CHAPTER 7

Sociocultural Contexts for Teaching and Learning

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The increased recognition of the roles that cultural and social factors play in human development along with advances in neuroscience and cognition research present challenges to existing theories of learning and development. Creating new explanatory theories that address the complexities of human learning is a research priority in a number of different fields (National Research Council [NRC], 1999). This new agenda is especially important if education is going to meet the needs of all students, including the linguistically and culturally diverse. In this chapter, we explore the work of the Russian psychologist Lev Semyonovich Vygotsky, whose growing influence is shaping culturally relevant and dynamic theories of learning. In spite of increasing references to his work in the fields of education and educational psychology, his theoretical foundations and his methodological approach to the study of the mind remain relatively unknown to broader audiences in those fields.

We begin our discussion of Vygotsky's contributions to educational psychology with an overview of his life and work and then discuss ways in which sociocultural theorists have built on his legacy. Vygotsky emphasized the critical roles that individuals play in creating contexts and the ways in which they internalize interactions with the environment and other people. Humans' use and appropriation of socially created symbols were at the center of this investigation. We provide a brief overview of his theories on language acquisition, sign-symbol use, and concept formation in their relationships to learning and development. We use these concepts as the primary lenses for our examination of some salient issues in educational psychology and current educational reform efforts. To support our analyses we rely on an extensive and diverse literature reflecting what has been variously referred to as sociocultural or cultural-historical research.

Sociocultural Research

The central shared theme in this family of theories is the commitment to study the acquisition of human knowledge as a process of cognitive change and transformation. Sociocultural approaches use different disciplinary tools, including

discourse analysis as developed by linguists, longitudinal methods familiar to developmental psychologists, and, most frequently, qualitative methods of observation, participation, and documentation as practiced by ethnographers and cultural psychologists. This research does not fit easily into the methodological framework most familiar to readers of psychology. Our colleagues (Cole, 1996; Rogoff, 1990; Scribner & Cole, 1981; Wells, 1999) found that they could not adapt large-scale, cross-sectional methods to their inquiries into psychological processes in culturally distinct contexts. Their research demanded an interdisciplinary methodological approach for which they chose Vygotsky's. Using his approach and theoretical framework, they examined the interrelationships of social and individual processes in the construction of knowledge and the ways in which culture shapes the "apprenticeships of thinking" and diverse ways of knowing.

In their cross-cultural study of literacy among the Vai of Liberia, Scribner and Cole (1981) at first applied traditional, experimental methods of research. However, those efforts failed because the researchers had not adequately identified the specific contexts and purposes for which that population used writing. To accomplish meaningful participation by their subjects, they used ethnographic inquiries and the development of culturally relevant problem-solving tasks. Scribner and Coles' resulting work, *The Psychology of Literacy,* has influenced many sociocultural theorists because their methodological approach provides complex documentation of existing conditions and subsequent change. The emphasis is on examining real-life problems in natural settings (frequently in classrooms) and analyzing the ways in which people appropriate new learning strategies, jointly develop artifacts, and practice newly acquired competencies.

Sociocultural Approaches and Educational Psychology

The experiences of sociocultural researchers using ethnographic approaches and the theoretical framework developed by Vygotsky have contributed to a view of teaching/learning (*obuchenie* in Russian) that places culture, context, and system at the center of inquiry. Our purpose, then, is to clarify the concepts that guide sociocultural interdisciplinary research and its relevance for educational psychology. We realize that the framework we describe is not easy to convey, as it relies on philosophical assumptions and psychological ideas at variance with a common understanding of educational psychology. What, then, is its relevance to this volume? A common ground, we believe, is a shared commitment to the improvement of all children's opportunities to learn in rapidly changing, complex societies. Sociocultural researchers have a contribution to make to this objective, as much of their work—while situated at the interface of a number of disciplines—is aimed at educational reform. This contribution is especially important today with the increased presence of linguistically and culturally diverse learners. Vygotsky's theoretical framework, with its emphasis on language, culture, social interaction, and context as central to learning and development, is particularly relevant to teaching these learners. Our intent is to describe this broad framework and then apply it to a narrower focus—the obstacles these learners face when acquiring literacy in a second language.

A Vygotskian Framework

In developing his framework, Vygotsky studied and critiqued contemporary psychologists' theories of the mind and, in particular, focused on the ways that they addressed the development of higher psychological functions. Vygotsky's theoretical approach stressed the complex relationships between the cognitive functions that we share with much of the natural world and those mental functions that are distinct to humans. He emphasized the dialectical relationship between individual and social processes and viewed the different psychological functions as part of a dynamic system. His study of the interrelationships between language and thought, and his examination of the role of concept formation in the development of both, clearly illustrates a central component of his methodological approach: *functional systems analysis.* Alexander Luria (1973, 1979) further developed the concept of a dynamic system of functions in his neurological research on the ways in which brain trauma affects cognitive processing.

Vygotsky's use of functional systems analysis to study language acquisition, concept formation, and literacy provides insights into *synthesis* and *transformation* in learning and development. This synthesis is hard to conceptualize because we are used to methodological individualism—a single focus on behavior in isolation from culturally constituted forms of knowing, productive social interaction, and dynamic contexts. In contrast, the weaving together of individual and social processes through the use of mediational tools, such as language and other symbol systems, and the documentation of their synthesis and transformation is crucial for understanding sociocultural theories and, in particular, the role that they ascribe to context. In educational psychology, where the relationship between students and teachers has been of vital concern, the emphasis throughout the twentieth century has been on the developmental unfolding of the self-contained learner. In contrast, Vygotsky stressed the important role of interaction of the individual and the social in the teaching/learning process. He defined *social* in the broadest sense, including everything cultural as social: "Culture is both a prod-

uct of social life and of the social activity of man and for this reason, the very formulation of the problem of cultural development of behavior already leads us directly to the social plane of development" (Vygotsky, 1997a, p. 106). His emphasis on the interdependence of individual and social processes is one reason why his work is so important today.

The transformation of social processes into individual ones is central in sociocultural theory and contributes to its interdisciplinary nature. Within a framework based on Vygotsky's theory, it is difficult to maintain the traditional distinctions between individual and social processes, between educational and developmental psychology, between teaching and learning, and between quantitative and qualitative methods. Sociocultural approaches thus draw on a variety of disciplines, including linguistics, anthropology, psychology, philosophy, and education. Their contemporary influence is most noticeable in interdisciplinary fields such as sociolinguistics and cultural psychology.

Overview of Vygotsky's Work

Dominant psychological theorists (such as Piaget and Freud) generally ignore the role of history and culture, and consequently, they base their analysis of teaching on universal models of human nature. In contrast, Vygotsky's sociocultural framework supports pedagogical methods that honor human diversity and emphasize social and historical contexts. Although some of Vygotsky's concepts, most notably the *zone of proximal development,* have been widely described in textbooks, the full range of his contributions has yet to be explored and applied. (For overviews of Vygotsky's work, see Daniels, 1996; John-Steiner & Mahn, 1996; Kozulin, 1990; Moll, 1990; Newman & Holzman, 1993; Van der Veer & Valsiner, 1991; Veresov, 1999; Wertsch, 1985a, 1991.) There was very little biographical material in the first works of Vygotsky to appear in English. James Wertsch (1985b), a sociocultural theorist who played an instrumental role in helping make Vygotsky's ideas available in English, interviewed people who knew Vygotsky to provide biographical material for his books. Although more biographical material has become available, including important information from his daughter, Gita Vygotskaya (1999), there is still one important unresolved question: At what point was Vygotsky able to synthesize his understanding of Marx and Engels's methodological approach with his increasingly empirical knowledge of psychology? When Vygotsky began his investigation of higher mental functions, he clearly had assimilated Marx and Engels's dialectical method and their analysis of the formation and the development of human society as foundations for his own work.

Vygotsky's Experimental Method

In this chapter we look at Vygotsky's application of the dialectical method to the study of the development of human cognitive processes and emphasize, in particular, his analysis of how language and other symbol systems affect the origins and development of higher mental functions. Vygotsky used the concept of *meaning* to analyze this relationship. He also looked at the ways in which other culturally constituted symbol systems such as mathematics and writing contributed to the development of human cognition.

Other topics of shared interest to educational psychologists and sociocultural scholars include the study of memory (Leontiev, 1959/1981); of concept formation (Panofsky, John-Steiner, & Blackwell, 1990; Van Oers, 1999; Vygotsky, 1986); of teaching and learning processes (Moll, 1990; Tharp & Gallimore, 1988; Vygotsky, 1926/1997, 1978; Wells, 1999; Wells & Claxton, 2002); of mathematical development (Davydov, 1988; Schmittau, 1993); of literacy (John-Steiner, Panofsky, & Smith, 1994; Lee & Samgorinsky, 2000). We recognize how little is known in the West of the research conducted by Vygotsky, his collaborators, and his students. The reasons for the limited attention their work has received may reside in linguistic and cultural differences and also in its differing methodological approach. The Soviet scholars in the 1920s and 1930s did not use sophisticated statistics and carefully chosen experimental controls; instead, their focus was on the short- and long-term consequences of theoretically motivated interventions. Their approach centered on provoking rather than controlling change. "Any psychological process, whether the development of thought or voluntary behavior, is a process undergoing changes right before one's eyes" (Vygotsky, 1978, p. 61). These experiments, though called *formative,* had no relationship to *formative evaluation* common in the West. Griffin, Belyaeca, Soldatova, & Velikhov-Hamburg Collection (1993) described formative experiments:

> The question of interest is not *if* a certain type of subject performs correctly on a criterion task under certain conditions, but, rather, *how* the participants, including the experimenter, accomplish *what* task, using cultural artifacts. The task and goal are purposefully vague; they are underspecified initially from the perspectives of both subject and experimenter. A formative experiment specifies task and goal as the participants experience "drafts" of it being constructed, deconstructed, and reconstructed. The coordinations and discoordinations of the participants in the experiment make public "what is going on here"—what the task is. In this way of working, goal formation and context creation are a part of the material taken as data, not given a priori. (p. 125)

Our focus in this chapter is to examine how Vygotsky explained context creation through his studies of language, thought, and concept formation. Drawing on sociocultural studies based on Vygotsky's work, including our research in two, often overlapping fields—second language learning and literacy—we describe how Vygotsky's theoretical framework and methodological approach influenced our own studies. We conclude by examining how the sociocultural tradition can help us meet the challenge of providing effective education for all students, including the culturally and linguistically diverse and those with special needs. We start with an examination of the origins of the sociocultural tradition established by Vygotsky over 70 years ago.

VYGOTSKY AND SOCIOCULTURAL THEORY

> How is Vygotsky to be understood? As a hidden treasure who can now be revealed to the world? As an historical figure; part icon, part relic? As the construction of a historical figure used for contemporary purposes to ventriloquate contemporary arguments? As a lost contemporary, speaking to us across time? There is no exclusively correct choice among these alternatives, he is all of these. (Glick, 1997, p. v)

Historical and Biographical Background

Lev Semyonovich Vygotsky was born in 1896 in the small Russian town of Orsha and was raised in Gomel in Belorussia. His middle-class parents were able to afford private tutoring at a time when most Jewish students were excluded from regular public schooling. His mother's influence was profound, as she introduced Vygotsky to languages, literature, and the pleasures of daily conversation. In 1913 he was fortunate to be admitted as a result of a lottery to Moscow University, where he enrolled in the medical school. After a month he transferred to the law school, from which he earned a law degree in 1917. In 1914 he also enrolled in a free university, from which he also graduated in 1917 with majors in history and philosophy (Blanck, 1990). Literature remained a lifelong passion and furnished Vygotsky with important psychological insights. He was an avid reader of the work of European scholars, in particular, Spinoza, whose work was central to his theory of emotions. Vygotsky studied and translated many works of the leading psychological thinkers of his time (including Freud, Buhler, James, Piaget, and Pavlov). After graduating from the universities, Vygotsky returned to Gomel, where he spent the next 7 years teaching and continuing his intellectual pursuits: "He taught literature and Russian at the Labor School, at adult schools, at courses for the specialization of teachers, at Workers' Faculty, and at technical schools for pressmen and metallurgists. At the same time, he taught courses in logic and psychology at the Pedagogical Institute, in aesthetics and art history at the Conservatory, and in theater at a studio. He edited and published articles in the theater section of a newspaper" (Blanck, 1990, p. 35). His interest in teaching/learning and in psychology resulted in one of his earliest books, *Pedagogical Psychology,* published in 1926 (the American edition of this volume was retitled *Educational Psychology;* Vygotsky, 1926/1997).

The aftermath of the Russian revolution of 1917 provided new opportunities to Vygotsky. He was able to teach and travel, to present papers at psychological congresses, and to start to address the challenge of the nature of consciousness from a Marxist point of view. In 1924 he spoke at the Second All-Russian Psychoneurological Congress in Leningrad. His brilliant presentation resulted in his joining the Psychological Institute in Moscow, where he and his wife lived in the basement. A year later, Vygotsky was supposed to defend his dissertation titled *The Psychology of Art,* but he was bedridden with a serious bout of tuberculosis, the disease that killed him in 1934.

Developing a New Psychology

Once in Moscow, surrounded with young colleagues and students, Vygotsky devoted himself to the construction of a new psychology using a Marxist approach. During the turbulent years in the Soviet Union spanning from the 1917 revolution through the Civil War in the Soviet Union to Stalin's purges in the 1930s, many psychologists took part in rethinking basic issues, such as "What is human nature?" or "How do we define consciousness?" Vygotsky sought to apply Marx's dialectical method to the study of the mind rather than patch together quotations from Marx, as became the practice after Stalin took power in 1924. Vygotsky's creative, nondogmatic approach ran afoul of the ruling Stalinist bureaucracy, but he died right before the political climate became so repressive that the very discipline of psychology was temporarily obliterated.

Luria (1979), one of Vygotsky's closest collaborators, wrote, "Vygotsky was the leading Marxist theoretician among us" (p. 43). After quoting a passage from Marx on the nature of human consciousness, Luria wrote, "This kind of general statement was not enough, of course, to provide a detailed set of procedures for creating an experimental psychology of higher psychological functions. But in Vygotsky's hands Marx's methods of analysis did serve a vital role in shaping our course" (p. 43).

In addition to developing a new course for psychology, another of Vygotsky's goals was "to develop concrete ways

of dealing with some of the massive practical problems confronting the USSR—above all the psychology of education and remediation" (Wertsch, 1985a, p. 11). This was a huge undertaking in an underdeveloped, poor country that had borne the brunt of World War I in terms of loss of life and economic devastation, and then had gone through a profound social revolution and a prolonged civil war. The extraordinary challenge of developing literacy in a society where the population over the age of 9 years was largely illiterate made it difficult to use traditional approaches.

In their travels throughout the Soviet Union, Vygotsky and his collaborators were able to assess the population's needs and to set up laboratories and special education programs for children who had suffered trauma. This work contributed to Vygotsky's recognition of the crisis in psychology and led him to develop a new methodological approach for psychological research that included formative experiments rather than just laboratory experiments. "The central problems of human existence as it is experienced in school, at work, or in the clinic all served as the contexts within which Vygotsky struggled to formulate a new kind of psychology" (Luria, 1979, pp. 52–53).

Vygotsky's Methodological Approach

Elsewhere, we have written more extensively on Vygotsky's theoretical foundations and methodological approach (John-Steiner & Souberman, 1978; Mahn, 1999); here, we limit ourselves to examining the theoretical foundations for his functional systems analysis. An integral component of functional systems analysis is *genetic analysis*—the study of phenomena in their origins, their development, and eventual disintegration. Although Vygotsky's use of genetic analysis is perhaps better known, functional systems analysis constitutes the core of his scientific analysis and remains one of his most significant contributions to the study of the mind.

Use of Dialectics

Although Vygotsky's focus was on the development of the mind, of human consciousness, he situated that study in the historical development of society and in concrete contexts for human development. Vygotsky drew heavily from Marx and Engels's application of dialectical materialism to the study of human social development (historical materialism). He examined the origins and evolution of phenomena, such as higher mental functions, as dynamic, contextual, and complex entities in a constant state of change. His dialectical approach had the following as central tenets: (a) that phenomena should be examined as a part of a developmental process starting with their origins; (b) that change occurs through qualitative transformations, not in a linear, evolutionary progression; and (c) that these transformations take place through the unification of contradictory, distinct processes. He used dialectics to examine the processes that brought the mind into existence and to study its historical development. "*To study something historically means to study it in the process of change;* that is the dialectical method's basic demand" (Vygotsky, 1978, pp. 64–65). Vygotsky saw change in mental functioning not as the result of a linear process, but rather as the result of quantitative changes leading to qualitative transformations. In these transformations, formerly distinct processes became unified. Vygotsky grounded this approach in the material world, starting his analysis with the changes that occurred when humans began to control and use nature to meet their needs.

The Search for Method

This approach revealed the need for psychology to develop a new methodology that surmounted the weaknesses of both behaviorism and subjective psychology. Vygotsky (1978) wrote, "The search for method becomes one of the most important problems of the entire enterprise of understanding the uniquely human forms of psychological activity. In this case, the method is simultaneously prerequisite and product, the tool and the result of the study" (p. 65). In one of his first major works, "The Historical Meaning of the Crisis in Psychology: A Methodological Investigation," Vygotsky (1997b) subjected the dominant theories of his time to a critical analysis starting with the methodology that they inherited from the natural sciences.

This methodology based on formal logic posits a static universe in which immutable laws determine categories with impenetrable boundaries. It dichotomizes reality and creates binary contradictions: mind versus matter, nature versus culture, individual versus social, internal versus external, process versus product. Reductionist approaches "depend on the separation of natural processes into isolable parts for individual study. They have provided a rich repertoire of information about the world, but they systematically ignore the aspects of reality that involve relations between the separated processes" (Bidell, 1988, p. 330). Rather than isolating phenomena, Vygotsky approached the study of the mind by examining its origins and development and then exploring its interconnections with biological, emotional, cultural, and social systems. Luria (1979) clearly articulated the dialectical approach that Vygotsky used to study the relationship between the higher mental and elementary functions:

> Influenced by Marx, Vygotsky concluded that the origins of higher forms of conscious behavior were to be found in the individual's

> social relations with the external world. But man is not only a product of his environment, he is also an active agent in creating that environment. The chasm between natural scientific explanations of elementary processes and mentalist descriptions of complex processes could not be bridged until we could discover the way natural processes such as physical maturation and sensory mechanisms become intertwined with culturally determined processes to produce the psychological functions of adults. We needed, as it were, to step outside the organism to discover the sources of specifically human forms of psychological activity. (p. 43)

Ethnographic Research Methods

This stepping outside of the organism led sociocultural researchers to use ethnographic methods when they found that they could not adopt large-scale, cross-sectional methods to their inquiries into the apprenticeships of thinking in Guatemala (Rogoff, 1990) or the study of literacy in Liberia (Cole, 1996; Scribner & Cole, 1981). John-Steiner and Osterreich (1975) faced a similar dilemma in her work with Navajo children when she found that traditional vocabulary tests were inappropriate in assessing the language development of these bilingual children. She needed to develop culturally appropriate methods of observation and documentation to identify the learning activities in which traditionally raised Navajo children participated and to design new methods (e.g., story retelling) for evaluating their language learning. Her work among Native American populations played an important role in the development of her theory of cognitive pluralism (John-Steiner, 1991, 1995).

Cognitive Pluralism

Through her observations in Native American schools, John-Steiner noted that Navajo and Pueblo children conveyed knowledge not only through language, but also by dramatic play, by drawing, and by reenacting their experiences, as well as in spatial and kinesthetic ways. This caused a shift in her approach to the nature of thought and theories of thinking. To show the importance of varied semiotic means—sign-symbol systems used for understanding reality and appropriating knowledge—John-Steiner (1991, 1995) developed a pluralistic rather than a monistic theory of semiotic mediation based on her studies of these learners who were raised in culturally diverse contexts. Likewise, in her studies of apprenticeships, Rogoff (1990) found the importance of visual as well as verbal semiotic means in participatory learning. Although Vygotsky's (1981) focus was more on language's mediational role, he also recognized other semiotic means: "various systems of counting; mnemonic techniques; algebraic symbol systems; works of art; writing; schemes, diagrams, maps and mechanical drawings; all sorts of conventional signs and so on" (p. 137).

The concept of cognitive pluralism provided John-Steiner with a lens to examine the impact of external activities on the acquisition and representation of knowledge. Ecology, history, culture, and family organization play roles in the patterning of events and experience in the creation of knowledge (John-Steiner, 1995). In a culture where linguistic varieties of intelligence are dominant in the sharing of knowledge and information, verbal intelligence is likely to be widespread. In cultural contexts where visual symbols predominate, as is the case in many Southwestern communities, internal representations of knowledge reflect visual symbols and tools. John-Steiner's interpretation of the multiplicity of ways in which we represent knowledge does not have the strong biological base of Gardner's (1983) theory of multiple intelligences but shares the emphasis on the diversity of knowledge acquisition and representation. Her *Notebooks of the Mind* further illustrates the concept of cognitive pluralism by examining the varied ways in which experienced thinkers make and represent meaning through the use of words, drawings, musical notes, and scientific diagrams in their planning notes (John-Steiner, 1985a). She cites the work of Charles Darwin, who relied on tree diagrams in his notebooks to capture his developing evolutionary theories in a condensed visual form.

The Role of Culture

Cross-cultural studies such as Cole, Gay, Glick, and Sharp's work (1971) on adult memory illustrate the relevance of cognitive pluralism and contribute to our understanding of the impact of culture on cognition. In their work among the Kpelle and the Vai in Liberia, Cole and his collaborators found that categories organized in a narrative form were remembered very well by native participants whereas their performance on standard (Western) tasks compared poorly with that of North American and European participants. In *Cultural Psychology,* Cole (1996) proposed that the focus of difference among distinct groups is located in the ways they organize the activity of everyday life. Sociocultural researchers have increasingly made such activity a focus for study as described by Wertsch (1991):

> When action is given analytic priority, human beings are viewed as coming into contact with, and creating, their surroundings as well as themselves through the actions in which they engage. Thus action provides the entry point into analysis. This contrasts on the one hand with approaches that treat the individual

> primarily as a passive recipient of information from the environment, and on the other with approaches that focus on the individual and treat the environment as secondary, serving merely as a device to trigger certain developmental processes. (p. 8)

Sociocultural studies, such as those just mentioned, explore the role played by culture in shaping both thinking and context. They illustrate Vygotsky's analyses of both the growth and change of higher psychological processes through cultural development and of the relationship between the elementary and the higher mental functions.

VYGOTSKY'S ANALYSIS OF ELEMENTARY AND HIGHER MENTAL FUNCTIONS

> We will term the first structures primitive; this is a natural psychological whole that depends mainly on the biological features of the mind. The second, arising in the process of cultural development, we will term higher structures since they represent a genetically more complex and higher form of behavior. (Vygotsky, 1997a, p. 83)

When Vygotsky developed his analysis of higher mental functions, psychology was divided into two dominant and distinct camps: one that relied on stimulus-response to explain human behavior and the other that relied on introspection as an alternative to empirical research. Rather than trying to reconcile these two disparate approaches, Vygotsky argued that a whole new approach was necessary to study the mind—one that critically examined psychology's origins in the natural sciences. In developing his new approach, Vygotsky focused on the origins and the development of the higher mental processes. He distinguished between mental functions that reside in biology—the reflexes of the animal kingdom (involuntary attention, mechanical memory, flight)—and those that result from cultural development—voluntary attention, logical memory, formation of concepts.

Vygotsky studied prevailing psychological explanations of the development of higher mental functions and found that they addressed the origins, development, and purposes of the elementary mental functions but not the roles of language, human society, and culture in the genesis and development of the higher mental functions. His analysis of Freud was particularly intriguing in this regard. While he accepted the subconscious, Vygotsky also commented that "the subconscious is not separated from consciousness by an impassable wall" (quoted in Yaroshevsky, 1989, p. 169). Vygotsky (1997a) felt that clinical studies that isolated features or functions of human behavior resulted in "an enormous mosaic of mental life . . . comprised of separate pieces of experience, a grandiose atomistic picture of the dismembered human mind" (p. 4). Vygotsky's (1997a) critique of this picture became the starting place for his research.

He drew the distinction between the higher and lower mental functions along four major criteria: origins, structure, function, and their interrelationships:

> By origins, most lower mental functions are genetically inherited, by structure they are unmediated, by functioning they are involuntary, and with regard to their relation to other mental functions they are isolated individual mental units. In contrast, a higher mental function is socially acquired, mediated by social meanings, voluntarily controlled and exists as a link in a broad system of functions rather than as an individual unit. (Subbotsky, 2001, ¶ 4)

Functional Systems Analysis

To study higher mental functions, Vygotsky developed a *functional systems approach,* which analyzed cognitive change as both within and between individuals. In a previous paper we defined functional systems as "dynamic psychological systems in which diverse internal and external processes are coordinated and integrated" (John-Steiner & Mahn, 1996, p. 194). A functional systems approach captures change and provides a means for understanding and explaining qualitative transformations in mental functions. In their analysis of psychological processes as functional systems formed in the course of development, Vygotsky and Luria examined the ways biological, social, emotional, and educational experiences of learners contribute to and function within dynamic teaching/learning contexts.

Research Applications

In *The Construction Zone,* Newman, Griffin, and Cole (1989) described their application of Vygotsky's and Luria's functional systems analysis to education. They conceptualized a functional system as including "biological, culturally variable, and socially instantiated mechanisms in variable relations to the invariant tasks that we investigate" (p. 72). Invariant tasks here refers to specific memory and concept sorting tasks used in clinical evaluations and experimental studies in which participants are provided with mediating tools. This approach was also used in Vygotsky's well-known block test, which consisted of 22 wooden blocks of varying sizes, shapes, and colors, with nonsense syllables on the bottom of the blocks serving as guides to systematic sorting. These syllables are mediating tools because they help the subjects to construct consistent clusters of blocks. As children acquire increasingly more sophisticated ways of sorting blocks, their progress

reveals changes and reorganizations in their functional systems and not just the simple addition of new strategies.

In his research with patients with frontal lobe injuries, Luria (1973) found that their injuries limited their use of external devices so that they needed assistance in using semiotic means. He found that patients improved when clinicians provided new tools and mechanisms to solve memory and sorting tasks. Wertsch (1991) described the *semiotic mediation* between individuals and cultural or mediational tools:

> The incorporation of mediational means does not simply facilitate actions that could have occurred without them; instead as Vygotsky (1981, p. 137) noted, "by being included in the process of behavior, the psychological tool alters the entire flow and structure of mental functions. It does this by determining the structure of a new instrumental act, just as a technical tool alters the process of a natural adaptation by determining the form of labor operations." (pp. 32–33)

Elsewhere, Wertsch (1985a) described multiplication as an example of mediation because of the ways in which semiotic rules provide a system, spatially arranged, to assist the individual who is engaged in mediated action.

Cultural Tools

Sociocultural researchers examine the use of mediational tools such as talk or charts in the evolution of cognitive constructs. These external tools reflect the crystallized experiences of learners from previous generations:

> Sociocultural theory . . . can be characterized by its central claim that children's minds develop as a result of constant interactions with the social world—the world of people who do things for and with each other, who learn from each other and use the experiences of previous generations to successfully meet the demands of life. These experiences are crystallized in "cultural tools" and children have to master these tools in order to develop specifically human ways of doing things and thus become competent members of a human community. These tools can be material objects (e.g., an item of kitchenware for one specifically human way of eating and cooking), or patterns of behavior specifically organized in space and time (for example, children's bedtime rituals). Most often however, such tools are combinations of elements of different order, and human language is the multi-level tool, par excellence, combining culturally evolved arrangements of meanings, sounds, melody, rules of communication, and so forth. (Stetsenko & Arievitch, 2002)

These symbolic tools and artifacts reveal information about the ways in which humans think, reason, and form concepts.

Vygotskian approaches that focus on symbolic representation and mastery of mathematical concepts are becoming more popular in mathematics education. In their research of high school mathematics, Tchoshanov and Fuentes (2001) explored the role of multiple representations and symbolic artifacts (numerical, visual, computer graphic symbols, and discourse). These multiple semiotic means constitute a functional system that, if used flexibly by different learners, effectively contributes to the development of abstract mathematical thinking.

In studies of literacy, a functional systems analysis highlights the integration of the semantic, syntactic, and pragmatic systems in reading and focuses on ways learners from diverse backgrounds use their past learning strategies to acquire new knowledge. In a study of Hmong women, Collignon (1994) illustrates a synthesis between traditional sewing practices and English as a Second Language (ESL) instruction. The method by which sewing was taught to young Hmong women became their preferred method for learning English as a second language. Here, developmental change goes beyond the addition of a new skill as represented in many traditional learning theories; it implies synthesis and transformation through the weaving together of individual and social processes.

INDIVIDUAL AND SOCIAL PROCESSES IN LEARNING

One of Vygotsky's major contributions to educational psychology—his analysis of the interweaving of individual and social processes—is also a major theme of a recent volume that reports on a 2-year project evaluating new developments in the science of learning (NRC, 1999). Two central aspects of learning presented in the findings of this project coincide with essential concepts of Vygotsky's analysis. First is the role of social interaction and culture in teaching/learning: "Work in social psychology, cognitive psychology, and anthropology is making clear that all learning takes place in settings that have particular sets of cultural and social norms and expectations and that these settings influence learning and transfer in powerful ways" (NRC, 1999, p. 4). The second aspect is the functional systems approach: "Neuroscience is beginning to provide evidence for many principles of learning that have emerged from laboratory research, and it is showing how learning changes the physical structure of the brain and, with it, the functional organization of the brain" (NRC, 1999, p. 4). The analysis presented in this volume also supports Vygotsky's position that learning leads development.

Learning and Development

"Learning and development are interrelated from the child's very first day of life," Vygotsky (1978, p. 84) wrote. In comparing his own approach to that of some of his influential contemporaries, including Thorndike, Koffka, and Piaget, Vygotsky argued against using maturation as the central explanatory principle in development. He also had a different view on the relationship of development and social processes. "In contrast to Piaget, we believe that development proceeds not toward socialization, but toward converting social relations into mental functions" (Vygotsky, 1997a, p. 106). He further opposed approaches that reduced learning to the acquisition of skills. In contrast to traditional "banking" concepts of learning, Vygotsky (1926/1997) introduced a different metaphor:

> Though the teacher is powerless to produce immediate effects on the student, he's all-powerful in producing direct effects on him through the social environment. The social environment is the true lever of the educational process, and the teacher's overall role is reduced to adjusting this lever. Just as a gardener would be acting foolishly if he were to affect the growth of a plant by directly tugging at its roots with his hands from underneath the plant, so the teacher is in contradiction with the essential nature of education if he bends all his efforts at directly influencing the student. But the gardener affects the germination of his flowers by increasing the temperature, regulating the moisture, varying the relative position of neighboring plants, and selecting and mixing soils and fertilizers. Once again, indirectly by making appropriate changes to the environment. Thus, the teacher educates the student by varying the environment. (p. 49)

This metaphor describes a process of scaffolded learning (Wood, Bruner, & Ross, 1976) in which someone who is more expert creates the foundation for the *zone of proximal development.* Vygotsky (1978) used this concept, for which he is best known, to differentiate between two levels of development: The first, the actual level of development, is achieved by independent problem solving. This is the level of development of a child's mental functions that has been established as a result of certain already-completed developmental cycles and is measured when students are given tests to complete on their own. The second level, designated by Vygotsky as the potential level of development, describes what a child or student can accomplish with the guidance or collaboration of an adult or more capable peer. Through the concept of the zone of proximal development, learning processes are analyzed by looking at their dynamic development and recognizing the immediate needs for students' development. The issue, however, is not resolved once we find the actual level of development. "It is equally important to determine the upper threshold of instruction. Productive instruction can occur only within the limits of these two thresholds of instruction. . . . *The teacher must orient his work not on yesterday's development in the child but on tomorrow's*" (Vygotsky, 1987, p. 211). Vygotsky developed the concept of the zone of proximal development late in his life and did not have the opportunity to elaborate it fully. Therefore, it is important to situate this concept in his more developed theory of teaching and learning.

Teaching/Learning

Vygotsky's work is characterized by its emphasis on the dialectical relationship between teaching and learning. The Russian word *obuchenie,* which means teaching/learning, speaks of a unified process, rather than the paradigmatic separation of the two: "The Russian word obuchenie does not admit to a direct English translation. It means both teaching and learning, both sides of the two-way process, and is therefore well suited to a dialectical view of a phenomenon made up of mutually interpenetrating opposites" (Sutton, 1980, pp. 169–170). Among sociocultural theorists, teaching/learning is represented as a joint endeavor that encompasses learners, teachers, peers, and the use of socially constructed artifacts:

> The importance of material artifacts for the development of culture is by now well understood; the invention of the flint knife and later of the wheel are recognized to have radically changed the possibilities for action of the prehistoric societies which invented them. . . . In more recent times, the same sort of significance is attributed to the invention of the printing press, powered flying machines and the microchip. But Vygotsky's great contribution was to recognize that an even greater effect resulted from the development of semiotic tools based on signs, of which the most powerful and versatile is speech. For not only does speech function as a tool that mediates social action, it also provides one of the chief means—in what Vygotsky (1987) called "inner speech"—of mediating the individual mental activities of remembering, thinking, and reasoning. (Wells, 1999, p. 136)

In addition to his emphasis on socially constructed artifacts, Vygotsky also stressed the role of the environment as reflected in the gardening metaphor just quoted. In conceiving of environment more broadly than the physical context, Vygotsky attributed an important role to individuals' contributions to the environment, including their emotional appropriation of interactions taking place within specific contexts.

Affective Factors

In constructing a general trajectory of development and clarifying the role of context, Vygotsky (1994) underscored the specificity of human experience through his notion of *perezhivanija*—"how a child becomes aware of, interprets, [and] emotionally relates to a certain event" (p. 341); "the essential factors which explain the influence of environment on the psychological development of children and on the development of their conscious personalities, are made up of their emotional experiences [*perezhivanija*]" (p. 339). Vygotsky developed the concept of *perezhivanija* to describe an important component of the dynamic complex system that constitutes context—what the child or student brings to and appropriates from interactions in a specific context.

The translators of the article, "The Problem of the Environment," in which Vygotsky (1994) explained his notion of *perezhivanija,* noted that the "Russian term serves to express the idea that one and the same objective situation may be interpreted, perceived, experienced or lived through by different children in different ways" (Van der Veer & Valsiner, 1994, p. 354). This notion, often left out of discussions of context, was a central consideration for Vygotsky.

Sociocultural Approaches to Context

The word "context" is open to a multitude of interpretations. The etymology of "context" from the Latin *contextera* (to weave together) is closely related to that of "text," the Latin *textum* (that which is woven, a fabric; Skeat, 1995). This explanation of the word helps capture two central elements in Vygotsky's theoretical framework: the dialectical weaving together of individual and social processes in learning and development, and the recognition that human activity takes place in a social and historical context and is shaped by and helps shape that context. Vygotsky viewed humans as the creators and the creations of context and felt that their activity reflected the specificity of their lives rather than ahistorical, universal principles. In emphasizing the active role of learners, we see them, along with other sociocultural theorists (i.e., Rogoff, 1990; Tharp & Gallimore, 1988), as members of learning communities. Such an approach helps synthesize a frequently dichotomized view of teaching and learning in education where the works of learning theorists are isolated from the findings of developmentalists.

In studying learning communities, sociocultural theorists have made the cultural and social aspects of context a focus for their studies (Cole, 1996; Forman, Minick, & Stone, 1993; Lave, 1988; Lave & Wegner, 1991; Rogoff, 1990). Tharp, Estrada, Dalton, and Yamuchi (2000) highlighted the educational importance of context in *Teaching Transformed:* "Effective teaching requires that teachers seek out and include the contexts of students' experiences and their local communities' points of view and situate new academic learning in that context" (p. 26). Tharp et al. illustrated a growing consensus among educational reformers of the significance of contextualized activities. They provided an example of contextualized activity consisting of sixth graders collecting height and weight data in the children's home communities and discussing the best way to represent the data while acquiring the relevant mathematical concepts. They further suggested that "the known is the bridge over which students cross to gain the to-be-known. This bridging or connecting is not a simple association between what is already known and what is new; it is an active process of sorting, analysis, and interpretation" (p. 29).

Assessment and Context

An important component in this bridging is accurate assessment of what the student brings to the classroom. Sociocultural approaches to assessment value the role that context plays and are concerned with the ways in which its influence can be described and measured. Wineburg (2001) contrasts Vygotskian approaches to traditional approaches that focus on the individual.

> [I]n contrast to traditional psychometric approaches, which seek to minimize variations in context to create uniform testing conditions, Vygotsky argued that human beings draw heavily on the specific features of their environment to structure and support mental activity. In other words, understanding how people think requires serious attention to the context in which their thought occurs. (Alternative Approach section, ¶ 5)

Language Use and Context

Lily Wong-Fillmore (1985) contributes to a broader understanding of context through her studies of teachers' language use in the classroom. In analyzing successful environments for learning a second language, she examines both the linguistic input of teachers as well as their ability to contextualize language. If teachers put their lessons in the context of previous ones, they

> anchor the new language in things that they have reason to believe the students already know. If the students remember what they did or learned on the earlier occasion, the prior experience becomes a context for interpreting the new experience. In lessons like this, prior experiences serve as the contexts within which the language being used is to be understood. (p. 31)

These studies illustrate that context is a widely shared concern among sociocultural theorists and one that virtually needs redefinition for different situations.

Culture and Context

The specific description of context is not separated from the process being studied and needs to include cultural considerations, as each context may call for distinct approaches. John-Steiner, for example, found that story retelling was an effective elicitation method for many children, but was not as effective with Navajo children until traditional winter tales were substituted for the generic stories she had used with mainstream students. Similarly, Tharp found that collaborative groupings that he used successfully with Hawaiian students did not work with Native American students where considerations of clan and gender had to be included in decisions about how to pair children. Griffin et al. (1993) include other elements that play a role in context: "the semantic significance of grammatical constructions, the media and mediation, communicative acts, social roles and classes, cultural (and ethnic) conventions and artifacts, institutional constraints, past history, and negotiated goals imaging the future" (pp. 122–123).

Sociocultural researchers whose studies focus on the workplace as a setting for learning also stress the importance of context. The Finnish researcher Yrjö Engeström (1994, 1999) and his collaborators (Engeström, Miettinen, & Punamäki, 1999) looked at school, hospital, outpatient, and industrial contexts. In their recent work they emphasized *knotworking,* which they define as "the notion of knot refers to a rapidly pulsating, distributed and partially improvised orchestration of collaborative performance between otherwise loosely connected actors and activity systems" (1999, p. 346). Among linguists, Michael Halliday (1978) is most emphatic in emphasizing the role of context, as seen in his influential book, *Language as Social Semiotic.* He succinctly summarized the relationship between language and context: "The context plays a part in what we say; and what we say plays a part in determining the context" (p. 3). This echoes Vygotsky's emphasis on the individual shaping context and language shaping the individual.

MEDIATION AND HIGHER PSYCHOLOGICAL PROCESSES

> If language is as ancient as consciousness itself, if language is consciousness that exists in practice for other people, and therefore for myself, then it is not only the development of thought but the development of consciousness as a whole that is connected with the development of the word. (Vygotsky, 1987, p. 285)

The way that language and, in particular, *word meaning* developed was a central concern of Vygotsky's and is key to understanding the intricate dialectical relationship he described between language, thought, and consciousness. In this section we examine one of the most influential and most original aspects of Vygotsky's legacy: his analysis of language's mediational role in the development of higher mental functions. In his study of the higher mental functions, Vygotsky (1997a) described two distinct streams of development of higher forms of behavior, which were inseparably connected but never merged into one:

> These are, first, the processes of mastering external materials of cultural development and thinking: language, writing, arithmetic, drawing; second the processes of development of special higher mental functions not delimited and not determined with any degree of precision and in traditional psychology termed voluntary attention, logical memory, formations of concepts, etc. (p. 14)

Vygotsky's analyses of the external materials—language, writing, and arithmetic—help us understand psychology's role in guiding educational approaches to teaching/learning. An important part of this analysis of the development of higher mental functions is his theory of concept formation and its relationship to language acquisition and verbal thinking.

Language Acquisition

Contemporary scholars have added to Vygotsky's theoretical claim that language is central to human mental development in a variety of ways, including showing "how symbolic thinking emerges from the culture and community of the learner" (NRC, 1999, p. 14). Vygotsky (1981) included important cultural and psychological tools in addition to language, such as mathematical symbols, maps, works of art, and mechanical drawings that serve to shape and enhance mental functioning. These socially constructed semiotic means are transmitted and modified from one generation to the next. Language, as the chief vehicle of this transmission, is a cultural tool (Wertsch, 1998).

Vygotsky examined semiotic mediation, including language, developmentally. In *Thinking and Speech* (1987) he wrote, "The first form of speech in the child is purely social" (p. 74). In this short statement he captures the fact that human survival requires the sustained attention to and care of others. In comparison to that of other species, the behavior of human infants is immature and indeterminate. Therefore, their earliest

efforts at communication require careful, finely tuned interpretations provided by caregivers:

> From the moment of birth this adaptation places the infant into social relations with . . . adults and through them into a sociocultural system of meaning. Thus the requirements of care allow the infant's individuality to develop with cultural sources and also provide the communicative formats necessary for the development of language. (John-Steiner & Tatter, 1983, p. 87)

Socialization of Attention

In order to begin understanding adult references, the very young learner has to share an attentional focus with the adult through a process of *socialization of attention* (Zukow-Goldring & Ferko, 1994). While children are dependent on their caregivers, the windows of opportunity to create joint attention are short because their attention is intermittent with their gazes shifting from faces to objects:

> We have called this process in which caregivers specify culturally relevant and socially shared topics perceptually for the child's benefit *socializing attention.* In socializing attention caregivers use both gesture and speech. In these situations the occurrence of a linguistic device, say a name, is actually coincident *both* with the presence of some stable pattern in the environment, the labeled topic of attention, and with the action directing attention to that object. (p. 177)

Before infants appropriate linguistic meaning they have to follow the adult's gaze and have their modes of expression interpreted. The connection between objects and their referents is not easy to establish because it requires multiple cognitive processes and it proceeds by fits and starts. This connection is also linked to the development of practical thinking, to the toddlers' manipulation of objects, and to their practical activities as well as to emotional and expressive behavior. "Laughter, babbling, pointing, and gesture emerge as means of social contact in the first months of the child's life" (Vygotsky, 1987, p. 110).

Language and Thought

Vygotsky conceived of two distinct and originally separate processes: prelinguistic development of thought and preintellectual development of expressive and social communication. These two paths of development become interdependent when children shift from passively receiving words to actively seeking language from the people around them. The merger of the expressive verbal and intellectual lines of development gives rise to the earliest forms of verbal thinking and communicative, intelligent speech. This change is manifested in children's constantly asking for names of things, leading to an extremely rapid increase in their vocabulary. In this process the "child makes what is the most significant discovery of his life" (Vygotsky, 1987, pp. 110–111), the discovery that each object has a *name,* a permanent symbol, a sound pattern that identifies it.

Since Vygotsky first described this qualitative change in young learners from learning words item by item to the 2-year-old's active search for names, the field of language acquisition has grown enormously. Research by Scaife and Bruner in 1975 highlighted the Vygotskian notion of shared attention and joint activity that starts at a very young age. They demonstrated that infants follow the gaze of adults and pay selective attention to those aspects of their environment that are also of interest to those around them. Katherine Nelson (1989) showed that the creation of scripts by the infant and the adult, necessary for language acquisition, also supports shared attention. "Children like to talk and learn about familiar activities, scripts or schemes, the 'going to bed' script or the 'going to McDonald's' script" (NRC, 1999, p. 96). Bruner (1985) argued that sharing goes beyond the immediacy of gaze and reciprocal games—that it illustrates the principle of *intersubjectivity,* which is critical to the acquisition of language.

Intersubjectivity and Language Acquisition

Rommetveit (1985, p. 187) relates the intersubjectivity of the young child to an adult's as he described an inherent paradox in intersubjectivity. His description started by drawing on William James's (1962) quote, *"You accept my verification of one thing. I yours of another. We trade on each other's truth"* (p. 197):

> *Intersubjectivity must in some sense be taken for granted in order to be attained.* This semiparadox may indeed be conceived of as a basic pragmatic postulate of human discourse. It captures in a condensed form an insight arrived at by observers of early mother-child interaction and students of serious communication disorder. (p. 189)

Explanations of language acquisition that rely on biologically hardwired mechanisms tend to diminish the role of social interaction and intersubjectivity. The debates in the field between those who look to innate mechanisms and those who look to the sustaining impact of social interaction and finely tuned exchanges help highlight the distinction that Vygotsky drew between basic biological processes on the one hand and

language as socially constructed by interactive processes on the other. These debates have important implications for education:

> The social interaction of early childhood becomes the mind of the child. Parent-child interactions are transformed into the ways the developing child thinks, as are interactions with siblings, teachers and friends. . . . In schools, then, dedicated to the transformation of minds through teaching and learning, the social processes by which minds are created must be understood as the very stuff of education. (Tharp et al., 2000, p. 45)

Individual and Social Processes

The interdependence between social and individual processes in language acquisition described by sociocultural researchers illustrates the unity of distinct processes—an essential tenet of Vygotsky's methodological approach. Vygotsky examined the contradictory aspects of this unity. Children are born into a culture and develop language through the communicative intent that adults bring to their child's utterances, but there is another process at play: the development of a child's individual personality: "Dependency and behavioral adaptability provide the contextual conditions for the correlative processes of individuation and enculturation, both of which are essential to the development of language" (John-Steiner & Tatter, 1983, p. 87).

In tracing the process of individuation in the development of the child, Piaget's early research, especially his concept of egocentric speech, a form of language in which the speaker uses speech for noncommunicative, personal needs influenced Vygotsky. Vygotsky described the separation and transformation of social (interpersonal) speech into private speech—utterances that are vocalized but not for communicative purposes (Diaz & Berk, 1992)—and of private speech into inner (intrapersonal) speech. Vygotsky's analysis of this internalization process provides an important example of the utility of a functional systems approach. For Vygotsky, developmental change unifies the usual polarity between those processes that occur among individuals (studied by sociologists and anthropologists) and those that occur within individuals (the domain of psychologists). In his well-known *genetic principle* he proposed that each psychological process occurs first between the child and a more experienced adult or peer, and then gradually becomes internalized by the child. Jerome Bruner (1962) captured this aspect of sociocultural theory when he wrote that "it is the internalization of overt action that makes thought, and particularly the internalization of external dialogue that brings the powerful tool of language to bear on the stream of thought" (p. vii).

Internalization of Speech

The process of internalization, however, is not accomplished through simple imitation; rather, it involves a complex interplay of social and individual processes that include transmission, construction, transaction, and transformation. The internalization process described by Vygotsky has had a number of interpretations and remains a topic of interest among sociocultural theorists (Chang-Wells & Wells, 1993; Galperin, 1966; John-Steiner & Mahn, 1996; Packer, 1993; Wertsch & Stone, 1985). The internalization of language and its interweaving with thought was a central focus of Vygotsky's analysis. An important concept in this examination was *semiotic mediation.*

Humans learn with others as well as via the help of historically created semiotic means such as tools, signs, and practices. Yaroshevsky and Gurgenidze (1997) described the centrality language held for Vygotsky in semiotic mediation and, therefore, in the development of thinking:

> Then the word, viewed as one of the main variants of the cultural sign, acquired the meaning of a psychological tool whose interference changes (along with other signs) the natural, involuntary mental process into a voluntarily guided process, or more exactly, a self-guided process. The attempt to understand the character of the interrelations between the different mental processes made Vygotsky think about the instrumental role of the word in the formation of the functional systems. (p. 351)

Vygotsky used a functional systems approach to examine the relationship between thought and word. His analysis revealed both word and thought as changing and dynamic instead of constant and eternal. Their relationship was part of a complex process at the center of which Vygotsky discovered *word meaning* and *verbal thinking.*

Word Meaning and Verbal Thinking

Instead of isolating language as an object for study (linguistics) and thinking as another object for study (psychology), Vygotsky studied their unity and sought an aspect of that unity that was irreducible and that maintained the essence of the whole. The concept of word meaning provided him with the foundation for examining children's use of inner speech and verbal thinking:

> Word meaning is a unity of both processes [thinking and speech] that cannot be further decomposed. That is, we cannot say that word meaning is a phenomenon of either speech or thinking. The word without meaning is not a word but an empty sound. Meaning is a necessary, constituting feature of the word

> itself. It is the word viewed from the inside. This justifies the view that word meaning is a phenomenon of speech. In psychological terms, however, word meaning is nothing other than a generalization, that is a concept. In essence, generalization and word meaning are synonyms. Any generalization—any formation of a concept—is unquestionably a specific and true act of thought. Thus, word meaning is also a phenomenon of thinking. (Vygotsky, 1987, p. 244)

In his analysis of the relationships between thought and word, Vygotsky examined the origins of both and then traced their developments and interconnectedness, concluding that "these relationships emerge and are formed only with the historical development of human consciousness. They are not the precondition of man's formation but its product" (Vygotsky, 1987, p. 243).

Inner Speech

Using word meaning as a unit of analysis, Vygotsky (1987) studied the internalization of speech and its relationship to verbal thinking. He concluded that "inner speech is an internal plane of verbal thinking which mediates the dynamic relationship between thought and word" (p. 279). He investigated children's appropriation of socially elaborated symbol systems as a critical aspect of their learning-driven development. These investigations led to his most fully elaborated application of the concept of internalization—the transformation of communicative language into inner speech and further into verbal thinking:

> The movement from inner to external speech is not a simple unification of silent speech with sound, a simple vocalization of inner speech. This movement requires a complete restructuring of speech. It requires a transformation from one distinctive and unique syntax to another, a transformation of the sense and sound structure of inner speech into the structural forms of external speech. External speech is not inner speech plus sound any more than inner is external speech minus sound. The transition from inner to external speech is complex and dynamic. It is the transformation of a predicative, idiomatic speech into the syntax of differentiated speech which is comprehensible to others. (pp. 279–280)

As the condensed, telegraphic, predicative style of inner speech is hard to access overtly, it rarely occurs in ordinary conversation. Vygotsky relied on literary examples to illustrate inner speech. The most famous was the account from Tolstoy's *Anna Karenina* in which Kitty and Levin declare their love for each other by relying solely on the first letters of words. Vygotsky's interpretation of this conversation of condensed exchanges was that the participants were so deeply involved with each other that there was minimal psychological distance between them. Their expressive means then became reduced to the smallest possible units as well.

Word Meaning and Word Sense

While looking for related forms that reveal the dynamics of inner speech, John-Steiner (1985a) examined the notebooks of writers. In several writers' diaries, she found condensed, jotted notes through which these writers, including Virginia Woolf, Henry Miller, and Dostoyevsky, planned their chapters and books. "Use of a telegraphic style makes it possible to gallop ahead, exploring new connections. . . . [O]ften when there is a transcribed record of the way in which writers plan their work, it takes the form of these very condensed thoughts" (p. 112). These planning notes that John-Steiner named *inner speech writing* reveal two aspects of verbal thinking, word *sense* and word *meaning:*

> A word's sense is the aggregate of all the psychological facts that arise in our consciousness as a result of the word. Sense as a dynamic, fluid, and complex formation has several zones that vary in their stability. Meaning is only one of these zones of the sense that the word acquires in the context of speech. It is the most stable, unified, and precise of these zones. In different contexts, a word's sense changes. In contrast, meaning is a comparatively fixed and stable point, one that remains constant with all the changes of the word's sense that are associated with its use in various contexts. (p. 276)

Vygotsky utilizes different genres of language use to distinguish between word *meaning* and word *sense.* Actors use "sense" to convey the specific, contextually bound ways in which a person acts and feels. Poets use meaning and sense to convey the general and specific possibilities of a poetic image or an unexpected phrase. Meaning and sense are transformed for children through development as they reflect the changing complexity of experience.

> Our desire to differentiate the external and sense aspects of speech, word, and thought has concluded with the attempt to illustrate the complex form and subtle connections of the unity that is verbal thinking. The complex structure of this unity, the complex fluid connections and transitions among the separate planes of verbal thinking, arise only in process of development. The isolation of meaning from sound, the isolation of word from thing, and the isolation of thought from word are all necessary stages in the history of the development of concepts. (Vygotsky, 1987, pp. 283–284)

It is to Vygotsky's developmental examination of concept formation that we turn next.

Language Acquisition and Concept Formation

Language depends on classification. In order to label two objects with the same word, the child needs to identify them as similar in some crucial way. However, to achieve effective categorizing, children traverse through a number of phases. At first, they tend to apply words to "a series of elements that are externally connected in the impression that they have had on the child but not unified internally among themselves" (Vygotsky, 1987, p. 134). While a child's word meaning is not complete and is diffuse in its application, it will at times externally coincide with the adult's word meaning. At those points of intersection the child will "establish social interaction through words that have meaning" (p. 134), even though the child's meanings differ from those of the adult.

At the beginning of the process of categorizing objects, children develop a syncretic image, a "heap" of "objects that are in one way or another combined in a single fused image in the child's representation and perception" (Vygotsky, 1987, pp. 134–135). Through a process of trial and error, children begin to refine the syncretic image but do so "guided not by the objective connections present in the things themselves, but by the subjective connections that are given in their own perception" (p. 135). Objects that are in close proximity with each other in everyday life, but do not share any common features, may be placed together in a heap. On the other hand, the child may just have a subjective feeling that certain things belong together. When children no longer mistake the connections in their impression of objects for connections between the objects themselves, Vygotsky says that they have passed to a mode of thinking in complexes.

Complexive Thinking

In complexive thinking, "the world of objects is united and organized for [children] by virtue of the fact that objects are grouped in separate though interconnected families" (Vygotsky, 1987, p. 136). In a concept-sorting task, developed for Head Start children, John and Goldstein (1967) found that first graders tended to group cards functionally. For instance, they placed a barn, a farmer, and a horse into a single group, rather than placing the farmer with other working people and the horse with other animals. Kozulin (1990) illustrated such concrete and functional grouping of objects that complement each other (e.g., saucers and spoons). At an early stage of language use "word meanings are best characterized as family names of objects that are united in complexes or groups. What distinguishes the construction of the complex is that it is based on connections among the individual elements that constitute it as opposed to abstract logical connections" (Vygotsky, 1987, p. 136). In order to be included in a group or complex, any empirically present connection of an element is sufficient. Language plays a significant role in facilitating the connection of objects and events.

Double Stimulation and Concept Formation

Vygotsky developed a method with Lev Sakharov to study the different stages of concept formation. They referred to their approach as the *method of double simulation*—a method in which both objects and mediating artifacts such as signs are introduced. In this case, the researchers used nonsense syllables on the bottom of the blocks of different colors, shapes, heights, and surfaces. The task of the participants was to discover a systematic way of grouping these blocks. As mentioned earlier, the youngest children grouped blocks in syncretic ways, whereas the next-older children displayed thinking in complexes. The achievement of true concepts (that of a triangle, for instance) requires not only that the mature and developing learners have a joint understanding and a common referent when they point to a triangle, but also that the developing learner has mastered the processes of analysis, separation, and abstraction—all needed to achieve the mastery of true concepts. The research Vygotsky (1987) described in chapter 5 of *Thinking and Speech* is relevant to the study of categorization and to the study of language development. It documents how communication is linked to concept formation, and how concepts become more fully mastered by children and adolescents. As semantic mastery is achieved, *meaning* continues to develop further through social interaction and learning.

Everyday and Scientific Concepts

Vygotsky was not fully satisfied by these studies because he realized the artificiality of the tasks, particularly in their reliance on nonsense syllables in guiding the sorting process. He subsequently moved to another aspect of concept formation, drawing a basic distinction between everyday and scientific concepts—work partially informed by Piaget's work on spontaneous and nonspontaneous concepts. Everyday concepts are developed in the context of the child's experiences in noninstructional settings and are supported by the young learner's engagement in joint activities. Adults do not teach these concepts in a systematic fashion. A frequently used example of an everyday concept is that of *brother.* A child

correctly identifies his own brother or those of his friends without being able to define it in a more systematic way as a "male sibling." Vygotsky (1987) defined scientific concepts as ones usually introduced to the child in school and ones that are part of systems: *"The system emerges only with the development of the scientific concept and it is this new system that transforms the child's everyday concepts"* (p. 223).

Vygotsky (1987) noted that before scientific concepts could emerge, higher mental functions such as " voluntary attention, logical memory, abstraction, comparison, and differentiation" (p. 170) needed to develop. When scientific concepts do emerge, there is a "complete restructuring of the child's spontaneous concepts" (p. 236), with scientific concepts providing "the gate through which conscious awareness enters the domain of the child's concepts" (p. 193). Vygotsky added, "The basic characteristic of [scientific concepts'] development is that they have their source in school instruction. Therefore, the general problem of instruction and development is fundamental to the analysis of the emergence and formation of scientific concepts" (p. 214).

Context and Concept Formation

In a study conducted in the upper Amazon region of Brazil, Elvira Lima (1998) examined concept formation in her work with Indian teachers from the Tikuna tribe. Over a period of three years, she learned about the ways in which members of this community as a part of their learning relied on drawing as culturally shaped mediation: "Tikuna culture uses body and nature dynamically as supports for graphic representation to convey meaning. Even orality in the school culture is functionally articulated with visual production" (Lima, 1998, p. 97). Drawing is thus a central mode of expression among this large tribe, whose members are committed to cultural continuity while embracing traditional schooling as a mode of survival. In her work with the lay teachers (individuals who were simultaneously teaching and obtaining their certification), Lima introduced two scientific concepts: the *developing child* and the *milieu* adopted from the French cultural-historical theorist, Henri Wallon.

Because drawing and graphic representations are central to the way in which the Tikuna deal with their world, this was the medium that Lima used to capture key features of the tribe's world, including the central role of the forest in which they live. She also relied on the notion of contrast for teaching the concept of *milieu* and showed a documentary on the Masai people from Africa. The words in the documentary were in English, but the teachers who did not know English captured the "meaning" of the film by relying on the visual elements and the music. They conveyed their own understandings of this unfamiliar milieu by drawings assembled into a mural and placed on the wall of the school. Verbal and written activities, including contrastive structures between the tribe's native language and Portuguese, further developed the concept. The study of the milieu led easily to exploring the lay teachers' concepts of how the Tikuna child develops through instruction designed to construct a scientific concept of the developing child.

Lima is an ethnographer and a cognitive psychologist who uses all possible resources to teach and gather information. Her intent in her work with the Tikuna teachers was to help them understand the developing Tikuna child. Lima had the lay teachers rely on their observations represented in drawings and stories to construct their understanding of the concept of the developing child. She and the teachers went through a systematic analysis of the themes in these drawings. They supplemented their representations with diagrams, verbal abstractions, and written language.

Lima also relied on other learning and planning experiences that had taken place in the Tikuna village. Her students, the lay teachers, participated in a mathematics course in which spatial concepts that the villagers needed to build a school and living quarters were used as the basis of teaching and learning. The development of the blueprints and the subsequent building of the school provided these teachers with an opportunity to weave everyday with scientific concepts. Lima helped them to reflect on these experiences through verbal and written means and provided them with grammatical constructions that captured concepts not immediately accessible in their native language by introducing the appropriate terminology in Portuguese.

This study also illustrates the concept of *formative experiments,* a notion mentioned earlier. Lima had the opportunity to evaluate how her students, the lay teachers, appropriated the concepts that she was teaching them over time. She alternated between intensive periods of teaching and travel in Brazil and abroad. After each of her trips she examined some of the new educational materials her students had developed during her absence. They reflected an increasingly sophisticated understanding of the environment, a development that reflected the mutual coconstruction of academic-scientific concepts through "drawings, written Tikuna and Portuguese, oral Tikuna, and diagrams as equally relevant mediation" (Lima, 1998, p. 103). She described the learning styles of her students as the dialectical weaving together of experiential and scientific knowledge where "success [is] defined as the learning of formal knowledge [that] depends on the creation of a pedagogy that is culturally appropriate but that does not restrict the student to what he or she already experiences culturally" (p. 103).

Lima's research illustrates the dynamic interweaving of various means of representation into a functional system. It also illustrates the way in which a native language and a second language may complement each other in expanding conceptual understanding while enriching the bilingual's sensitivity to the expanding possibilities of semantic understanding.

Concepts and First and Second Language Acquisition

In order to explain his theory of concept formation, Vygotsky related the differences between scientific and everyday concepts to the differences between acquiring one's native language and a second language. Children learn their native languages without conscious awareness or intention. In learning a second language in school, the approach "begins with the alphabet, with reading and writing, with the conscious and intentional construction of phrases, with the definition of words or with the study of grammar" (Vygotsky, 1987, p. 221). He added that with a second language the child first must master the complex characteristics of speech, as opposed to the spontaneous use of speech in acquiring the native language. In contrast to first language acquisition, where the young child focuses primarily on communicative intent, second-language learners are more conscious of the acquisition process. They are eager to approximate native use. As they listen to themselves while communicating, they refine and expand their conscious knowledge of both their first and second languages. Second-language speakers' conscious awareness of their syntax and vocabulary is well documented by researchers who focus on repairs in speech. These corrections of one's utterances during speech are common. An example of such self-repair is "I see much friends . . . a lot of friends" (Shonerd, 1994, p. 86). In suggesting that these corrections reflect the speakers' efforts to refine their linguistic knowledge, Shonerd quoted Wolfgang Klein: "The language learner must make his raincoat in the rain" (p. 82).

Vygotsky's (1987) examination of the relationships between first and second language acquisition shows how both "represent the development of two aspects of a single process, the development of two aspects of the process of verbal thinking. In foreign language learning, the external, sound and phasal aspects of verbal thinking [related to everyday concepts] are the most prominent. In the development of scientific concepts the semantic aspects of this process come to the fore" (pp. 222–223). He added another comparison between scientific concepts and learning a second language. The meanings a student is acquiring in a second language are mediated by meanings in the native language. Similarly, prior existing everyday concepts mediate relationships between scientific concepts and objects (Vygotsky, 1987). Vygotsky cautions, however, that the examination of the profound differences in the acquisition processes of first and second language acquisition

> must not divert us from the fact that they are both aspects of speech development. The processes involved in the development of written speech are a third variant of this unified process of language development; it repeats neither of the two processes of speech development mentioned up to this point. All three of these processes, the learning of the native language, the learning of foreign languages, and the development of written speech interact with each other in complex ways. This reflects their mutual membership in a single class of genetic processes and the internal unity of these processes. (Vygotsky, 1987, p. 179)

This unity Vygotsky found in inner speech, verbal thinking, and meaning.

MAKING MEANING IN THE CLASSROOM

Using Vygotsky's theoretical approach and methodology, Mahn (1997) examined ways in which inner speech, verbal thinking, and meaning making unified the processes of first and second language acquisition and writing in English as a second language. We examine his study in some depth to illustrate how students' prior experiences and *perezhivanija* help constitute the teaching/learning contexts. Mahn (1997) also shows how Vygotsky's notions of inner speech and verbal thinking can help develop efficacious pedagogical approaches for culturally and linguistically diverse students.

A Study of Second Language Writers

In a three-year-long study, Mahn (1997) examined the role of inner speech, verbal thinking, culture, discourse, and affect in students learning to write in a second language. This study involving 74 students from 27 countries revealed ways in which second-language learners make meaning through written communication with their instructor. Mahn used Vygotsky's theoretical framework to analyze students' perceptions of the use of written dialogue journals with their instructor as a means to build their self-confidence and to help them with academic writing. Their perceptions, which were gathered through interviews, questionnaires, reflective quick writes, their journals, and in academic essays, helped illuminate the role played by inner speech and verbal thinking in their composing processes. Particularly revealing were their descriptions of obstacles in the movement to written speech, or as one student artfully phrased it, "blocks in the elbow" and the effect of these blockages on inner speech and verbal thinking. Mahn used a

functional system analysis to examine the alternative systems or channels that students used when blockages occurred.

Although Mahn's study analyzed other aspects of the writing process, we focus here on his use of Vygotsky's theoretical framework in three areas: (a) the way bilingualism exemplifies the unification of diverse language processes; (b) the relationship between verbal thinking and the internalization and externalization of speech; and (c) the relationship between verbal thinking and writing. Mahn focused on the students' descriptions of the interruptions or blockages in both the internalization and externalization processes that students described when writing in a second language. Students reported that the main cause of interruption of these processes was an overemphasis on correctness in their previous instruction. They described the tension between having a thought or concept and becoming lost in their struggle to produce it correctly. This is similar to the tension Vygotsky described between the external manifestations of speech, an everyday concept, and the development of meanings in a system, a scientific concept.

Vygotsky and Bilingualism

The functional systems approach Vygotsky used to analyze this tension was also used in his analysis of bilingualism. He was particularly interested in the issue of bilingualism because of the many nationalities represented in Russia, which presented complicated challenges for educators. In his discussion of the psychological and educational implications of bilingualism, Vygotsky stressed an important aspect of a functional systems approach discussed previously: the unification of diverse processes. The achievement of balanced, successful bilingualism entails a lengthy process. On the one hand, it requires the separation of two or more languages at the production level, that is, the mastery of autonomous systems of sound and structure. At the same time, at the level of verbal meaning and thought, the two languages are increasingly unified. "These complex and opposing interrelationships were noted by Vygotsky, who had suggested a two-way interaction between a first and second language.... The effective mastery of two languages, Vygotsky argued, contributes to a more conscious understanding and use of linguistic phenomena in general" (John-Steiner, 1985b, p. 368). His concept of inner speech played an important role in the separation and combination of the two languages.

Writing and Inner Speech

In his analysis of verbal thinking, Vygotsky (1987) traced the internalization of word meaning from external speech to its innermost plane—the affective-volitional plane that lies behind and motivates thought. He also examined the reverse process of externalization, which "moves from the motive that gives birth to thought, to the formation of thought itself, to its mediation in the internal word, to the meanings of external words, and finally, to words themselves. However, it would be a mistake to imagine that this single path from thought to word is always realized" (p. 283). The study of language has revealed the "extraordinary flexibility in the manifold transformations from external to inner speech" (John-Steiner, 1985a, p. 118) and from inner speech to thought. In Mahn's study (1997) students described using dialogue journals to overcome obstacles in both the internalization and externalization processes and to expedite inner speech's function of facilitating "intellectual orientation, conscious awareness, the overcoming of difficulties and impediments, and imagination and thinking" (Vygotsky, 1987, p. 259).

The differentiation of speech for oneself and speech for others, a process in which social interaction plays a crucial role, is an important part of this process. An interlocutor in oral speech helps achieve intersubjective understanding through intonation, gesture, and creation of a meaningful context centered on communicative intent. This recognition of speech for others leads to a differentiation between speech for others and speech for oneself. Until that realization, egocentric speech is the only mode a child uses. The differentiation of speech functions leads to the internalization of "speech for oneself" and then to inner speech. When the differentiation is extensive, we "know our own phrase before we pronounce it" (Vygotsky, 1987, p. 261). It is the struggle to "know the phrase" that can provide a stumbling block for the second-language learners. For them, the movement from thought to production is often problematic, especially if they have learned English through a grammar-based approach.

The way that a child or student acquires a second language has an impact on the development of inner speech and verbal thinking. Inner speech functions differently for children learning the second language simultaneously than it does for those learning the second language through traditional, grammar-based approaches in school. If awareness of correctness dominates, affective factors, including those that result from different cultural practices, may impede the internalization of English and disrupt verbal thinking. A number of students, who described this disruption in their thinking or composing processes, added that when they wrote in their dialogue journals without worrying about correctness, their ideas were both more accessible and easier to convey. They also reported that disruption was less likely to occur if they were able to describe an event that occurred in the context of their native language using their native language and one that occurred in an English context in English.

Writing and Verbal Thinking

John-Steiner (1985a) underlined the importance of drawing on the perspectives of writers when looking at aspects of verbal thinking: "A psychological description of the processes of separation and unification of diverse aspects of language is shallow without a reliance on the insights of writers, they who have charted the various ways in which ideas are woven into text" (p. 111). Because it is a more deliberate act, writing engenders a different awareness of language use. Rivers (1987) related Vygotsky's discussion of inner speech and language production to writing as discovery: "As the writer expands his inner speech, he becomes conscious of things of which he was not previously aware. In this way he can write more than he realizes" (p. 104). Zebroski (1994) noted that Luria looked at the reciprocal nature of writing and inner speech and described the functional and structural features of written speech, which "inevitably lead to a significant development of *inner speech.* Because it delays the direct appearance of speech connections, inhibits them, and increases requirements for the preliminary, internal preparation for the speech act, written speech produces a rich development for inner speech" (p. 166).

Obstacles in Writing

Problems arise for second language writers when the "rich development" becomes mired during the time of reflection, when they perform mental "grammar checks" on the sentences under construction. Students' descriptions of this process indicate that during this grammar check they lose the unity between inner speech and external speech and consequently lose their ideas. Vygotsky (1987) wrote that whereas "external speech involves the embodiment of thought in the word, in inner speech the word dies away and gives birth to thought" (p. 280). The problem for students who focus excessively on correctness is that the words do not become the embodiment of thought; nor do they "die." They remain until the student creates what they feel is a grammatically correct sentence. In the meantime, the thought dies, and the motivation for communication diminishes. When the students take the focus off correctness, words die as they enter the realm of thought. Vygotsky (1987) took the analysis of internalization beyond even this realm, locating the motivation for thought in the affective/volitional realm:

> Thought has its origins in the motivating sphere of consciousness, a sphere that includes our inclinations and needs, our interests and impulses and our affect and emotion. The affective and volitional tendency stands behind thought. Only here do we find the answer to the final "why" in the analysis of thinking. (p. 282)

When students used only those words or grammatical forms that they knew were correct, they felt that they could not clearly transmit ideas from thought to writing. If they did not focus on correctness, they took chances and drew on the word meanings in their native language as a stimulus to verbal thinking. This helped them develop their ideas (e.g., "Journals helped me to think first; to think about ideas of writing instead of thinking of the grammar errors that I might make"). They describe how verbal thinking helped in the move to written speech because it was initiated with the intent of communicating an idea rather than producing the correct form—be it vocabulary, spelling and usage, sentence structure, genre, or rhetoric. The fluency entailed with writing in dialogue journals depends on the simultaneous operation of inner speech and external speech and writing, an operation that is diminished when the focus of inner speech is on correctness.

Shaughnessey (1977) observed that the sentence unfolding on paper is a reminder to the basic writer of the lack of mechanical skill that makes writing down sentences edited in the head even more difficult. In more spontaneous writing, writers do not have a finely crafted sentence in their head; rather, as in oral speech, the writer, at the time of initiation, will not know where the sentence will end. For ESL students, the focus on form short-circuits the move to inner speech, and the thought process and writing are reduced to the manipulation of external speech forms. Students reported that with too much attention to correctness they would lose their ideas or not be able to convey them (e.g., "When I'm afraid of mistakes, I don't really write the ideas I have in mind"). Students related that through writing in their dialogue journals they decreased the attention to surface structure and experienced an increased flow of ideas inward and outward. With this increased flow, a number of students reported that they benefited from the generative aspect of verbal thinking (e.g., "With the journal you have one idea and start writing about it and everything else just comes up"; "They seemed to help me focus on what I was writing in the sense that I let the words just flow and form by themselves"; "The journals we did in our class were useful to me because it helped me form my thoughts"; "Journal helps me to have ideas flow and write them down instead of words sticking in my mind").

In written speech the absence of intersubjective understanding and meaningful communicative interaction makes production difficult and constrained. The traditional reaction to students' text with a focus on error provides interaction that diminishes the intersubjective understanding and the motivation to communicate. This not only makes production more difficult but also impairs the internalization of speech. In contrast, students reported that dialogue journals helped to

promote intersubjective understanding and the creation of a context for meaningful communication. This helped them overcome blockages in both the internalization and externalization processes. Through the interaction in the journals and by shifting the focus from form and structure to meaning, students reflected that they could think better in English (i.e., that they could use inner speech more effectively). They also commented that their motivation to communicate ideas facilitated production of written speech. With the focus on meaning, the students could get their ideas on paper and then revise the form and structure rather than trying to work out the grammar in their heads before committing the thought to paper (e.g., "I wrote while thinking rather than formulating sentences in the mind"). Attention to mechanical correctness in verbal thinking caused the students' ideas to evanesce not into thought, but into thin air.

Vygotsky's Influence on Literacy Research

Mahn's study resonates with the findings of other writing researchers who focus on the processes of writing and not just on the final product. Writing theorists such as Emig (1971), Britton (1987), Langer and Applebee (1987), and Moffett (1981) constructed a new approach to literacy that relied on some of Vygotsky's key ideas. In a similar vein, Vygotsky's influence has been important in the development of reading theories by Clay (1991), Holdaway (1979), Goodman and Goodman (1990), and Taylor (1998). Among the topics explored by these literacy researchers are sociocultural considerations of the literacy socialization process (Panofsky, 1994).

Foundations for Literacy

In the "Prehistory of Written Language," Vygotsky (1978) examined the roles of gesture, play, and drawing in this socialization for literacy. He analyzed the developmental processes children go through before schooling as a foundation for literacy learning in school. He argued that gestures lay the groundwork for symbol use in writing: "The gesture is the initial visual sign that contains the child's future writing as an acorn contains a future oak. Gestures, it has been correctly said, are writing in the air, and written signs frequently are simply gestures that have been fixed" (Vygotsky, 1978, p. 107). In a study on parent-child book reading, Panofsky (1994) also emphasized the importance of connecting visual signs with verbal representations. She suggested that children need assistance in interpreting pictures in books, a process that contributes to the move from signs to representations. An example of such a move is a parent's saying, "See that tear? He is crying" (Panofsky, 1994, p. 232). Anne Dyson (1989), who has shown the importance of dramatic play, drawing, and writing in the development of child writers, also emphasized the multidimensionality of literacy.

Vygotsky (1978) described the interweaving of diverse forms of representation such as scribbles accompanying dramatic play: "A child who has to depict running begins by depicting the motion with her fingers, and she regards the resultant marks and dots on paper as a representation of running" (p. 107). When children use symbols in drawing, writing development continues. As they begin to draw speech, writing begins to develop as a symbol system for children.

Implications for Teaching

The emphasis on the functions of writing for children is paramount among contemporary literacy scholars (Smith, 1982). Such an emphasis also characterizes Vygotsky's thoughts and predates some of the current, holistic approaches to reading and writing: "Teaching should be organized in such a way that reading and writing are necessary for something . . . writing must be 'relevant to life' . . . and must be taught naturally . . . so a child approaches writing as a natural moment in her development, and not as training from without. . . . In the same way as they learn to speak, they should be able to learn to read and write" (1978, pp. 117–119). The contributors to a recently published volume, *Vygotskian Perspectives on Literacy Research* (Lee & Smagorinsky, 2000), expand on the zone of proximal development (Lee, 2000), present cross-cultural studies of teachers' socialization and literacy instruction (Ball, 2000), and present different approaches to classroom literacy practices (Gutiérrez & Stone, 2000), among other topics. Literacy learning, from a sociocultural perspective, is situated in a social milieu and arises from learners' participation in a community's communicative practices. These studies highlight the relationships between context and individual and social processes and at the same time underscore the need to develop environments for literacy teaching/learning that honor linguistic and cultural diversity.

An underlying current in these studies is the need for social action, especially among those who rely on critical literacy, defined by Shor (2001, ¶ 4) as "language use that questions the social construction of the self." Harste (2001) drew the connection between critical literacy and social action:

> While critical literacy involves critical thinking, it also entails more. Part of that "more" is social action built upon an understanding that literacy positions individuals and in so doing, serves some more than others. As literate beings, it behooves us

not only to know how to decode and make meaning but also to understand how language works and to what ends, so that we can better see ourselves in light of the kind of world we wish to create and the kind of people we wish to become. (Introduction, ¶ 7)

In her article "Selected Traditions: Readings of Vygotsky in Writing Pedagogy," Courtney Cazden (1996) highlighted a current of critical theorists (Burgess, 1993; Kress, 1993) who rely on Vygotsky and address issues of power, conflict, and resistance. She also highlighted other researchers who use inner speech, verbal thinking, and literacy to relate social and cultural factors to the development of the cognitive processes involved in reading and writing (Britton, 1987; Moffet, 1981).

In this chapter we chose to examine the ways in which Vygotsky's ideas help to understand and redefine teaching/learning contexts by focusing on language acquisition, verbal thinking, concept formation, second language acquisition, and literacy. In the last section we briefly describe some of Vygotsky's work in other domains—special education, assessment, and collaboration—as they relate to efforts to reform education to meet the needs of all students.

VYGOTSKY'S CONTRIBUTIONS TO EDUCATIONAL REFORM

Two recent volumes—*Learning for Life in the 21st Century: Sociocultural Perspectives on the Future of Education* (Wells & Claxton, 2002) and *Vygotsky and Culture of Education: Sociocultural Theory and Practice in the 21st Century* (Ageev, Gindis, Kozulin, & Miller, in press)—add to the already considerable corpus of research that uses Vygotsky's theory to understand educational psychology and educational reform. As mentioned previously, Vygotsky played a significant role in shaping education in the Soviet Union following the 1917 revolution. One of the great challenges for educators then, as now, was providing appropriate education for students with special needs. These students had been severely neglected under the czar: "A tragic product of the years of war, revolution, civil strife, and famine was the creation of an army of homeless, orphaned, vagrant, abandoned, and neglected children—about seven million of them by 1921–1922" (Knox & Stevens, 1993, p. 3). Vygotsky's approach to educating these children speaks across time to educators today who are developing inclusive education environments that serve the needs of special learners and all students. His views on the social construction of concepts of "disability," "defect" (which was the common term in Vygotsky's time), or "exceptionality" also speak to us across the decades.

Special Needs

A child whose development is impeded by a defect is not simply a child less developed that his peers; rather he has developed differently . . . a child in each stage of his development in each of his phases, represents a qualitative uniqueness, i.e., a specific organic and psychological structure; in precisely the same way a handicapped child represents a qualitatively different, unique type of development. (Vygotsky, 1993, p. 30)

In a special issue of *Educational Psychologist* devoted to Vygotsky's ideas, Boris Gindis (1995) described the emphasis that Vygotsky placed on the variety of psychological tools that had been developed to help students with special needs: "Vygotsky pointed out that our civilization has already developed different means (e.g., Braille system, sign language, lipreading, finger spelling, etc.) to accommodate a handicapped child's unique way of acculturation through acquiring various symbol systems" (p. 79). Signs, as used by the deaf, constitute a genuine language with a complex, ever-expanding lexicon capable of generating an infinite number of propositions. These signs, which are embedded in the rich culture of the deaf and represent abstract symbols, may appear pantomimic, but their meaning cannot be guessed by nonsigners. The "hypervisual cognitive style" (Sacks, 1989, p. 74) of the deaf, with a reliance on visual thought patterns, is of interest in this regard: "The whole scene is set up; you can see where everyone or everything is; it is all visualized with a detail that would be rare for the hearing" (p. 75). Sign language is but one example of the multiplicity of semiotic means in the representation and transformation of experience. The diversity of the semiotic means and psychological tools is of special interest to educators who work in multicultural settings and with children who have special needs.

In two special issues of *Remedial and Special Education* devoted to sociocultural theory (Torres-Velásquez, 1999, 2000), educators and researchers reported on studies using Vygotsky's theory as a framework and addressed two important considerations: the ways in which the needs of children are determined and the ways in which their performance is measured and assessed. Linguistic and cultural diversity among students with special needs adds a layer of complexity to this process:

The transitory nature of our populations and the existence of public laws mandating that all children be treated equally in schools have increased the diversity of learners in classrooms. Children gifted, average, and those with special needs are learning together in the same classroom. Understanding and recognizing who these children are is a prerequisite for guiding their

> ability to learn. Understanding the importance of students' perceptions of themselves as learners, and the effect of these perceptions on self-esteem is paramount. Since it is the obligation of all teachers to find a way for all children to learn, knowing how each child processes information is essential. (Glazer, 1998, p. 37)

The challenge is to develop assessment that is authentic and that is sensitive to the diversity in the ways students process and communicate information.

Assessment and Standardized Testing

Assessment is an integral part of the teaching/learning context and is becoming even more so with the emphasis from politicians and school administrators on the results of standardized testing. There are broad implications for pedagogy resulting from the push to make such testing more pervasive. Some of Vygotsky's earliest work critiqued the standardized intelligence tests being developed at that time:

> Vygotsky is rightfully considered to be the "founding father" of what is now known as "dynamic assessment" (Minick, 1987; Guthke & Wingenfeld, 1992; Lidz, 1995). In the early 1930s, at the height of the enthusiasm for IQ testing, Vygotsky was one of the first (if not the only one in his time) who defined IQ tests' limitations based on his understanding of disability as a process, not a static condition, and on his understanding of development as a dialectical process of mastering cultural means. He noted that standardized IQ tests inappropriately equalize the natural and cultural processes, and therefore are unable to make the differentiation of impaired functioning that can be due to cultural deprivation or can be the result of organic damage. (Gindis, 1999, p. 337)

One of the most important considerations of dynamic assessment is making sure that there is not a bias against linguistically and culturally diverse students. Sybil Kline (2001), through the Center for Research on Education, Diversity, and Excellence, produced a report on the development of alternative assessment for such students. The Opportunity Model is based on cultural-historical theory and the research of Vygotsky and Luria. This nondiscriminatory approach to special education evaluation has as key features "a socioculturally-based alternative to the IQ test, and the introduction of the concepts of 'teachability,' 'opportunity niche,' and 'cognitive nurturance' into the special education eligibility and intervention process" (Kline, 2001, ¶ 3).

Sociocultural critics also argue that because knowledge construction is social, "a focus on individual achievement actually distorts what individuals can do" (Wineberg, 1997). There is reluctance among those researchers who rely on traditional psychometrics to try to assess the role of collaboration, as they view even minimal collaboration as a threat:

> If, on the other hand, we view teaching through the lens of Vygotsky and other sociocultural theorists, we will see collaboration in a different light. Instead of worrying that collaboration wreaks havoc on the meaning of the overall score, we may view the lack of collaboration as a more serious defect than its inclusion. (Wineburg, 1997, A different way section, ¶ 1)

Collaboration in Education

In describing Vygotsky's work, we have highlighted his emphasis on the collaboration involved in the coconstruction of thinking, meaning, and consciousness. Vygotsky described a synthesis that evolved from the sustained dynamic of individuals engaged in symbolic behavior both with other humans, present and past, and with material and nonmaterial culture captured in books, artifacts, and living memory. He achieved some of his most important insights by cultivating intellectual interdependence with his immediate collaborators, and with other psychologists whose writings he studied and translated into Russian (including Piaget, Freud, Claparede, Montessori, and Kohler). In this collaborative context sociocultural theory was born (John-Steiner, 2000).

The benefits of collaboration are numerous; they include the construction of novel solutions to demanding issues and questions. Through joint engagement and activity, participants in collaboration are able to lighten the burdens of their own past socialization while they coconstruct their new approaches. A fine example of this aspect of collaboration is provided by Rogoff, Goodman-Turkanis, and Bartlett (2001) in the students', returning student-tutors', teachers', and parents' descriptions of an innovative educational community. The multiple voices document participatory learning in the building of a democratic collaborative and also underscore the importance of dialogue in education.

Vygotsky's focus on dialogue was shared by his contemporaries Bakhtin and Voloshinov, and it remains a central focus for sociocultural theorists today (Wells, 1999). Dialogue and the social nature of learning guided the work of Paulo Freire (1970) and provided the theoretical foundation for collaborative/cooperative learning:

> The critical role of dialogue, highlighted by both Freire and Vygotsky, can be put into effect by the conscious and productive reliance upon groups in which learners confront and work

> through—orally and in writing—issues of significance to their lives. (Elsasser & John-Steiner, 1977, p. 368)

It is only when participants are able to confront and negotiate their differences and, if necessary, to modify the patterns of their relationship that learning communities can be sustained. As Rogoff and her collaborators concluded: "Conflicts and their resolutions provide constant opportunities for learning and growth, but sometimes the learning is not easy" (2001, p. 239). In some cases, these conversations become so difficult that a facilitator from outside of the group is asked to assist. In spite of these difficulties, the experience of multiple perspectives in a dynamic context provides particularly rich opportunities for cognitive and emotional growth for learners of all ages.

Collaborative efforts to bring about transformative change require a prolonged period of committed activity. Issues of time, efficiency, sustained exchanges, and conflict resolution face schools that are building learning communities, but most schools are reluctant to undertake these issues. For some participants in school reform such a task is too time-consuming, and the results appear too slowly. When participants leave working, egalitarian communities, their abandonment highlights the ever-present tensions between negotiation and bureaucratic rule. Successful collaboration requires the careful cultivation of trust and dignified interdependence, which contrasts with a neat, efficient division of labor. These issues highlight the important role that affective factors play in the building of such learning communities and in creating safe, engaging, and effective teaching/learning contexts.

CONCLUSION

Faced with myriad concrete problems, teachers frequently question the need for abstract theories. Vygotsky suggested that practice challenges us to develop theory, as do the experiences of those confronted with daily problems needing urgent solutions. Practice inspires theory and is its ultimate test: "Practice pervades the deepest foundations of the scientific operation and reforms it from beginning to end. Practice sets the tasks and serves as the supreme judge of theory, as its truth criterion. It dictates how to construct the concepts and how to formulate the laws" (Vygotsky, 1997b, p. 305). To meet the challenges facing educators today, we need the influence of both theory and practice to answer the urgent questions facing us at the beginning of this new century: How should we deal with the increasing linguistic and cultural diversity of our students? How do we document learning-based gains in our classrooms? How do we balance skills, knowledge, and creativity? How do teachers overcome their isolation? The theory we have presented here does not answer all these questions, but it provides tools for thinking about these questions, which differ from the ones posed to us in our schooling. We were taught to look for ways to simulate learning and memory tasks in controlled situations; in contrast, sociocultural researchers study these tasks in the classroom as they develop. Their observations are complex and hard to summarize. They point to funds of knowledge that children bring to the classroom, to resistance among learners who are marginalized, to children's development of concepts that reflect their families and their own daily experiences, to the importance of dialogue between learners, teachers, and texts, and to the multiplicity of semiotic means and the diversity of teaching/learning contexts both within and outside of schools. Sociocultural scholars and educators view school as a context and site for collaborative inquiry, which requires the practice of mutual respect and productive interdependence.

We have emphasized an approach that looks at human activities from the perspective of functional systems: the organization and reorganization of learners' problem-solving strategies, which integrate the social and individual experiences of learners with the culturally shaped artifacts available in their societies. In this chapter we examined *meaning making* in the acquisition of first and additional languages through a functional-systems lens.

The concept of meaning making, which was a central focus for Vygotsky at the end of his life, is one that we place at the center of discussions about educational reform. The ways in which we communicate through culturally developed means need to be valued in schools. By valuing all of the ways in which children represent and appropriate knowledge, we can begin to meet the challenges that face educational psychology in the twenty-first century: "The success of educational experiences depends on methods that foster cultural development, methods that have as a starting point the developmental processes of students and their accumulated knowledge, the developmental milieu, social practices, and the political meaning of education itself" (Lima, 1998, p. 103).

We began this chapter with a reference to the National Research Council's project on teaching and learning, and we conclude it with a quote from the book on that project that summarizes the challenge that lies ahead for educational reform:

> There are great cultural variations in the ways in which adults and children communicate, and there are wide individual differences in communications styles within any cultural community. All cultural variations provide strong supports for children's

development. However, some variations are more likely than others to encourage development of the specific kinds of knowledge and interaction styles that are expected in typical U.S. school environments. It is extremely important for educators—and parents—to take these differences into account. (NRC, 1999, pp. 96–97)

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