other (Comer, Haynes, Joyner, and Ben-Avie, 1996). Many children also need to be taught how to express their feelings and concerns, recognize others' views and feelings, and handle frustrations productively. These abilities support their ability to persevere in the face of difficulties and solve problems as they arise without losing control or giving up.

Supporting Identity Development. Children also develop a sense of self, including the kind of person they think they are and want to be, and a sense of identity,

which determines not only how they feel about themselves but also what they see as salient to their lives and worthy of their effort. The self-concepts children develop in a number of domains (for example, academic, social and interpersonal, physical, and so on) guide their investments of time and effort (Harter, 1988). Students who have positive views of themselves and their capabilities are more likely to succeed academically, socially, and physically (Assor and Connell, 1992; Ma and Kishor, 1997; Pintrich and Garcia, 1994; Yu, Elder, and Urdan, 1995). Those who see themselves as "good students" and who see intelligence as something that can be developed (rather than something that is innate and unchangeable) are more likely to focus on the task at hand, try a range of learning strategies, and persevere when frustrated by challenging problems.

Teachers, parents, and other community members contribute to students' self-esteem and perceptions of their own abilities (Harter, 1988, 1996; Hartup, 1989; Ryan and Lynch, 1989). When adults communicate high expectations, encourage students as they pursue challenging activities, praise specific accomplishments, and create a climate of helpful feedback, students demonstrate more confidence in what they can achieve (Eccles and others, 1989; Eccles (Parsons), 1983; Marsh, 1990; Harris and Rosenthal, 1985). When teachers convey a genuine respect for their students and treat their problems, interests, opinions, and views as important, they are helping their students see themselves as valuable contributors to school and society (Katz, 1993). We saw how this looks in practice in our earlier example, when Jean Jahr vocally encouraged all of her students, asked them to share their solutions publicly, affirming that their ideas were important, sought to understand a puzzling solution so that she could explain it to the class, and gave a student credit for having posed the problem in the first place. She encouraged students to work together to give each other helpful feedback. As a consequence, her students clearly saw themselves as helpful contributors to the classroom and as confident learners of mathematics. Like Jean, teachers need to understand how social messages and their own behaviors can influence the development of a positive sense of identity and an academic self-concept that will support ongoing effort in school.

Teachers of adolescents should be aware of the ways in which self-concepts become more differentiated across domains (for example, scholastic competence versus romantic appeal) (Harter, 1998), and they should be aware of the critical changes in self-esteem that can occur at the onset of puberty, especially for girls (Simmons and Blyth, 1987). Teachers can help their students maintain positive self-images by identifying the strengths of individual students, demonstrating different pathways to success, and recognizing classwide progress (Rosenholtz and Simpson, 1984). Research on efforts designed to support adolescents' psychological development and connections with school have found positive outcomes when programs involve systematic reflection on experiences—for example, discussing biographies or keeping writing journals.

Students also have positive experiences when they have opportunities to take on responsible, real-life roles like peer teaching, peer counseling, or volunteering in the community (Sprinthall, 1989). Most critical is the development of earned self-esteem through the support of growing competence (Chapman, Tunmer, and Prochnow, 2000; Lerner, 1996).

Development of strong, positive, racial and cultural identities has been found to contribute to positive school outcomes for students from racial/ethnic minority groups (Spencer and Markstrom-Adams, 1990), enabling students to maintain a healthy sense of self, to focus on positive achievements, and to demonstrate resilience in hostile environments. Without this kind of strong identity, grounded in positive racial socialization as well as opportunities for trust, many children of color who experience racial stigmatization develop a "reactive racial identity"—an identity in opposition to school in order to protect themselves from rejection or negative messages about their identity or their group (Spencer, Dobbs, and Swanson, 1988).

Developmentally aware teachers encourage strong identity development by providing opportunities for all students equally. They are sensitive to the social messages and expectations students receive from the media and the society, and they affirm students' sense of themselves and help them find and develop areas of competence. They give students increasing opportunities to make decisions and to act responsibly within the school and the community.

When children receive appropriate support and guidance along each of the developmental pathways, they learn to use their growing cognitive capabilities to undertake increasingly complex tasks and to reason through things with growing independence. They become more socially aware and adept. They learn how to recognize and manage their emotions. They recognize their strengths and interests as pathways to learning and healthy identity development. And they develop a growing capacity to think and act ethically and in concert with others.

CULTURAL CONTEXTS AND DEVELOPMENT

Researchers have come to understand that human development is strongly social rather than something that occurs on a preset biological timetable and that development is a function of each person's cultural context. In fewer and fewer classrooms in the United States does the teacher encounter a racially, ethnically, and linguistically homogenous group of children. In many instances the teacher will come from a different cultural background than many or most of the children in the class. The novice teacher needs to be well prepared to work in a culturally heterogeneous environment and to understand the relevance of diverse cultural backgrounds to development issues. In addition, she needs to understand how her own culturally based perspectives influence her perceptions and expectations.

Learning in Diverse Cultural Contexts

Culture includes the many social contexts we inhabit simultaneously: family history, community, geographical location, designations of race and ethnicity, language, strong interest affiliations, religion, gender, and sexual orientation. Each of these individually and in combination can shape behaviors, expectations of social interaction, and social or individual views of what is possible for oneself and others to engage in or achieve. Culture is not just a backdrop to learning, but, as Rogoff (2003) argues, development *is* the process of learning the tools and tasks of a particular culture. In other words, the goals of development are culturally determined. Thus teachers must not only be aware of differences, but also be aware of what is important to learn and how that learning takes place in different cultures. Rogoff observes that "learning is a process of changing participation in community activities" (p. 284). These activities include those that occur both in the classroom and in the home and community. When the teacher's culturally based perspective is very different from those of the children in her classroom, she must do a great deal of learning about the cultural contexts the children bring with them into the classroom.

What is valued or emphasized developmentally in one cultural context may be different from what is valued or emphasized in another. The styles of collaboration of adults (experts) and children (novices) may also vary with respect to how linguistic, cognitive, emotional, physical, and social development are fostered. Different styles of social and emotional communication can lead to misunderstandings unless a teacher is sensitive to the range of approaches to communication. For example, in some groups children are taught to speak freely to adults; in others, children are taught to show respect by not talking. In some contexts, questioning is encouraged as a form of discourse; in others, it is not. Language differences and the complex nuances of the use of language in different cultural contexts can pose challenges for effective teaching. (See "Talking in Class: A Case of Cultural Difference.")

Talking in Class: A Case of Cultural Difference

A speech-language pathologist working in an Inuit school in northern Canada asked a principal—who was not an Inuit—to compile a list of children who had speech and language problems in the school. The list contained a third of the students in the school, and next to several names the principal wrote, "Does not talk in class."

The speech-language pathologist consulted a local Inuit teacher for help determining how each child functioned in his or her native language. The teacher looked at the principal's notes and said, "Well-raised Inuit children should not talk in class. They should be learning by looking and listening."

When the speech-language pathologist asked that teacher about one toddler she was studying who was very talkative and seemed to the non-Inuit researcher to be very bright, the teacher said: "Do you think he might have a learning problem? Some

of these children who don't have such high intelligence have trouble stopping themselves. They don't know when to stop talking." (Crago, 1988, p. 219. Adapted from National Research Council, 2000, p. 146.)

Examples of cultural misunderstandings abound. Nieto (2000) observes that many Puerto Rican children signify nonverbally when they do not understand something by wrinkling their noses. When her students do not respond verbally to her question, "Do you understand?" a new teacher may wrongly assume that they understand. Similarly, Shirley Brice Heath discovered that African American children in a Southern community she studied did not answer obvious, factual questions to which they assumed the teacher knew the answer. This kind of questioning—"What color is the dish?" "How many fingers do I have?"—common in many white, middle-class homes, was not part of their experience where questions were used only when the asker genuinely did not know the answer. The result was that they did not answer such obvious questions, and teachers assumed they were less able learners (Heath, 1983).

When students experience a dramatically different set of norms and expectations at home and at school, this can create boundaries that are difficult to cross unless the teacher facilitates connections within and beyond the classroom. The teacher's knowledge of how to make students feel confident in the classroom and how to help them understand and respect the norms that operate there will matter greatly to her ability to support student learning. Similarly, her ability to create culturally responsive learning experiences, including choices of content, representations, and forms of discourse that connect to student experiences, will help her create bridges for students into academic material. Research provides many examples of culturally specific practices that have been found to make a positive difference for student achievement. For example, Katherine Au found that when teachers incorporated communication patterns that resemble how Hawaiian families tell stories at home and incorporated students' home experiences as part of the discussion of reading materials, they were able to significantly raise the reading achievement levels of their native Hawaiian students (Au, 1980). Teacher and researcher Carol Lee demonstrated substantial learning gains when she drew on and incorporated the linguistic styles and strengths her African American students brought to the classroom (for example, irony, double entendre, satire, and metaphorical language) (C. Lee, 1995). By making students' tacit knowledge explicit, she helped them to make connections between their own language and the literature they were analyzing.

Researchers have noted that the teacher's own cultural background and experiences can influence the developmental and behavioral expectations the teacher has for children in a classroom, ranging from how she asks questions and expects them to be answered to how she structures learning tasks. Few Americans escape the pernicious effects of the pervasiveness of the subtle racism and sexism in our society that, in turn, influence the developmental goals teachers set for the

children. Lower developmental expectations for children of color are too often the norm and become self-fulfilling prophecies, with negative consequences for the development of children. Teachers may treat students differently in the classroom unless they are aware of the assumptions they are making. For instance, researchers have found that teachers often have lower expectations, make less eye contact, and criticize children of color more frequently than white children (Brophy and Good, 1974; Wang and Lindvall, 1984). Similarly, lower expectations for female students and subtle, negative messages about their achievement can lead to fear of success (Hansen, 1977). Teacher education needs to enable teachers to examine these assumptions and develop countervailing practices that enable all students to develop in an environment of respect and encouragement.

SCHOOL AS A CULTURAL CONTEXT

It is important, too, for teachers to realize that schools have cultures, which can themselves be developmentally healthy or unhealthy, and that a teacher's work in the classroom can be much more effective if it represents shared values and norms throughout an entire school. As James Comer has demonstrated in his School Development Program, "a nurturing, challenging, and supportive school environment provides the nourishment that children need to be healthy, whole, and successful" (Comer, Haynes, Joyner, and Ben-Avie, 1996, p. xvii). This program, which helps educators learn how to embed principles of child development in every aspect of their work and to engage parents and communities as partners in education, has sharply improved student achievement in previously failing urban schools. Treating the school as an ecological system, Comer notes that the behaviors and attitudes of all of the adults in the school, ranging from the teachers and administrators to aides, counselors, cafeteria staff, and parents, create a powerful context shaping the behaviors, attitudes, and achievement of students. These behaviors include not only those directed toward the child in the classroom but between and among all the members of the community throughout the school:

> The child learns from the interactions that occur in the school setting, including interactions among the adults in the building and the connections between home and school. For example, the treatment of their parents by the school staff, of course, has an impact on how the students perceive the school and education in general. The children's learning process involves the environment in toto, including both the intentional, purposeful interactions and the offhand, seemingly inconsequential remark or gesture. Children learn by observing how their peers are disciplined, by overhearing how the adults in the building interact with one another, through contact with written and other cultural products, and especially, through significant adults who take an interest in them. (Haynes and others, 1996, pp. 44–45)

Changing interactions in this system is essential to changing the outcomes for students. If all of the adults work together to create norms of support and expectation, to model and teach students a consistent set of respectful, responsible behaviors, to support positive self-identities, and to support children's development along all of the developmental pathways, the climate in the school becomes a powerful support for children's development and learning. As Anson and colleagues (1991) note: "The greater the number and heterogeneity of adults endorsing mutual values, goals, and expectancies for a child, the more likely it is that the child will internalize these same goals as part of his or her own sense of identity" (p. 74).

Rather than looking only to the student to adapt to the environment, those who use an ecosystemic framework look also at the environment to see what needs to be modified to support healthy development. In research in middle schools, Eccles and colleagues (1993) have noted that many of the problems noted for early adolescents are actually the result of a "stage-environment" misfit—that is, the design of many junior high and high schools is out of sync with the developmental needs of students. When they most need intellectual challenge, opportunities to express opinions and participate in decisions, caring relationships, and affirmation in developing competence and identity, many adolescents are placed in large, impersonal, departmentalized structures where rules are more rigid, their participation is less sought, schoolwork is less engaging, they are less connected to adults, and their sense of identity is under attack. More personalized settings that allow more participation and responsibility-taking create greater achievement and greater affiliation with adults and with the academic enterprise.

In many cases, teachers will not find that the schools in which they teach are designed to be supportive of students and their healthy development. In these cases, they will need to understand what the features of a healthy environment are and how to work collaboratively with colleagues to develop changes that will allow their work with students to be successful.

In sum, effective teachers need to have a good grounding in normal development, an appreciation of the variations within normal development and the meaning of normal development within different cultural contexts, and the ability to employ the concept of the zone of proximal development for instructional purposes. Preparing an individual to be an effective teacher requires ensuring that the teacher develops her capacity to evaluate her own assumptions and behaviors, has tools to learn about the cultural backgrounds and experiences of the children in the classroom, and develops equitable and culturally responsive practices. We discuss some of these practices further in Chapter Seven, in the section on "Teaching Diverse Learners." Preparing the teacher to be a contributing member to a supportive school also means helping him or her understand how children's and adolescents' development is shaped by the

overall environment, and how this environment must be consciously shaped by the efforts of all of the members of the school community.

Preparing Novice Teachers to Create Developmentally Appropriate Classrooms and Schools

A solid grounding in development is essential for good teaching. It helps a teacher create settings that allow students to learn how to behave and interact socially, manage their emotions productively, and engage purposefully in individual and group learning opportunities that foster cognitive progress. Developmental knowledge is also essential for helping a teacher select and construct tasks that take into account a student's attention span and developmental readiness, and to individualize instruction when necessary. Developmental knowledge is essential for enabling the teacher to assess and understand how children think and their readiness for particular kinds of learning activities. Developmentally responsive teachers provide strategic guidance and assistance within students' zones of proximal development, accommodating individual differences and moving all children toward greater competence. Finally, developmental knowledge and an appreciation of cultural contexts are essential to enable a teacher to work cooperatively with families and connect the child's home experiences to the curriculum.

In many respects, developmental knowledge is to a teacher what organic knowledge of anatomy and physiology is to a physician. It provides the underlying understanding of how children work—how they think, behave, grow, and learn—which allows the teacher to develop diagnostic abilities that guide what she looks for and how she interprets children's behavior as she plans for both the group and for individuals.

Research on a set of extraordinarily successful teacher education programs has noted that many of them have particularly strong coursework on child and adolescent development tightly linked to clinical work that fosters child observation and analysis of learning within school and out-of-school environments (Darling-Hammond, 2000b; Darling-Hammond and Macdonald, 2000; Miller and Silvernail, 2000; Snyder, 2000; Zeichner, 2000). Interestingly, these programs share very similar approaches—some of them growing out of the early child studies of pioneers like Maria Montessori, Jean Piaget, John Dewey, and Lucy Sprague Mitchell—that have become increasingly widespread in other programs. These approaches emphasize systematic observation of children and their development, child case studies, and analyses of student work and learning, using assessment tools and tasks to help gauge development and learning. Some also include family and community studies or family interviews that help novice teachers understand their students' developmental contexts.

These opportunities are generally embedded in courses about human development across the life span so as to enable a general understanding of issues

related to the life course, developmental pathways and developmental trajectories. Beyond these general introductory courses, there is a strong focus on specific study of child and adolescent development, focused examination of cultural diversity and its relationship to effective teaching, and opportunities for classroom observations at several grade levels. Finally, in most of these programs, novice teachers have as background experience several opportunities for apprentice teaching or practicum experiences at multiple grade levels.

Curriculum Examples

One of these highly rated programs is Bank Street College in New York City, where Jean Jahr, the accomplished first-year teacher we visited at the start of this chapter, prepared to teach. Several studies have found that teachers rate their preparation at Bank Street extraordinarily highly, as do principals who employ these teachers (Darling-Hammond and Macdonald, 2000; Darling-Hammond, Chung, and Frelow, 2002), and the graduates are widely known to be successful urban teachers. Teachers and employers attribute these strengths to a deep understanding of and respect for children fostered in the teacher education program, an ability to diagnose students' strengths and readiness as well as their needs, and strong understanding of how to build curriculum that will foster learning from different starting points and take into account children's cultural contexts.

Jean attributed much of her skillful practice to a three-course sequence on child development at Bank Street College and to the developmental perspectives infused in most courses, including courses on content pedagogy in mathematics, literacy, science, social studies, and the arts. The three development courses include *Child Development* (one course for teachers of young children and another for teachers of older children and adolescents), *The Study of Children through Observation and Recording*, and *Family, Child, and Teacher Interaction*. In conjunction, these courses focus on children, how they grow and learn and the influences of societal factors in their development, as well as how teachers can use knowledge of students' strengths and needs to make decisions about curriculum, instruction, and assessment—and to communicate with families about their children's home and school lives. All of these courses explicitly address concerns for diversity in learning and cultures, including exceptionalities generally treated only in special education courses elsewhere. Jean noted in an interview: "Child Development was helpful (to my practice) because we read Piaget and started thinking about what is appropriate for a child and what isn't. What can you reasonably expect at different ages. And that is really the issue in teaching a combined second and third grade classroom . . . O and R [Observation and Recording] was very helpful in terms of a stance toward children. There was a huge amount of work, but it was worth it. One of the best things you can do is watch a child closely and try to understand why they're doing what they're doing" (Darling-Hammond and Macdonald, 2000, pp. 41, 44).

These understandings are reinforced with extensive clinical experiences in the Bank Street School for Children, an on-site PK–8 school where student teachers are found in virtually every classroom, and other partnering schools that model developmentally appropriate practice. Like other new Bank Street teachers, Jean attributes her ability to evaluate individual students' learning and support their progress to the consistency of her experience in courses, advisement, and field experiences at Bank Street. For example, the strategies Jean used with her students on a complex math problem were demonstrated in her preservice course on Math for Teachers, in which teachers would often begin a class by working in small groups solving the same problem and then demonstrating to one another the different ways they solved the problem. After groups present their solutions, the class discusses the different skills used in solving the problem and how they would teach students those skills.

The University of California at Berkeley's Developmental Teacher Education (DTE) program is another of the programs identified as exemplary in the same study (Snyder, 2000). DTE provides a four-seminar human development sequence that uses clinical methods for assessing levels of cognitive development and samples of children's spoken and written language for assessing their language development. Each seminar is connected to teaching methods courses and to one of the several student teaching placements through overlapping assignments and experiences. Issues of culture, context, and diversity are raised throughout these courses. As in a number of other programs with a strong developmental focus, two particularly powerful pedagogies shape student teachers' developmental learning: the use of systematic observation of children and the use of child cases.

Systematic Observation of Children

Child observation is widely used to help teacher candidates learn how to examine and assess child development and learning with enough care and detail to guide instruction. Students are guided in observing specific features of children's development and behavior that they will need to understand to guide their teaching through careful recording linked to specific developmental concepts and readings. Sometimes, these observations are linked to specific tasks (for example, Piagetian tasks assessing cognitive development) that the student teacher gives to students to observe their responses, with the goal of learning to observe where children are in their thinking in different domains. Sometimes the prospective teacher conducts interviews of students or collects work samples (written work or oral language samples) to gauge their learning about particular concepts or their reasoning about particular tasks. Observing and sampling across different domains of knowledge helps the prospective teacher to understand that one cannot find a "general stage of development" across domains or subject matter.

These experiences help prospective teachers begin to think about how to identify the zone of proximal development for students on different kinds of tasks as a guide to their later teaching. At Bank Street College, one of the early developers of the observational approach, the Observation and Recording course, popularly known as "O and R," is identified by students, graduates, and faculty as a critical means for prospective teachers to learn how to look closely at children. The course outline describes how the course is designed to sharpen the teacher's skills for seeking evidence while also allowing examination of the student teacher's own cultural and personal assumptions about children, so that the teacher can eventually observe and understand children more clearly and accurately:

> Almost everyone "observes" children informally, but what we "see" and remember is influenced by what we are looking for, what we expect to see and what we think about the nature and capabilities of children. Our observations of children are also influenced by our own values and feelings. In this course we will work toward sharpening awareness of our own cultural and personal assumptions when observing children. In this process we will work to develop greater sensitivity to ourselves as observers, to the language we use, and to the data we are choosing to attend to. The aim is to develop a personal style of observing and recording that is precise, vivid and non-judgmental, one that will serve us well in our work with children and families. Class time will be used to present, discuss and practice observational techniques. At times we will use films and videotapes in class in order to have common experiences for observation and discussion. (TE-502, Fall 1995; Darling-Hammond and Macdonald, 2000, p. 43)

Prospective teachers can study how students respond to particular learning tasks in order to figure out how to teach within the zone of proximal development. For example, an early assignment for candidates in the Developmental Teacher Education program at UC Berkeley asks:

> Select two learning tasks from the curriculum in your classroom which your students will understand at different levels. Administer interviews based on these two tasks to three children in order to investigate the different levels at which tasks might be understood using Piaget's method and his theory of development as a basis for interpretation. The focus in this assignment is on assessing the difficulty of the tasks in terms of the level of operational reasoning required for mastery. Write a report including a clear description of the tasks, a summary of the interview procedures and each child's responses, conclusions about each child's level of understanding, and about the level of reasoning required for mastery (Snyder, 2000, p. 113).

A similar approach is used at Wheelock College, yet another of the programs identified as extraordinarily successful in preparing urban elementary teachers (Miller and Silvernail, 2000). Keen observation is encouraged through guiding questions, and understanding in light of the literature on development is sought through specific readings that are provided as lenses for interpretation. In one

observation assignment, for example, after reading about different theories of physical and cognitive growth in young children and examining findings about motor development, students are asked to observe and record at least two behavioral events of a child and analyze the events as follows:

> The goal of your analysis is to construct an understanding of your focus child's physical abilities. As you analyze your focus child's behavior, think about what you have learned about theory and research on physical development. In analyzing the behavioral event records, use the information about theory and research on physical development discussed by Cole and Cole (1993, Chapters Five and Six), and by Post, Williams, Witt, and Atwood (1990), as well as other course materials. Here are some questions to ask yourself as you begin your analysis:
>
> - What do the child's locomotion and large muscle coordination show you about her or his perceptual-motor development? What does the child's behavior and vocalizations reveal about her or his awareness of body, time, space, and direction, and visual and auditory cues? How does the child's level of large muscle control influence her or his interaction with objects and with other people? (See Cole and Cole, 1993, pp. 183–184, 213; Poest and others, 1990.)
> - What do the child's fine hand movements and small muscle coordination show you about her or his perceptual-motor development?
> - Does the child seem to be developing "normally" in the physical domain compared with other children of the same age and gender? If so, how do the child's physical abilities differ from what would be expected of a younger child, and of an older child? (Miller and Silvernail, 2000, pp. 80–81)

These kinds of courses and assignments help teachers develop the close observational skills and the ability to interpret developmental data they will need to construct tasks that meet children where they are and move them along the developmental pathways toward greater competence.

The Child Case Study

Another common approach is the development of child case studies in which the teacher candidate functions as a researcher. The case study is used to help teachers learn to apply knowledge of development, learning, motivation, and behavior to specific children as they function in their family, school, and community contexts. Many teacher education programs engage their students in conducting child and adolescent case studies to help them link theories of learning and development to observations of actual children. The goal of such case studies is to examine student learning and development with an eye toward identifying strengths, developmental progress, important influences, and needs. Collecting and analyzing data for the case study—from observations, interviews, records, and analyses of student work—helps teachers

develop their skills of observation and documentation and their ability to analyze how children learn and how specific children can be supported in the process of development.

At Bank Street, the main assignment for the Observation and Recording course is an Individual Child Study for the purpose of "developing an increased awareness of the child's uniqueness, the relation of specific behavior to overall functioning, and the implications for learning" (Darling-Hammond and Macdonald, 2000, p. 43). This document is developed over several months from a number of different assignments, including short, weekly written observations of the child at school; a paper that examines the child in the context of his peers or group; an age-level study designed to see the child in light of developmental theory; and observations and interpretations of the child as a learner and member of a learning community.

Instructors review weekly observation and provide feedback designed to encourage the careful use of evidence and to suggest developmental theories and interpretations that will help the teacher make sense of what she is seeing. Specific data collection tools include a variety of techniques the teacher should be able to use in her own practice, such as a running record of a child's oral reading; observations of the child's use of language in different contexts; a collection of the student's work; recordings of children's responses to on-demand performance of specific tasks; and observations of children at play or in unstructured interaction with other children. The requirements ask that student teachers review all documentation, triangulate evidence to support their assumptions, make recommendations for teaching or further study, and use theoretical understandings to back up their recommendations.

In this kind of case, the narrative explicates with detailed examples a young person's thinking, learning, interactions, beliefs, concerns, and aspirations. In some instances, child case studies can be the basis for evaluating how better to work with a child who is having difficulty. Like some medical cases, written versions of such studies codify what is done by teachers when they evaluate a student using multiple tools of evidence, develop approaches to meet the child's needs, and examine the outcomes.

A vivid example of this kind of analytic child case study is provided in the account of Akeem, a third-grade student who entered Susan Gordon's classroom in a New York City elementary school after having been expelled for throwing a desk at a teacher in another school (Darling-Hammond, Ancess, and Falk, 1995, pp. 217–224). The case begins by describing Akeem's frequent outbursts, his efforts to disrupt classroom meetings, and his periodically surly and aggressive behavior. It continues by describing Gordon's efforts to document, using many tools of observation and assessment, exactly when these outbursts occurred, and her discovery that Akeem's misbehavior tended to occur when certain kinds of academic tasks arose, especially those requiring

reading or writing. The case provides a detailed description of Susan's efforts, with her colleagues, to discover what Akeem could do well, to provide opportunities for him to build upon his strengths, and to develop strategies for addressing his specific literacy needs.

Like physicians who use a variety of tests to figure out the source of a problem and their knowledge of physiology and the etiology of disease to develop treatment strategies, Susan Gordon and her colleagues used their understanding of development and a range of assessment tools to evaluate Akeem's difficulties and strengths and to develop an approach that could address the former while building on the latter. From her knowledge of development, Susan suspected that Akeem's outbursts were an expression of a more fundamental discomfort. She closely observed what Akeem did when he had choices available to ascertain what his interests and abilities were, and she conducted a number of assessments of his reading abilities—miscue analyses, comprehension exercises, and analyses of his reading strategies—to figure out what he did and did not know how to do and how he approached the task of reading. As she understood what was impacting Akeem's performance, she allowed him to work in hands-on learning centers that tapped his artistic skills and his abilities to construct machines and models. She found him books and developed writing assignments that built on these interests, while systematically teaching him new strategies for reading. As the case unfolds, Akeem develops architectural drawings and creates sophisticated comics that he later annotates and turns into books; he is recognized by peers for his artistic and mechanical abilities and begins to gain status in the classroom; he joins classroom activities with increasing enthusiasm and less disruption; and, importantly, with specific coaching from an increasingly well-informed teacher, he learns to read and write. The case follows Akeem until he finishes middle school with a solid academic record, near perfect attendance, and admission into a specialized high school for the arts.

This kind of case, which illustrates expert practice that is developmentally informed, provides novices with an illustration of how to collect evidence about students' learning and behavior in light of broader professional knowledge; how to diagnose learning needs; and how to build a set of teaching strategies that addresses these needs. When novices construct their own case studies of children, they engage in similar kinds of diagnostic thinking and in an integration of information from many perspectives: cognitive, social, emotional, and physical. Such case analyses are most powerful when they are directly tied to formal study of development, so that students have a basis for understanding what they see. The case construction process enables novices to learn how to apply theoretical knowledge to concrete examples, and the completed case provides a basis for evaluating their ability to do so.

The School Development Process

All of the programs we have discussed here treat teaching as a collaborative activity and use a variety of strategies to help prospective teachers learn to plan and problem solve with their colleagues. This includes assignments that require novices to work together in planning and implementing curriculum and lessons and evaluating each others' practice. It also includes placing student teachers in schools where faculty work together and where they can see how professionals solve problems and pursue changes in schools that operate collaboratively. This preparation enables new teachers to see themselves as members of a broader school community and to develop skills for participating in creating a school culture that is supportive to children. In the best cases, novices are prepared in schools that have developed a strong developmental focus, and they are asked to examine aspects of the schoolwide approach, so that they can see how such a focus operates throughout the school and what good practice looks like beyond the individual classroom. Finally, in these and other programs, novice teachers are given opportunities to consider the processes of school change and reform, and to participate in both university-based and school-based deliberations about changes needed to create supportive environments for children. In this way, they develop a sense of the professional role as they become teachers who help to shape the environment of the school as well as their individual classroom.

CONCLUSION

The core purpose of formal education is to enable the development of *all* children to take their place in adult society with the competencies to be positively contributing members to the society. Nothing less is at stake when a teacher is given the responsibility for helping students make developmental progress. We emphasize preparing novice teachers with a well-grounded developmental perspective in service of this goal. Such teachers should be able to choose learning experiences, materials, and instructional strategies that are used strategically to meet students where they are within their zones of proximal development so as to move all children toward greater competence and help them develop strong identities as learners. To develop appropriate tasks and support students' progress along the developmental pathways, teachers must become keen observers of children, be able to analyze students' learning in the context of development, and be able to translate what they note into curriculum, instructional strategies, and classroom management approaches. In both elementary and secondary classrooms, the more developmentally prepared teachers are, the higher the probability that each child will learn and grow successfully.