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An Investigation of the Ways Special Educators' Understand  
Learning and Teaching

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Steven Neil Toleikis  
B.Sc., Temple University, 1972  
Dip.Ed., University of Victoria, 1977

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We accept this thesis as conforming  
to the required standard

Dr. R. Tinney, Supervisor (Department of Psychological Foundations)

Dr. B. Timmons, Departmental Member (Department of  
Psychological Foundations)

Dr. A. Oberg, Outside Member (Department of Curriculum Studies)

Dr. B. Hanley, External Examiner (Department of Arts)

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University of Victoria

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Supervisor: Dr. R. Tinney

### ABSTRACT

Founded on the hypotheses that understanding informs acting, that teachers play an active role in students' learning, that teachers construct understanding from their personal knowledge and experience, and that language both reflects and constructs this sensemaking process, this study considered the content of teachers' understanding, and the ways in which that understanding was expressed and constructed. A little researched aspect of teachers' understanding was investigated: special educators' understanding of learning and teaching.

The research findings demonstrated that aspects of special education teachers' understanding could be identified by examining the teachers' spoken and written thoughts and experiences about learning and teaching. The evidence indicated that understanding can be conceived of as having a contour, a framework and a foundation. Both framework and foundation were formed from the thematic groups and nested metaphors or images of each teacher. The configuration of this construction appeared to be determined by relationships between branch metaphors, core metaphors, themes, and the borders of each teacher's explicit or implicit awareness. Though some commonalities among the

teachers were demonstrated, there was evidence that each teacher constructed his or her understanding individually, rather than inheriting historical approaches to education such as the psychometric, developmental, behavioral, or information processing perspectives. The implications of these findings to practice and research were examined.

Examiners:

[REDACTED]  
Dr. R. Tinney, Supervisor (Department of Psychological Foundations)

[REDACTED]  
Dr. B. Timmons, Departmental Member (Department of Psychological Foundations)

[REDACTED]  
Dr. A. Oberg, Outside Member (Department of Curriculum Studies)

[REDACTED]  
Dr. B. Hanley, External Examiner (Department of Arts)

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How do people learn? Over the years, theorists and researchers have approached this question from a variety of perspectives. Each approach has created a different conception of learning, and has offered different ideas about teaching practice (Shuell, 1986). However, each approach can offer only a partial view of learning and teaching. Learning and teaching are complicated experiences (Fischer, 1980; Grimmett, 1982; Thompson, 1982; Ornstein, 1985), and ultimately all experience lies beyond complete representation or comprehension (Polanyi, 1962; Palmer, 1969; Rasmussen, 1974; Wittrock, 1981; Thomas, 1982; Travers, 1982; Hammersley & Atkinson, 1983; Lampert, 1984; Simpson & Galbo, 1986). Any conception of learning actually represents an understanding about the experience of learning. The question "How do people learn?" demands rephrasing. It is more pertinent to ask: "What do people understand about learning?" and "What are the ways in which people form that understanding?"

The experience of teachers provides one arena for investigating these questions, for learning and teaching are intimately related activities. Presumably historical conceptions of learning and teaching have influenced the way in which today's teachers work and think. Because the play of learning is dynamic and context-dependent, though, educational research and theories that do not actively involve the teacher--a primary actor in the educational drama--may be mere scenery and backdrops. Theories of learning and teaching that are drawn from teachers' practice (Polkinghorne, 1986; Hunt, 1987; Miedema, 1987; Clandinin & Connelly, 1988),

allowing teachers an active role in generating research results (Borko, Shavelson, & Stern, 1981; Elbaz, 1983; Shavelson, 1983; Turner, 1987; Jardine & Grahame, 1988), might reasonably be thought to make educational research more meaningful to teachers. A teacher's understanding of learning and teaching interacts with the way in which that teacher perceives, interprets, and acts during any given teaching moment (Larson, 1975; Kornblau & Keogh, 1980; Hammersley & Atkinson, 1983; Rohrkemper & Brophy, 1983; Coenen, 1986; Taylor, 1987). Research that engages the teacher in the exploration of his or her understanding of the educational process should prove especially meaningful to the teacher involved, and provide an important perspective on the nature of understanding about learning and teaching.

Though much effort has gone into investigating aspects of teachers' attitude, practice, decision making, problem solving and thinking-in-action (Joyce, 1978-79; Peterson & Clark, 1978; Kornblau & Keogh, 1980; Prawat, 1980; Borko, Shavelson, & Stern, 1981; Elbaz, 1983; Whitten & Westling, 1985; Bransford, Sherwood, Vye, & Reiser, 1986; Clark & Lampert, 1986; Dreyfus & Dreyfus, 1986; Heppner & Krauskopf, 1987; Ysseldyke, Thurlow, & Christenson, 1987), there has been little research into teachers' understanding of learning and teaching. Even fewer researchers have explored the topography of special education teachers' understanding. Every interaction with a student has the potential to become an opportunity for a teacher to create, or to reflect upon, his or her understanding of learning and teaching. Teachers of

students with challenging needs seem to be in a particularly strong position with regard to the creation of understanding. Students with mental disabilities, for example, present a plethora of unique and often complex learning needs (Campione, Brown, & Ferrara, 1982; Haywood, Meyers, & Switzky, 1982; Brooks & McCauley, 1984), which their teachers may find very challenging (Eggen & Kauchak, 1988). To teach successfully, special educators must find ways to make sense of experiences that can be confusing, ambiguous, or upsetting. Given this special complexity, special education teachers' ways of understanding learning and teaching becomes a critical topic for research.

The broad goals of the present study were to identify, describe, and examine special education teachers' understanding of learning and teaching. Conceived to be exploratory in nature, the investigation was founded on the supposition that special education teachers' reported experiences and thoughts could lead to discoveries about those teachers' understanding. It was devised to seek evidence of four historical perspectives on learning and teaching. It proposed that teachers' ways of understanding exist at once on explicit and implicit levels; it also seemed possible that every teacher would construct a personal framework for his or her understanding. An investigation was undertaken to determine both what a special educator understands about learning and teaching, and the way in which he or she constructs that understanding. It was anticipated that the investigation would create a picture of the way in which special education teachers construct their

understanding, and that this outline could serve as a map for future research.

### A Background to the Present Study

Before investigating special education teachers' understanding of learning and teaching, it was necessary to consider some of the major forces that may have shaped that understanding. The distinctive images and ideas about learning of the four historical perspectives considered have had a strong effect on special education as it is practiced today. These contributions will be surveyed here in order to provide a background to the present study.

Modern efforts to understand learning were begun by scientists investigating concepts of intelligence (Landry & Robichaud, 1980). These researchers believed intelligence and learning to be attributes, and posited a link between them. The first two major outlooks that will be discussed, the psychometric perspective of Alfred Binet, and the developmental perspective of Jean Piaget, adopted this approach. Behaviorism and information processing, two other major perspectives toward learning and teaching, will also be discussed in the following sections.

## Learning as an Entity:

### The Psychometric Perspective

Alfred Binet formulated a conception of intelligence and learning based on early twentieth century belief that individual ability could be best understood by comparison with a group (Cravens, 1987). He conceived intelligence to be a singular, measurable attribute with a biologically limited capacity, and saw learning to be an ability limited by intelligence. Working with these conceptions, he devised a psychometric method for the assessment of intelligence. Tasks from the academic domain were used for the assessment. Binet's psychometric assessment procedure eventually evolved, through the work of Lewis Terman and his associates, into the "IQ" test (Campione, Brown, & Bryant, 1985; Lerner, 1986).

The psychometric approach has widely influenced educational practice. Educators have categorized and placed students, and developed educational programs, using tools designed from a psychometric viewpoint. More recently, the psychometric approach has faced a number of criticisms. Educators using IQ scores had come to see the term "intelligence" as synonymous with the ability to perform well in "schoollike and testlike situations" (Campione, Brown, & Ferrara, 1982, p. 392). However, it was found that though IQ scores may be helpful in setting general expectations for performance in school environments, "these measures fail to provide explanations of the cognitive structures underlying a particular IQ score" (Dougherty & Moran, 1983, p. 260). In addition, psychometric testing did not seem to generate the

information necessary for the creation of effective educational programs (Wagner & Sternberg, 1984).

The psychometric approach has also influenced special education practice. For example, IQ scores were used for decades to categorize and place individuals with mental disabilities. Research findings from the last twenty years, however, have indicated that measures of personality, motivation, and modes of thinking are more relevant to the assessment of these individuals than are measures of academic ability (Haywood, Meyers, & Switzky, 1982). Unfortunately, Binet's narrow definition of intelligence, and the resulting widespread acceptance of the use of IQ scores to categorize individuals, has reinforced a disturbing tendency in our society to separate people with apparent differences by means of labels that are at best ambiguous, and dehumanizing at worst (Gartner & Lipsky, 1987).

Consideration of the impact of Binet's perspective on the development of special education is instructive in its' capacity to illustrate the power an understanding of intelligence and learning can have on teaching practice. A few examples will serve to make this point. Underlying the psychometric approach is the belief that individuals are best identified by means of comparison with a group norm (Snow, 1982). This belief supports the tendency to label people, and has led to a move to segregate students with special learning needs according to the results of their IQ tests. The perception that IQ scores are a measure of a larger concept called "intelligence" led some special educators to attempt to improve

students' intelligence by improving their performance on academic activities, and to their confusion of normed IQ scores with students' total abilities. This perception of IQ scores has also led to the development of curricula for students with mental disabilities that were either too academically oriented or that abandoned academic activities altogether on the assumption that IQ tests predicted school achievement, and that students with very low scores had little potential for success in normal school environments. Finally, Binet's belief that intelligence was an expression of biological capacity led educators who adopted it into a hopeless position, especially with regard to students with mental disabilities, for how much impact could education have upon pre-determined biological factors often so dramatically different from a norm?

Clearly, the psychometric school of thought has had a strong effect upon both regular and special education. The power of this approach to influence modern educational practice came about not only through sometimes contentious theoretical arguments and research findings, but also through the particular understanding of learning and intelligence embedded within the perspective. This understanding is predicated on the idea that intelligence and learning are objects that can be defined, measured, and sorted, on the image of intelligence as a container or reservoir (Lakoff & Johnson, 1980), and on the conception of performance on academic tasks as a measure of learning and intelligence. These compelling images of intelligence and learning are the metaphoric legacies of Binet's work. It is a measure of the evocative strength of his

understanding that, to some degree, Binet's perceptions continue to exist in contemporary educational situations.

### Learning as a Mobile Entity:

#### The Developmental Perspective

The developmental perspective was developed in the early twenties from Piaget's observations and interpretations of the behavior of young children at play (Hayes & Hayes, 1987). From his vantage point as a biologist, Piaget looked at intelligence and learning as biologically functional activities. He believed that people used mental activities such as learning and intelligence to adapt to and to survive in their environment (Lerner, 1986). He also viewed intelligence and cognition as equivalent concepts (Siegler, 1986).

Piaget focused his interest on the cognitive development of children (Ginsburg & Opper, 1969; Piaget, 1973). He described a process of cognitive development that moved along in stages, following a single, linear, and universal route. Considering a person as a biological organism, he recognized that physical and social environment, maturation, and the individual's own self-regulatory processes, could determine the rate of cognitive development. He saw the nature and order of these sequences as invariant, and as a feature of biological maturation. Although Piaget's theory was largely developmental, much subsequent research has attempted to determine whether education can accelerate movement through the stages that Piaget had identified. Research findings have indicated that Piagetian stages could not be taught (Dougherty & Moran,

1983), though the issue remains inconclusive (Wagner & Sternberg, 1984).

There are similarities between the views of Binet and Piaget. Like Binet, Piaget related learning to intelligence, describing both as objects that could be defined and measured. Piaget also believed that cognitive structure and capacity, rather than human performance, had the greater power to shape intelligence. However, there were also significant differences between these two men's ideas. Binet believed that biology played a formative role in shaping intelligence. While Piaget accepted this, he also considered the functional role that biology plays in developing intelligence. Conceiving learning and intelligence within the broader framework of biological function led Piaget to recognize that environment and individuality both play parts in the development of the human animal. It also led him to believe that observing maturational growth, rather than measuring psychometric norms, was a better way to understand the ways in which a person thinks. In effect, by including maturation and biological function in his paradigm, Piaget placed the idea of learning as entity into a temporal, and somewhat social, context. An image of learning different from that of Binet was formed, through which learning could be seen as a thing that moved over time, something that could be delayed, jump started, or accelerated (Ginsberg & Oppen, 1969; Siegler, 1986; Hayes & Hayes, 1987). Thus, Piaget's image of intelligence and learning as biologically functional activities led him to create a somewhat more

fluid picture of learning than Binet's concept of learning and intelligence as static entities.

Like the psychometric approach, Piaget's ideas have significantly influenced modern educational thinking. Many ideas expressed by educators today are drawn from Piaget's image of learning as a biologically functional entity that advances over time. The ideas that children need to participate in experiential learning, that motivation plays a part in the learning process, that teaching should be based on real experience, and that children learn best when provided with options for achieving a goal, are all related to maturational and biological aspects of Piaget's paradigm (Ginsberg & Opper, 1969; Brooks, Fusco, & Grennon, 1983). However, as with the psychometric perspective, there are some concerns about the effectiveness of the developmental outlook's translation from theory into educational practice. Wagner & Sternberg (1984) summarized four general issues:

1. The theory is of competence rather than of performance. . . .
2. The long time covered by each period limits the usefulness of the periods for sequencing instruction. . . .
3. The theory emphasizes maturation rather than learning. . . .
4. The theory lacks sufficient empirical support to serve, at present, as a basis for educational intervention (p. 198).

As with the psychometric perspective, Piaget's understanding of learning has influenced the practice of special educators. Some teachers, for example, have attempted to create educational programs for students with mental disabilities based on Piaget's

ideas (Hayes & Hayes, 1987). Using his descriptions, they have tried to locate a student within one of the four identified cognitive stages. Anticipating that practice would speed the student through the stage, they have taught the activities described for that stage (Kahn, 1977; Dougherty & Moran, 1983). Another example of the influence of the Piagetian view of learning upon educational practice is a longstanding preschool program named, significantly, "Project Head Start". Created in the United States, it uses Piagetian and other activities to "advance" the learning of disadvantaged children (Zigler & Finn-Stevenson, 1988). Educators' interpretations of the Piagetian perspective have similarly influenced the development of special education curricula, instructional techniques, and programs.

A number of issues arise from the use of this approach to educate people with mental disabilities. First, as stated earlier, it has not been established that education accelerates the movement of any child through Piaget's developmental stages, let alone a child with mental disabilities. Nor has it been shown that matching a person with mental disabilities to a certain Piagetian stage would mean that the individual is necessarily at that stage (Weisz & Yeates, 1981). As well, educators and theorists have concern about teaching to the activities that Piaget described. Some have argued that the activities were intended only as developmental signposts, while others felt that it is not appropriate for a mature individual with mental disabilities to practice activities suited to children (Hayes & Hayes, 1987). Finally, as Piaget's model primarily concerns cognitive development, special educators who use this approach tend to

emphasize teaching to this particular aspect of human potential. Especially for students with mental disabilities it is more appropriate for an educator to teach to a student's strengths rather than his or her weaknesses.

It is necessary to consider a pedagogical "cousin" to the developmental approach that has often been used in special education. This related approach is the building of educational programs from items selected from lists of developmental goals. As the student practices a skill successfully, the student's program moves, goal by goal, up a developmental ladder. This approach seems to be built on assumptions about learning borrowed from Piaget's paradigm. It too frames learning in locomotive terms, but it is portrayed as a product built over time, rather than as the biological act of a maturing organism. Educational programs designed from this perspective take an especially rigid shape. Students are expected to perform the activities for each developmental stage regardless of students' chronological age, and without consideration of their interests or life contexts.

The developmental point of view has greatly influenced the understanding and practice of education in this century. From Piaget's consideration of the biological function of learning and intelligence came his image of intelligence and learning as mobile entities. Piagetians have viewed cognitive development as a thing that progresses in stages, and learning as advancing over time. Educators who speak of learning as an activity that can be held back, accelerated, or delayed, or as a product that builds over time, are

using metaphors drawn from Piaget's understanding of learning (Lakoff & Johnson, 1980). Educators that recognize the importance of maturational processes and the environment to the learner, or believe that thinking is synonymous with intelligence, are also evoking Piaget's understanding of intelligence and learning. Consideration of the Piagetian perspective has provided another example of the influence a particular understanding of learning can have on teaching practice.

#### Learning as a Product of Mechanical Forces:

##### The Behaviorist Perspective

For over fifty years, the behaviorist view has been compelling for many scientists. It has also made a deep impression on modern understanding of teaching and learning. The behaviorist school of thought takes a stance toward the idea of learning that is very different from the psychometric and developmental approaches. Considerations of intelligence do not enter the picture. Early behaviorists contended that there was no empirical support for the idea of inner human processes such as intelligence or learning, and looked instead at human performance. They argued that only directly observable behaviors of the organism were worthy of scientific investigation (Bower & Hilgard, 1981). Many modern behaviorists have accepted the concept of inner human processes, but even so, they have continued to assert that consideration of such unobservable concepts is empirically unsound (Eggen & Kauchak, 1988).

Rather than considering biological or maturational factors, behaviorists conceptualize the environment alone as impacting on the individual (Skinner, 1974; Bijou & Baer, 1977). Behavioral scientists, for example, argue that what others call "learning" is merely evidence of behavioral responses elicited from the organism by environmental stimuli. Like psychometricians and developmentalists, behaviorists objectify learning, but the learner's behavior, rather than learning itself, becomes the object (Franks, 1987). They similarly objectify the environment, seeing it as acting on the learner. Behaviorists identify this relationship as a stimulus-response mechanism, and see it as the basic building block of all learning; indeed, of all activity by organisms (Lerner, 1986). Behaviorism, then, focuses not on defining learning or on considering its function, but on describing the way in which the objectified learner appeared as things were done to it.

This way of understanding learning has influenced educators as strongly as the psychometric and developmental outlooks. Educational researchers with a behaviorist view have dedicated enormous effort to analyzing behavioral elements of a teacher's performance, attempting to identify effective teaching behaviors. Curriculum designers with this perspective on learning have tried, using task analysis, to reduce learning goals to their component parts. They have offered instructional guides that break a multitude of activities into behaviorally specific goals and objectives. Some educators with this view have conceptualized instruction as stimuli that can change learner behavior, and have designed programmed

instruction packages to achieve that change. Teachers adapting this perspective see themselves as managers of student behavior. They assume that to change a student's behavior is to change the student him or herself. If a student seems not to be learning, the behaviorist perspective sees the behavior of the learner, or of the teacher, as dysfunctional. Specialists are called on to "repair" the student or teacher, or the student is placed in a class taught by behavior management teachers. Essentially, educators using the behaviorist perspective view the individual as a biological machine manipulated by external forces, and perceive learning as the product of mechanics (Lerner, 1986).

Many special education teachers have found the behaviorist metaphor for learning especially attractive (McCarver & Cavalier, 1983), perhaps because it complements the psychometric approach in viewing learning as an object. The psychometric approach puts a label on the student-object, often serving to place the student in a special program. The behaviorist paradigm provides tools for modifying the student-object once he or she has been placed. Perhaps the behaviorist approach appeals to special education teachers largely because they sometimes find it difficult to understand a student with mental disabilities. Looking at the student from a behaviorist perspective, a teacher need not understand the student in order to teach. Instead, a teacher can approach a challenging student by attempting to objectify the student's behavior: by observing the student's behavior, supposedly without interpretation, and then responding with the necessary

instructional stimuli for reducing or increasing the frequency of the desired behavior (Hayes & Hayes, 1987). Unlike the two earlier paradigms, this perspective's appeal was the ability to translate easily it into direct practice, and its apparent success in training students with special learning needs (Landry & Robichaud, 1980; Haywood, Meyers, & Switzky, 1982). In any case, the behaviorist understanding of learning has contributed much to special education practice. Some of the other contributions of this outlook are: the promotion of a systematic approach to educational goal setting and planning, the development of a simple method for recording change in the learner, the provision of specific ways to change behaviors, and the recognition of the instructor's influence on the learning process (Bower & Hilgard, 1981).

Despite its influence, the behaviorist model is not without flaws. Individuals with mental disabilities often have difficulty generalizing activities learned in one setting to other settings (Blackman & Lin, 1984; Franks, 1987). The behaviorist outlook, with its tendency to break down activities into discrete behavioral units, and to practice these units in isolation, may lead to a fragmented perception of the activity. As a result, the functional meaning and the motivation inherent in performing a task may become lost.

Like the "cousin" to the psychometric approach mentioned earlier, a behaviorist understanding of learning can lead teachers to see learning as a product that can be built or constructed. Teachers may anticipate that after the individual learns one isolated behavioral component the next can be added to it, until the complete activity

generalizes to real settings. However, such assumptions of generalization remain largely unsupported. Research findings have demonstrated that behavior modification practices do not promote long term generalization of skills (Whitman, Scibak, & Reid, 1983; Franks, 1987): but they have shown that learning best occurs within a natural context (Landry & Robichaud, 1980; Wagner & Sternberg, 1984; Gartner & Lipsky, 1987). Finally, during the past two decades the fundamental tenet of behaviorism--that only observable behaviors are worthy of study--has been strongly contested (Misgeld, 1975; Shavelson & Stern, 1981; Bruner, 1985; Patton, 1987). Neuropsychologists, for example, have accepted the idea of inner mental processes, finding that what they term "brain activity" actually does "influence attention, perception, motivation, and the use of memory in the construction of meaning from experience" (Wittrock, 1981, p. 12).

Educators who speak about learning including mechanistic images and applying mechanistic concepts are all using behaviorist metaphors for learning. Though the behaviorist image of learning as a product of mechanical forces continues to be an evocative one for many special education teachers, it is doubtful that this point of view will bring any new insight to the educational field (Franks, 1987). It is ironic that an approach that focuses on behavior to the exclusion of emotive or cognitive considerations has been so instrumental in generating metaphors for special educators' conception of learning and teaching.

### Learning as a Procedural System:

#### The Information Processing Perspective

Entering the educational scene in the seventies, cognitive psychology has offered yet another approach to learning (Das, Jarman, & Kirby, 1975). Cognitive psychologists consider activities such as perception, memory, thinking, and problem solving, that behaviorists ignore (Shuell, 1986). Cognitive psychologists view intelligence differently from practitioners of the three other approaches presented here. They objectify intelligence as the purposeful use of information to achieve a goal (Dash, 1979), painting a picture of intelligence that foregrounds ideas about performance over concepts of capacity.

Information processing researchers describe information processing as a system that deals with the ways in which sensory input is received, transposed, stored, retrieved and applied (Swanson, 1987). Educational researchers with this perspective, a branch of cognitive psychology, see information processing, rather than mental structure, biological function, or behavior, as the major influence on thinking and learning (Ericsson & Simon, 1980). They turn away from attempts to define learning, to identify its capacity or function, or to describe, and toward attempts to determine the processes by which it works (Wittrock, 1978; Joyce, 1978-79; Weiss, Weisz, & Bromfield, 1986). This approach, the last to be considered here, is currently perceived as "the mainstream of thinking in both psychology and education" (Shuell, 1986, p. 414).

As the field of information processing is relatively young, a consensus has not yet formed concerning its paradigms. Swanson (1987) has noted that most theories of information processing hypothesize three major components: a structural component, (e.g., sensory stages and short term memory) defining boundaries within which information can be presented, a strategy component, describing the operation of the structural components, and an executive process, overseeing the various control strategies. Scientists looking at people from an information processing perspective have tended to explore a common group of subjects and questions. Sternberg (1985) has identified these as:

1.) What are the mental processes that constitute intelligent performance on various tasks? 2.) How rapidly and accurately are these processes performed? 3.) Into what strategies for task performance do these mental processes combine? 4.) Upon what forms of mental representation do these processes and strategies act? 5.) What is the knowledge base that is organized into these forms of representation, and how is it affected by the processes, strategies, and representations that individuals use? (pp. 1-2).

Information processing paradigms are typically complex. For reasons of empirical simplicity, most investigators researching information processing have analyzed subcomponents, looking at elements such as short term memory, sensory input modes, or information storage structures (Siegler, 1986). An information processing perspective has also been used to look at the ways in

which teachers make decisions (Borko, Shavelson, & Stern, 1981; Ysseldyke, Thurlow, & Christenson, 1987), solve problems (Bransford, Sherwood, Vye, & Reiser, 1986; Dreyfus & Dreyfus, 1986; Heppner & Krauskopf, 1987), and interact with students (Thompson, 1982; Levine & Mann, 1985; Repp, Felce, & deKock, 1987). Generally, information processing researchers interested in people with mental disabilities have attempted to delineate the information processing capabilities of people with mental disabilities, and to identify differences and similarities in these capabilities between people with and without mental disabilities. In order to gain an understanding of the information processing view of individuals with mental disabilities, a summary of this research follows.

Research findings generated from this perspective have tentatively indicated that individuals with mental disabilities function comparably to individuals without such disabilities at tasks that require automatic memory and little change in knowledge (Campione, Brown, & Ferrara, 1982). Researchers testing the incidental learning of children with mental disabilities and their mental age peers have also found that both groups perform comparably. Generally, though, research findings have indicated that, compared to individuals without mental disabilities, people with mental disabilities are "deficient" in a variety of information processing tasks (Weiss, Weisz, & Bromfield, 1986). This population seems to have deficits in attending to tasks that require information selection or inhibition (Brooks & McCauley, 1984), in

certain aspects of short term memory and discrimination tasks (Campione, Brown, & Bryant, 1985), in the speed at which they process information (Merrill & Mar, 1987), and in metacognition, the ability to think about thinking (Landry & Robichaud, 1980; Wagner & Sternberg, 1984). Certain information processing researchers have even posited that some people with mental disabilities exhibit "multiple deficiencies" (Weiss, Weisz, & Bromfield, 1986, p. 173).

Reviewing research findings on the learning of persons with the most severe and profound mental disabilities, Haywood, Meyers, and Switzky (1982) have concluded "that learning is both possible and actually common in such persons" (p. 314-315). Given the list of "deficits" earlier identified, a special educator adapting an information processing outlook might find this conclusion difficult to believe. The information processing approach seems to lead to the conceptual decomposition of the individual into discrete elements of information processing, and to the judgement of a system by its efficient operation.

Attempts to apply information processing paradigms to the education of individuals with mental disabilities have tended to follow the decomposition and analysis strategies used by information processing empirists. Feuerstein's Instrumental Enrichment Program is an example of this approach, proposing a detailed system for identifying impairments in the ways information is processed, targeting smaller components of that process, and then practising them (Feuerstein, 1979; Wagner & Sternberg, 1984).

The success of this approach with people who have difficulty generalizing activities out of the context of the actual event is questionable. Other researchers have suggested that training students in metacognitive skills might prove useful (Wittrock, 1978), but given the complex nature of these skills, this approach will likely prove fruitless for people with mental disabilities (Haywood, Meyers, & Switzky, 1982).

The information processing approach does offer an understanding of an individual with mental disabilities. One essential concept of this understanding is the idea of "processing deficits." Implicit in this idea is the notion of information processing as a mechanical system or program made of components that are either operative or deficient. Indeed, the idea of information processing originated with people who saw computers as models for what goes on in the human brain (Bower & Hilgard, 1981). Memory storage units, information input and output routines, processing rates, system control features and other concepts that appeared in information processing paradigms are all ideas originating from computer technology. In this regard, the information processing perspective shares some ground with behaviorism: whether defining it as a behavior or a procedural operation, both approaches seemed to objectify learning, and to see human functioning in a mechanical context. Where behaviorism posits mechanical forces working to modify behavioral responses, information processing portrays mechanical procedures or processes working to manipulate incoming and outgoing data.

Understanding learning as a procedure or strategy that operates to use information purposefully has the potential to inspire special educators to look for, and remedy, a student's inefficient learning strategies, and re-train them. Indeed, "cognitive strategies instruction" has been recommended for individuals with learning disabilities (Sheinker, Sheinker, & Stevens, 1984). Feuerstein's approach and certain models of teacher decision making and problem solving (Ysseldyke, Thurlow, & Christenson, 1987) are examples of approaches created from a conception of learning as a programmable operation.

Despite its youth, the information processing perspective has proven a rich source for research. To date, however, most research findings that incorporate an information processing perspective are more descriptive than prescriptive: little from this perspective can as yet contribute to the education of people with mental disabilities. However, as with each of the perspectives considered above, this outlook has inspired people to see learning and teaching from its unique perspective, and to create new educational approaches. Educators who speak about learning as a process of input and output, or about the strategy of learning, striving to make teaching and learning efficient operations, describing people with mental disabilities as functioning deficiently, or making analogies between computers and people are creating these ideas from an understanding of learning and teaching that derives from the information processing perspective.

### A Summary of this Section

By approaching the idea of learning from a different angle, each school of thought reviewed above has offered a unique understanding about learning and teaching. Woven within that understanding are ways--integral ideas and images--of forming that understanding. The educational practices developed from each perspective are grounded in these primary ways of understanding. Though not one of the approaches surveyed provides a complete picture of learning, each has the potential to evoke meaning in teachers today.

A teacher who understands learning and teaching from a psychometric perspective might conceive that the primary role of the teacher would be to promote intellectual growth. Intelligence would thus be talked about as an object that could be defined, measured, or sorted. It might be described as a limited attribute, or identified as a key determiner of performance, and the limit or capacity of intelligence would be seen to effect an individual's learning potential. The teacher might then categorize students using cognitive levels, capacities, or abilities. When discussing curriculum, the teacher would likely accent the importance of academics or cognitive skills.

An educator following the developmental approach might tend to recognize the importance of individual maturational processes, cognition, and the effect of the environment on the learner. From this perspective, a teacher might argue that motivation and real, meaningful experience can influence the way in which a student

learns. Learning would be described as a process of growth, a product built over time, or a series of stages. It also might be talked about as something that can progress, move forward, or be held back. Thinking might be considered to be synonymous with intelligence.

A teacher looking at teaching from a behaviorist perspective, might argue that the student's behavior should be a primary consideration when deciding what to teach, how to teach it, and how to assess what has been learned. The teacher might argue that learning is best assessed by observing the learner's behavior. Behavior would be objectified, and talked about as a product requiring repair, reinforcement, or modification. Learning might be presented as a product of external stimuli, and the student viewed as a biological machine being acted upon by external stimuli. Learning activities might be broken into discrete behavioral units, and practised in a fragmented and hierarchical fashion. Concepts such as learning efficiency, task analysis, goal identification, reinforcement scheduling, and environmental impact upon the student might be utilized by the teacher.

The information processing perspective stresses performance over cognitive capacity, and accents the role of information in learning. Information is objectified, and described in mechanical terms. As a result, a teacher influenced by this approach might talk about information as something that can be analyzed into subcomponents, inputted, filtered, retained, integrated, or outputted. From this perspective, teaching would be seen to involve

strategies, processes, procedures, and/or systems. The learner would be perceived as a more or less efficient information processing system, as an information manipulator decomposing input into discrete components. Teachers that recognize the role of information in learning, describe learning as efficient or deficient, speak about teaching as a strategy or as a process, or make comparisons between people and computers, are speaking from an information processing perspective.

### A Consideration of the Questions to be Investigated

#### Looking at the Problem

Examination of historical attempts to define learning, identify the capacity or function of learning, describe what it looks like, or how it works provided examples of ways learning has been understood, but failed to yield a comprehensive picture of learning. It is not surprising that after almost a century of research the field of education still lacks an integrated theory of learning (Bower & Hilgard, 1981; Thomson, 1982; Shuell, 1986) or a proven instructional paradigm (Grant & Zeichner, 1984). Learning and teaching are complex (Fischer, 1980; Grimmett, 1982; Thompson, 1982; Ornstein, 1985). In recognition of this complexity empiricists have resorted to investigating what they have perceived to be the smaller aspects of learning (Lerner, 1986), but exploring a part does not necessarily lead to comprehension of the whole. In the classic story of the blind men and the elephant, each man

explores a portion of an elephant believing himself to have understood the whole. The blind man feeling the trunk announces, "An elephant is like a hairy snake!" The blind man touching the elephant's side says, "An elephant is like a great wall of old leather!" Just as in that story, each historical school of educational thought discussed above has approached learning from a different angle and then proclaimed that learning is an entity, a product, or a process.

But perhaps learning is not so much an object, or a factor of human design, as it is an expression of human experience. Uri Bronfenbrenner (1979), the father of the contextual perspective, has proposed that within experiences are layers of environments, or contexts. Contextualists have posited that interaction and constant change, existing within interrelated contexts, are the very nature of the human condition (Lerner, Skinner, & Sorell, 1980). If learning is an experience, and if the contextualists' understanding of experience as everchanging, contextual, and multidimensional makes sense, then any understanding of experience will necessarily be limited, for people's experiences are bounded by what they select to notice, remember, interpret, or act on (Polanyi, 1962; Rasmussen, 1974; Wittrock, 1981; Thomas, 1982; Travers, 1982; Hammersley & Atkinson, 1983; Lampert, 1984).

Seen from the contextual perspective, understanding of learning as an entity, a product, or a process are limited; not because they are drawn from an empirical approach that fractures experience, but because they represent attempts to understand and speak about experience. By virtue of its multifaceted nature, all experience

remains beyond complete comprehension and expression. "We humans do not communicate our experience but rather what the experience means to us" (Simpson & Galbo, 1986, p. 38). If learning and teaching can only be known through experience, then conceptions of them drawn from any perspective cannot be definitive. Each conception can only be an expression of a particular understanding about the experience of learning and teaching. Given this, researchers of learning must turn and explore the topography of understanding. It is necessary to investigate what people understand about learning and teaching, and essential to discover the ways in which that understanding is created.

### Thoughts on the Nature of Understanding

Before contemplating a way to research a person's understanding of learning and teaching and the way in which he or she constructs that understanding, forming a coherent idea of "understanding" became critical. Understanding has often been equated with knowing and believing, but the three concepts, though related, are not the same (Van Manen, 1977). Understanding has more connection to meaning than it has to knowing and believing (Bennis and Nanus, 1985). Knowing may be conceived as the holding of information; and believing, as meaning created from faith or trust. In contrast, understanding can be seen as meaning created from experiential knowledge (Polanyi, 1962); "lived meaning" (Giorgi, 1986, p. 21): a fundamental condition of being human (Palmer, 1969).

Exploring the notion of understanding further, life experience may be imagined as a landscape (Greene, 1982; Bruner, 1985). Explicit understanding thus becomes a construct built from materials found in the landscape of personal knowing and experience (Polanyi, 1962; Belenky, Clinchy, Goldberger, & Tarule, 1986). These constructs are located within the landscape, or grounds, of personal experience (Clandinin, 1986).

From this perspective, many explicit meaning constructs may be seen to rest on the personal landscape of experience. Indeed, anything framed by understanding may be viewed as a construct. Traveling over the landscape of experience, people seem to follow different maps on different occasions. From moment to moment, as we perceive, interpret, and act, we move in and out of numerous structures of understanding. People's ways of understanding love, history, children, a friend, a chair, a work of art, and learning or teaching are all examples of constructs.

Expressions such as images, metaphors, and themes are seen as some ways in which understanding constructs may be built (Clandinin, 1986; Munby, 1986; Tesch, 1987). These ways of understanding may be best comprehended as foundations of understanding or as topographical signs marking implicit assumptions lying beneath the conceptual landscape. The different ways of understanding learning offered by the four historical perspectives on learning, for example, are founded on assumptions drawn from implicit images of learning as an entity, a mechanism, or a procedure. The individual's ongoing effort to create meaning

from experience may thus be termed "sensemaking", and individuals are engaged in it all their lives.

### Positing Hypotheses

The practice of teaching greatly affects student learning (Englert, 1984; Eggen & Kauchak, 1988) and a teacher's understanding of learning influences the way in which he or she teaches (Elbaz, 1983). Shulman (1988) has proposed that developing teachers' awareness of what they know, and of their ways of knowing it, would make them better educators. Given the importance of personal understanding to the teaching act, a teacher's reflection upon what he or she understands would presumably lead to a renewed awareness of learning and teaching, rendering investigation of teachers' ways of understanding learning and teaching particularly worthwhile.

It seemed likely that teachers working with students with challenging needs would have occasions to construct understanding about learning and teaching, and that a study of such teachers would offer a rich opportunity to learn about the nature of understanding. Exploration of these teachers' reported experiences and thoughts could lead to important discoveries about their explicit or implicit understanding of learning and teaching. It was conceivable, for example, that some or all of the four historical perspectives might appear as aspects of a teacher's understanding of learning and teaching. It was also possible, however, that a teacher would compose his or her own unique understanding. My ultimate

hypothesis was that a consideration of teachers' explicit and implicit understanding would reveal something about the way these teachers constructed that understanding.

### Research on the Problem

Over the last fifteen years a great amount of research effort has gone into investigating teacher action. Hoping to improve teacher education, researchers have sought to identify factors of "effective teaching" (Brophy, 1988). Many aspects of the teaching act, such as classroom management, instructional organization, lesson presentation, and lesson evaluation have been studied (Englert, 1984). This approach has provided a wealth of information (Blackwell, 1972; Larson, 1975; Forness, Silverstein, & Guthrie, 1979; Milne, 1979; Dusek & Joseph, 1983; Good & Brophy, 1984), but researchers have been unable to find the sought after information: a set of general and consistent instructional rules that may be taught to teachers (Eggen & Kauchak, 1988).

Other researchers have inquired into aspects of teacher thinking, and have looked into teacher attitudes (Peterson & Clark, 1978; Kornblau & Keogh, 1980; Prawat, 1980; Whitten & Westling, 1985). Recognizing that a teacher may make as many as 1,300 decisions a day (Jackson, 1968), some researchers have investigated the decision making and problem solving aspects of teaching (Yinger, 1979; Lohead, 1981; Borko & Shavelson, 1983; Larkin & Rainard, 1984; Bransford, Sherwood, Vye, & Reiser, 1986; Heppner & Krausford, 1987; Ysseldyke, Thurlow, & Christenson, 1987).

Research findings on teachers' thinking have indicated that teacher knowledge is contextual, interactive, and speculative (Clark & Lampert, 1986). Teacher thinking during teaching seems to be action oriented, and immediate (Elbaz, 1983), with teachers performing "inflight" information processing while teaching (Joyce, 1978-79). The main concern of teachers during teaching seems to be to maintain the flow of instructional activity (Peterson & Clark, 1978; Morine-Dershimer, 1978-79). Teachers instructing students also tend to concentrate on fine tuning their teaching activities (McNair, 1978-79). Finally, research findings have indicated that teachers follow simplified, self-constructed models of reality when decision making (Shavelson, 1983). These findings support Simpson and Galbo's (1986) contention that "a large portion of a teacher's responses must be intuitively derived, providing a 'sense' of the most productive behavior at the moment. But useful responses are not accidental" (p. 50).

Despite these findings, and the possibility that teachers' understanding could influence their action, little work has been done to investigate teachers' understanding of learning and teaching. Munby (1986) has confirmed that "very few studies [have] . . . attempted to discover something about teachers' beliefs or knowledge from the perspective of the teachers themselves" (p. 198). Even less has been done to the explore ways in which teachers construct their understanding.

Beach (1975) has noted that people have difficulty synthesizing large amounts of information. Whether planning, implementing, or

evaluating teaching actions, teachers must have ways of making sense of the diverse landscapes of their experiences. Researching the development of expertise in nurses by looking at reports of critical incidents Benner (1984) has found that nurses with differing amounts of experience think in different ways. As they establish experience, nurses move away from rule-based and situation-specific ways of thinking, becoming first analytical, and eventually metaphoric, generalist, and even intuitive. Perhaps, like these nurses, the way teachers interpret, or understand, learning and teaching experiences relates to the nature and quantity of their experiences.

The few studies that have looked into the nature of teachers' understanding have provided some indication that teachers' ways of understanding experience are similar to those of the nurses Benner studied. Clandinin (1985) studied teachers' personal practical knowledge, "that body of convictions, conscious or unconscious, which have arisen from experience" (p. 362). Arguing that teachers' experiential knowledge has validity, Clandinin (1986) observed and conversed with two teachers to determine their personal knowledge. She found that the teachers had well formed, but not well articulated, ideas on their roles and aims in the classroom. They also seemed to "crystallize" their experiential knowledge into what Clandinin identified as "images" (p. 16). Clandinin found that images were expressed verbally, metaphorically, and through practice. She described these images as having moral, emotional, personal, and professional dimensions. Finding that images had

their origin in experience, and that images both shaped experience and were shaped by it, Clandinin hypothesized that teachers' "experience is constructed in the form of images which are expressed in practice" (p. 130). One may infer from this that images were one of the implicit ways these teachers constructed understanding upon the landscape of their experience.

Munby (1986) hypothesized that teachers "construct[ed] educational reality" (p. 201) through the use of metaphors. He examined one teacher's metaphor: the lesson as a moving object. A later study (Russell, Munby, Spafford, & Johnston, 1988) established the importance of metaphor to teachers, considered the change in teachers' perspectives as they grew in experience, and, in an effort to understand the relation between theory and practice, compared the metaphors of a beginning teacher to those of a teacher with more experience. The study raised more questions than it answered, but the researchers recommended that "teachers be given the opportunity to speak about their work," stating that it is "important to attend to the language they use to discuss their work" (Russell, Munby, Spafford, & Johnson, 1988, p. 77).

Hunt (1987), using exercises designed to help teachers identify their implicit theories of teaching, found that experienced teachers reported having a number of personal metaphors for teaching. The teacher was seen as a "river fed by springs," a "guide," a "band leader," a "family," and a "conductor on a train" (pp. 77-78). He concluded that the metaphors that teachers generate give teachers a way to communicate about their work. Guay (1987) called for "a

critical examination of the assumptions and contradictions inherent in the metaphors governing educational theory" (p. 29). Many others have argued that metaphors influence the practice of teachers (Ortony, 1975; Holt, 1984; Gregory, 1987; Kloss, 1987). Research findings have indicated that teachers construct an understanding of learning experiences using images and metaphors. There may be other ways in which teachers construct understanding.

The limited amount of research into teachers' understanding and its means of construction becomes even more obvious when special educators are considered. Aspects of the act of teaching students with mental disabilities have been well documented (Semmel, Sitko, & Kreider, 1973; Bryan & Wheeler, 1976; Cooper, Burger, & Seymour, 1979; Milne, 1979; Forness, Guthrie, & MacMillan, 1981; Westling, Koorland, & Rose, 1981; Thompson, 1982; Gable, Hendrickson, Shores, & Young, 1983; Levine & Mann, 1985; Whitten & Westling, 1985; Algozzine, Morsink, & Algozzine, 1986; Repp, Felce, & deKock, 1987); however research findings on special educators' understanding of learning and teaching are notably absent. A consideration on these terms of Ysseldyke, Thurlow, & Christenson's (1987) extensive research review on the thinking of special educators confirms that there has been very little research into the implicit, or even the explicit, understanding of learning and teaching from the perspective of special educators. No known research findings have addressed the ways special educators construct understanding. This lack of research is surprising, given

that teachers working with students who have mental disabilities face a high frequency of critical teaching incidents, experiences that could lead them to consider the nature of their understanding of learning and teaching. Benner's research has suggested that the way in which people understand experience is related to the nature of their experiences. If this is so, then special educators' experiences with students who have mental disabilities should provide a good terrain for investigating a teacher's understanding of learning and teaching, and the ways that understanding is constructed.

#### A Summary of this Section

After posing the questions: "What do people understand about learning?" and "What are the ways in which people form that understanding?" four major perspectives on education were surveyed. Embedded in each perspective's approach are implicit images of learning. These ways of understanding learning may inform the practices of educators who subscribe to each perspective. My consideration of the nature of learning led to the proposition that learning is likely to be an experience rather than an entity, product, or process. This realization led in turn to reflections on the nature of understanding. My ultimate hypothesis was that everyone constructs personal meaning from the landscape of his or her personal knowledge and experience, and that images and metaphors are some of the primary ways in which understanding is constructed. This hypothesis, given special

educators' educational experiences, made consideration of their understanding of learning and teaching appear of particular importance. Though some research has explored teachers' use of images and metaphors to construct understanding, no study has appeared to consider the unique understanding of special educators. Deeper exploration into understanding of learning and teaching could thus be provided by a consideration of the conceptual landscapes constructed by seasoned special educators.

### The Research Questions

Four questions were investigated, but two determined the primary focus of my investigation. These were: "What would the reported experiences and thoughts of experienced teachers of students with mental disabilities reveal about these teachers' understanding of learning and teaching?" and "What would these descriptions and thoughts reveal about the ways in which they construct their understanding?" While gathering information on these questions, two secondary questions also received attention. These were: "Is there evidence of the psychometric, developmental, behavioral, or information processing perspectives in the teacher's understanding of learning and teaching?" and "Would a mutual investigative dialogue be meaningful to teachers?"

## A Consideration of Methodology

One hypothesis of this study was that understanding informed action, a perspective that also applied to considerations of the research approach. Every research study necessarily incorporates someone's understanding of what to research, how to research, how to interpret discovered information, and what to do with that information (Watson, 1920; Palmer, 1969; Fielding & Fielding, 1986). Speier (1973) has argued that making any judgement involves human interpretation, while Polanyi (1962) has proposed that attempts to remove the human perspective from research border on absurdity. Clearly, acts of interpretation cannot be divorced from the performance of research. Ignoring the inevitable involvement of the researcher can only lead to the performance of research from a position of unrecognized bias. Many researchers, for example, have assumed research approaches that quantify, objectify, or predict without considering the implications underlying these approaches (Polkinghorn, 1986).

As theorists have recommended (Bogdan & Taylor, 1975; Misgeld, 1975; Lotto, 1983), careful consideration of the methodological approach was essential to my consideration of ways to perform this study. Some previous educational researchers had approached research about teaching as though the teacher were an object, perhaps conceiving learning as an equation made from the elements of student, instructor, and environment (Letteri, 1985; Keefe, 1987). This perspective might be valuable when the

teachers' behavior is considered out of the context of experience (Franks, 1987). The intent of my research study, however, was not simply to observe a special education teacher's action during a teaching or learning experience, but to explore the ways by which teachers interpret or understand that experience. Research approaches that attempt to quantify or objectify provide too narrow a view of such complex terrain as teachers' understanding of experience (Sevigny, 1981; Lampert, 1985).

How, then, were the questions posed by my study to be researched? Grimmert (1988) offered a possible direction, arguing that the interactive complexity of teaching required that:

questions of meaning precede questions of truth. That is, how subjects attribute meaning to phenomena [should be] the initial focus of researchers rather than the investigation of the validity of those meanings. The purpose of this kind of research is neither prediction nor explanation, rather, it is to explore phenomenologically how educators create [their world] (p. 11).

Hammersley and Atkinson (1983) have noted that in order "to understand people's behavior we must use an approach that gives us access to the meanings that guide behavior" (p. 7). A possible means of researching teachers' ways of understanding consisted in following in the footsteps of researchers who have asked not "what works?" or 'what works with whom?', [but] . . . 'what is happening here, and why?'" (Clark, 1978-79, p. 54). I determined to assume the role of an archaeologist (Keller & Grontkowski, 1983) attempting to unearth from the experiential grounds of the

teacher's construct of teaching and learning the teacher's implicit ways of understanding. Acting, in a sense, as an investigative reporter, interviewing the teacher about his or her thoughts and experiences, enabled the charting of this experiential ground preparatory to its archaeological analysis.

Seeking to uncover teachers' implicit understanding implies the possibility that teachers might learn about their own ways of constructing meaning, and introduces issues of mutuality (Edwards & Mercer, 1987) into considerations of the research approach. In a thoughtful and provocative article, Simpson and Galbo (1986) have argued that "human meaning is a function of human interaction" (p. 38) and that interaction can be a "critical catalyst" in rendering implicit meaning explicit. Interaction between my consideration of teachers' descriptions, and the teachers' "re-framing" of their explicit understanding (Schon, 1983) seemed required to unearth the teachers' implicit ways of understanding learning. Rather than seeing the teacher as an object, then, my approach recognized the teacher as an interactive player in the learning experience (Good & Brophy, 1974; Hunter, 1979; Elbaz, 1983; Shavelson, 1983; Borko, Shavelson, & Stern, 1986; Turner, 1987) and as an important participant in the research endeavor (Lampert, 1984; Clandinin, 1986; Hunt, 1987; Clandinin & Connelly, 1988; Wallat, Green, Conlin, & Haramis, 1988).

By what means was the topography of the teacher's understanding to be best explored? Rasmussen (1974) has noted that experience is primarily communicated through language.

Language, however, is not neutral, but rather performs an interpretive as well as an expressive function (Patton, 1987; Schon, 1987). Palmer (1969) has offered the view that people shaped language, and in turn are shaped by it. Given an association between language and experience, and given that "the most pregnant carriers of meaning are . . . the words of a language" (Polanyi, 1962, p. 57), if understanding is to be viewed as the creation of meaning from experience, it is reasonable to propose a relationship between language and understanding.

This relationship provided the means of exploring teachers' understanding of learning: teachers' language reveals the shape of their understanding (Prawat, 1980; Young, 1981; Carson, 1986; Giorgi, 1986; Munby, 1986; Jardine & Grahame, 1988; Pinar, 1988). My approach proposed that the content of a teacher's language could reveal his or her explicit understanding, and that the form of that language could reveal the teacher's implicit ways of constructing that understanding. When assembled, this information would then create a meaningful view of each teacher's explicit and implicit understanding of learning.

### A Summary of this Section

Research into special education teachers' understanding of learning and teaching called for an investigative approach that was exploratory, interactive, and focused on a teacher's language. To explore that understanding, the researcher first needed to report the teachers' descriptions of their phenomenological world, and

then to interpret the language used in those descriptions. The teachers needed to perform an active and mutual role in this research effort, and they needed an opportunity to reflect on learning and teaching.

### A Description of the Investigation

Research projects generally involve four general phases: invention of the research study, investigation for information, interpretation of the results, and reflection upon the research experience (Van Manen, 1984; Kirk & Miller, 1986). The background thinking that led to the creation of the present research study has been discussed in my preceding sections. In this section the actual research investigation will be described. In following sections, the material generated from the research will be interpreted, summarized, and discussed.

### The Research Material

An exploration of a special education teacher's understanding of learning and teaching requires an investigation of the teacher's communication about that understanding. Whether involving movement, sound, image, or other means, all human expression has been described as representations of interpreted experience (Polanyi, 1962; Palmer, 1969; Rasmussen, 1974; Simpson & Galbo, 1986), and thus as the symbols and signs of sensemaking. Any of these expressive methods could have provided the means of

investigating understanding about learning and teaching. However, given that words have been considered one "of the most commonly used conveyers of information in our world" (Kolers & Brison, 1984, p. 106), words provided the primary research material in my study.

Teachers could speak about many matters involving learning and teaching. For the purpose of this research study, two topics were selected from among the many: descriptions of teaching experiences, and thoughts about teaching and learning. This choice was made for three primary reasons: (a) that the content of teachers' thoughts and descriptions could provide examples of their explicit understanding about learning and teaching; (b) that eliciting language about specific, concrete experiences and general, abstract thoughts would provide two alternate perspectives on the teachers' understanding; and (c) that the way in which the teachers expressed thoughts and described experiences could reveal some of the implicit ways in which the teacher constructed understanding.

### The Teachers

Various researchers have identified a special education teacher as one that labels him or herself as a special education teacher, has professional preparation in the field, is presently teaching a program for students with special needs, and/or has prior experience teaching students from two or more areas of exceptionality (Stuck & Wyne, 1971; Blackwell, 1972; Semmel, Sitko, & Kreider, 1973; Bryan & Wheeler, 1976; Foos, 1976; Westling, Koorland, & Rose, 1981; Gable, Hendrickson, & Young,

1984; Westling, 1985; Levine & Mann, 1985). These criteria were used to select special education teachers for my study.

Before seeking teachers, written permission to perform research was obtained from the superintendent of a medium sized, urban school district. A preliminary exploration into a territory as complex as learning, and as personal as understanding, required a deep consideration of the perspective of a few informed citizens of this republic. A broader investigation into understanding about learning could only be initiated after information was discovered that could guide the mapping of that future research. There were eleven teachers in the district teaching classes of students with moderate mental disabilities. Four teachers, each of whom had over seven years experience in special education, were invited to participate in the study. This number represented slightly less than half of the total number of teachers. Every teacher invited chose to participate.

Each teacher's first interview began by ensuring that the teacher met the necessary criteria for inclusion in the study: the teachers identified themselves as special education teachers, had experience teaching in three or more areas of exceptionality, and were presently teaching a program for students with special needs. Two teachers reported having university training in special education topics, and all had participated in some form of specialized training. To ensure the commonality of the group, the teachers selected had also remained at their particular schools, teaching students with moderate mental handicaps, for two or more years.

### The Student Group

Labels such as "mentally retarded," "developmentally delayed," "cognitively disabled," "intellectually subnormal," "mentally deficient," "mentally handicapped," and others have been used at different times in different cultures and with a variety of meanings (Holowinsky, 1986) to separate people with apparent differences. Such labels are easily confused with the people on whom they have been placed. In recognition of the dangers inherent in using a label indiscriminately, and given that the present study focused attention on teachers' understanding of students with mental disabilities, a clear definition of the term "mental disabilities" was required.

In the last few years there has been vigorous debate about the use of IQ-based labels. Some have argued that because of the great differences in etiology and the broad range of features connected with the term "mental disability," efforts to classify people with mental disabilities by IQ are meaningless (Anderson, 1986). There has been a move away from classifying people with disabilities strictly by IQ, and toward a definition that also adds levels of adaptive functioning (Ashman & Jurisich, 1983; Grossman, 1983; Hayes & Hayes, 1987). The Diagnostic and Statistical Manual of Mental Disorders (1985) has demonstrated this consideration to some degree, listing the essential features of "mental retardation" as: "(1) significantly subaverage general intellectual functioning, [and] (2) resulting in, or associated with, deficits or impairments in adaptive behavior" (p. 36). The broad definition used by the DSM-III

served as the referent for the term "mental disabilities" as it was used in this study.

### The Interview Schedule

The interview schedule used in this study was created by the researcher after a review of the Ninth Mental Measurements Yearbook (Mitchell, 1985) determined that there were no available means for facilitating a teacher's exploration of his or her understanding of learning and teaching. The final version of the interview schedule was created after reviewing interview questions, topics and formats from a number of sources (Foos, 1976; Bradburn & Sudman, 1979; Spradley, 1979; Woodward & Chambers, 1980; Goetz & LeCompte, 1981; Sudman & Bradburn, 1983; Englert, 1984; Converse & Presser, 1986; Gable, Hendrickson, & Young, 1984; McEvoy, Nordquist, & Cunningham, 1984; Westling, 1985; Munson, 1986-87; Husband & Foster, 1987). It was also examined by a senior school district administrator, two school district psychologists, two university professors of education, and pilot tested with an experienced special education teacher.

Since the intent of this study was to determine the ways in which teachers interpret acts, there was no need to establish a positive correlation between each teacher's actions and his or her recall of them. It was important, however, to look at the teacher's understanding from a number of angles, not in order to verify the consistency of his or her statements, but rather to provide a number of standpoints for surveying the shape of that understanding

(Sevigny, 1981; Burgess, 1984; Patton, 1987). Questions and activities in the interview schedule, therefore, were created to generate an extensive view of a teacher's construct of learning and teaching. For example, because a teacher may speak and write with different voices and may, while using those voices, accent different aspects of experience, the interview schedule provided a number of opportunities for a teacher to speak and write about teaching and learning. Questions were framed in focused and open formats (Spradley, 1979), and were designed to elicit organizational and comparative information (Burgess, 1984), as well as descriptive information about mundane and critical experiences (Benner, 1984; Woolsey, 1986; Grimmett, 1988), and distant and recent events. Questions were also conceived as guides to conversation rather than as standardized stimuli (Weber, 1986).

### The Management of the Information

Because of the importance of keeping a verbatim record of the teacher's language, each meeting was tape recorded. The complete conversations were transcribed to a word processing document using a computer. Each hour of conversation took approximately three hours to transcribe. The transcripts for the eight conversations totaled 512 pages. The final conversation of one teacher could not be transcribed, due to the poor quality of the recording.

Each transcript was dated and marked with a code for the teacher's name, sex, and the age group of students the teacher was

teaching. Each response of the teacher was also coded with a number, the date, and the teacher's code name. This was done to aid computerized searching and sorting of the transcribed information. All identifying references to the individual, school, or district were deleted from the printed transcripts.

### The Research Design

During the investigation phase, teacher descriptions generally were elicited before teacher thoughts. This lessened the possibility that teachers would tailor their descriptions of experience to fit their recently expressed ideas about teaching or learning. On the supposition that conversing with each teacher a number of times, over a number of weeks, would create a wider sample of the teacher's thoughts and experiences (Patton, 1987), each teacher participated in three conversations, scheduled about a week apart. Each meeting lasted at least an hour and one-half. The investigation phase of the study took approximately six weeks to complete.

At the beginning of the first interview, each teacher was given a letter to read. It explained the purpose and format of the study. The teacher was guaranteed that all responses would remain anonymous, and that copies of completed transcripts would not be distributed without the teacher's written permission. The teacher was also assured that there was absolutely no compulsion to answer questions. The teacher signed the letter to indicate that he or she understood these things. It is worth noting that all of the teachers chose to answer all of the questions.

The first meeting with each teacher was in three parts. In the first part, background information was gathered. In the second part, the teacher completed a short written activity. This activity used open ended questions to encourage the teacher to communicate general thoughts about teaching and learning. In the final, and longest, part of the meeting, the researcher conversed with the teacher using both focused and open-ended questions. The questions were mostly about teaching experiences. At the meeting's end, the teacher was given a second writing activity to complete at home. This activity posed two open-ended questions designed to elicit written descriptions of teaching experiences. The second meeting occurred approximately a week later.

At the second meeting, each teacher was given an opportunity to comment on the home written exercise just returned to the researcher. The meeting then began with a third writing activity. Using focused questions, this brief activity was designed to elicit the teachers specific thoughts about the learning and teaching of students in the teacher's class. In the next, and longest, part of the meeting the researcher posed both open-ended and focused questions in order to discuss the teacher's general thoughts about learning and teaching. The third and final meeting occurred approximately a week later.

Soon after each interview, the researcher recorded his own thoughts and impressions of the interview, and a brief summary. Prior to the third meeting, the researcher reviewed the audio tapes of the previous interviews, his notes about the conversations, and

the teacher's written responses. The third meeting began with the researcher sketching a summary of the last two meetings. The teacher was encouraged to clarify or add to it. Using examples from the last two meetings, an open-ended dialogue was initiated. The intent of this dialogue was to confirm with the teacher the researcher's tentative summary and interpretation of what the teacher had said and written. The fourth and final writing activity was completed by the teacher at the end of this meeting. It was designed to provide the teacher with an opportunity to comment on the research experience. The responses in this exercise were later to be compared with the teacher's responses in the first writing activity. The final phase of the research involved an analysis and interpretation of the information gathered. This stage was completed in about ten months.

#### The Interpretation of the Information

Guided by the research questions, during the interpretative stage of the research cycle a three way analysis of each teacher's written and spoken material was conducted. The material was reviewed many times. The beginning stages of the interpretation process primarily involved an inductive examination of the teacher's spoken and written language. As the material became more familiar, a more specific content analysis was conducted. Next, particular aspects of the material were compared and contrasted.

Each teacher's material was studied in the same manner. During the inductive examination, the teacher's language was considered

with as little pre-conception as possible about what might be discovered (Patton, 1987), in order to allow patterns and relationships within that language to appear (Goetz & LeCompte, 1981). The language was reviewed, sorted, categorized, and connected according to criteria that appeared through examination of that language. The attempt to discern patterns began with a casual review of each conversation soon after it occurred. A more thorough second review was conducted as the researcher, preparing for the third conversation, listened to the complete tapes of the first two interviews.

After all the verbatim transcripts were completed, the inductive process was intensified. The teacher's transcripts and written activities were carefully read completely for the first time, and a second complete reading followed. During this latter reading, a paraphrased summary of each transcript page was written. Copies of quotations and/or paraphrases of quotations were sorted into two groups of categories. The first group was created through inductive analysis, with the categories appearing as the reading of the teacher's texts progressed, and included general topics such as the teaching experience, learning, and the role of the teacher. The second group of categories were designed to elicit more specific information, and served to frame a content analysis of the teacher's material. These categories included responses that related to the two primary and two secondary questions posed by the present study.

A third complete reading of the teacher's transcripts and written responses was performed, and additional material was added to the categories. To ensure that evidence was not overlooked, a computerized search of every word in each transcript was completed. Every occurrence of key words drawn from the four historical perspectives of learning was identified, and quotations added to the computerized file of evidence for each perspective. By the end of this process of searching and sorting, the teacher's language had been grouped into what Miles and Huberman (1984) have called "clusters."

Comparisons and contrasts (Husband & Foster, 1987) between the teacher's written and spoken language were performed, in addition. In order to provide material to compare across interviews, the teacher was asked questions about teaching and learning that differed in phrasing, and not in content, from the first to the second interview. In the first interview the teacher was asked what teaching was "like," and in second, what teaching "meant." At a different point in the first interview the teacher had also been asked what learning "meant," and in the second interview what learning was "like." Further material for comparison was provided by the first and the last written exercises, in which the teacher was asked a set of identical questions: the teacher was asked to relate his or her understanding of teaching students with mental disabilities, and to describe the ways in which the teacher thought such a student learned.

The clusters of quotations grouped under the general categories created through inductive examination as described above were re-studied; a more intensive inductive examination was performed, and the clusters re-sorted into categories more germane to the teacher. These groups were re-combined with the group of phrases gathered earlier under the category of responses to the first primary research question; that is, phrases that revealed the teacher's understanding of learning and teaching. These re-grouped quotations were then re-sorted inductively. Themes personal to each teacher began to appear (Tesch, 1987). Quotations were sorted into groups according to these themes, and the teacher's particular thematic clusters created. The summary thematic statements of each cluster were examined, compared, and connected (Bromley, 1986). The clusters and themes were then examined for any "deeper significance . . . revealed beneath the manifest content" (Palmer, 1969, p. 44) of the language.

#### A Presentation and Discussion of the Research Findings, by Teacher

This section is organized by teacher. The two elementary teachers are discussed first. Each teacher is presented similarly. First, an introductory sketch of the teacher is provided. A research question is then posed. The relevant findings for that teacher are presented and discussed. The consideration of the findings for the question posed ends with a summary discussion. The next question is posed. The relevant findings from the teacher are presented and

discussed, and so on until all the questions have been considered. This sequence is then repeated for the next teacher. This report on the research study will end with a summary and discussion of all of the teachers and the findings for each.

### A Presentation and Discussion of the Findings for the First Teacher

#### An Introduction to the First Teacher (Elementary)

This teacher received her teaching certificate many years ago. She later returned to university and earned a degree in early childhood education. She has been a teacher for fifteen years. During the first three years of her career she taught classes of primary-aged children. She has had twelve years experience as a special education teacher, and has taught in a segregated special school, and in a special class in a elementary school. She has taught children with severe and moderate mental disabilities, physical disabilities, hearing and vision impairments, autism, and communication disorders. She confirmed that she identifies herself as a special education teacher.

For the last five years she has taught in a special class at a regular elementary school. Ranging in age from eleven to fourteen years old, the students in her class at the time of the study met the school district's criteria for placement as students with moderate mental handicaps. The teacher thus met the established criteria for inclusion in the present study.

What Did the Reported Experiences and Thoughts of the Teacher Reveal About Her Understanding of Learning and Teaching, and the Ways in Which She Constructed that Understanding?

The special educator as a problem solver.

When the teacher was asked what a special educator was, she said, "A teacher focused on children with special needs. Probably every child has a special need of some sort, but . . . there are some students that have such problems in so many areas that they need some sort of specialized program." In these sentences the teacher expressed her sense that children with special needs have a unique set of problems, and framed the special educator as a person who works with students with exceptional problems. This concept, a special needs student with problems, commonly appeared during a review of her references to students with mental disabilities.

Early into the study, for example, she commented that, "these are very complicated students, and each one is really needy in his own way." On another occasion, while describing ways of constructing her understanding of her students, she listed discovering "their behavior and their medical problems" as important aspects of what she needed to know. In our final conversation she shared that one of her teaching approaches was to help students "solve the problem by providing them with materials or ideas." She also said, "That's what they're doing through life really. Everything they come up against is some sort of problem."

Her concept of a special needs student with problems was evidence of an understanding she held about teaching.

This understanding first appeared when she discussed differences between regular and special class teachers. She described the focus of the former as being on teaching curricula, and that of the latter, as being focused on solving problems. She clarified:

It goes a lot deeper than that. You have to have a knack for it. To be able to be successful with kids with problems, I think you have to be able to play detective and find out what makes the student tick. And how you can get through to them, and what might work, and devise materials or techniques that get through to them.

Later, she stated that a good special educator must "really be concerned about kids. I think you have to have quite a bit of patience [and] probably have to be creative, to be able to come up with unique ways sometimes." These thoughts reappeared in other conversations. She reported, for example, that she found it intriguing "watching children approach a problem and seeing how they figure it out." All of these quotations were examples of her implicit metaphorical understanding of the special educator as a patient, caring, and creative investigator, as a problem solver for students who have exceptional problems. This metaphor, which threaded through many of her ways of talking and writing, was a major characteristic of her understanding of teaching.

Some of her teaching approaches seemed to have been inspired by this metaphor, and provided further evidence for this metaphorical understanding. One of her reported approaches, for example, was to gather information about students. She had found that she can learn much about each student by "talking to parents, reading assessments, [and] observing the child." She elaborated that she liked learning about children by watching them "figure things out . . . to watch them approach something new, a problem. See what they do with it." In another conversation, when asked how she determined the best way of approaching each student, she replied:

[I] observe the child and try to figure out what makes him tick, and look at all the assessments I can find. And [I] talk to other professionals and try to put something together that might work. [I] try it and see what happens. What works [I] go with. It seems to evolve. You build on what you're doing.

Her way of talking about gathering information was evidence of her metaphor of the teacher as problem solver.

Some of her other reported approaches to teaching also supported her metaphor of the teacher as problem solver. For example, she reported individualizing her teaching approach. "Every child is so different. There's no course really on teaching this kid." Underlining her sense of being a creative problem solver, she said that if she were unable to find an effective teaching strategy that worked for an individual student, her response would be to "keep looking. Sometimes . . . if you can find some way of making a game out of it, making it a different activity, then they'll learn it

quite easily." It seemed likely that a teacher who understood herself as a problem solver would also perceive each individual student as a problem or challenge. There was also evidence that the teacher used some explicit problem solving strategies. For example, on three separate occasions, she wrote about her students' ways of learning. Each time, she consistently listed four primary strategies: repetition, observation, cueing, and reinforcement via successful learning experiences.

#### Teaching as developing an understanding of the student.

There were indications that the teacher first gathered information to form an understanding of a student, and then, based on that understanding, tried various problem solving strategies. The concept that developing an understanding of a student would assist the creation of a student's educational program was another characteristic of her understanding of teaching. There was implicit evidence for this in her way of writing descriptions of her students. For example, she began writing a story about a teaching success with her understanding that the student "had a war going on inside him." She then described what she did to "help him control himself." She began a similar exercise, but writing about a challenging student, with her understanding that the student was "a little girl who craves approval and who goes about it in the wrong ways." Again, the teacher then described how she solved the problem she had identified. In these examples, the teacher stated an understanding

about the student, and then described the program she had built upon this understanding.

Additional implicit evidence was provided by her verbal descriptions of her students. For example, she was asked to imagine that an experienced teacher was coming to teach her class. Unique among the teachers interviewed for the present study, this teacher answered with a sketch of each student. Inevitably, as she talked she first offered her understanding of the student, and then described what the student needed. One student had a "behavior problem." "You have to be careful how you handle her." Another student was "non verbal, very immature, [and] trying to talk." She described how she promoted communication with him. A third student was "our shining star," but had poor memory. The teacher stated, "First of all she has to remember to write down what she wants to remember." Again, she first expressed an understanding, and then outlined her approach for the student, founded upon this understanding.

The teacher's descriptions of her way of learning about a student were also enlightening. For example, she explained that she likes to gather information and "figure out what makes [a student] tick." She went on to say that she tries to "put something together" and build on that. In this example, as she talked about "figuring out" the student she used an image of piecing together or building. Later, as she reported her ways of planning for students, she said:

You go through all these different aspects of their personality, and you get down to the end. You put it all together and it all

adds up one way or another. You've sort of got a picture of the kid. It's a useful exercise because by the time you've done all that, it starts to seem quite clear what kind of program you need. Here, she talked of putting information together into a picture, and stated that she founded her program upon this image. The ways she described forming her understanding of her students implied that she saw it as a process of adding, building or putting together.

Clearly one aspect of the teacher's understanding of teaching was her concept of the role played by developing an understanding of a student in designing his or her program. This understanding was connected to her understanding of the special educator as problem solver. Her descriptions of the development of her understanding of students held the assumptions that students have problems, that their problems needed to be identified and understood, and that the teacher is the identifier and problem solver.

#### The teacher as a parent.

When the teacher was asked to fill in the blank to the phrase "teaching is like," she answered, "A lot like being a parent." She went on to explain her reasons for employing this simile:

[Students] need a lot of nurturing. They need a lot of positive reinforcement, a lot of ego boosting. Sometimes I think that's the most important part of the program, finding ways of letting them know that they're O.K., and making them feel good about themselves.

This remark demonstrated her understanding that teaching, like parenting, was a positive and supportive role. In a later conversation she was asked what being a teacher meant to her. She answered, "It means helping children grow, helping them develop," thereby expressing her understanding that one purpose of teaching was to help students. Again, in our last conversation she commented, "I suppose the ideal school situation would be more like a family situation, if it was possible to do that." These examples indicated that the teacher held an explicit understanding of the teacher as parent.

Her childhood memory of teachers was relevant to her positive image of the role. Discussing the teachers she had not liked as a child, she said:

Mainly they were teachers that had you do things, whether they made any sense or not. They weren't reasonable. They didn't seem to be fair. They made up rules and everybody had to obey the rules, whether they made sense or not.

These comments were interesting for two reasons. They provided hints of what she valued in teaching, but they also indicated her equation of the idea of teacher and the image of parent. In the above phrases, the word "parent" can be easily substituted for the word "teacher." In addition, the teacher shared two interesting stories about experiences that may have contributed to her positive view of teaching, and led her to draw connections between teaching and parenting. One story she told was about how she had loved school as a child. In the second grade in a one-room school, she

"got to help the grade one's with their work, and I decided I was going to be a teacher, and I never changed my mind." The other scenario she related was of having a brother twelve years younger than herself, "and I really enjoyed playing with him, and teaching him things. Being a little mother."

This teacher clearly felt that caring and helpfulness are important qualities for a special educator. Her appreciation of these qualities was further evidence that she understood teaching to be "like parenting." She explicitly noted, for example, that a good special educator has "to like kids, really be concerned about kids." Later she reported that as a staff, "We do get quite close to the kids." She talked about the teaching role as, "Sort of being a facilitator. . . . It's finding ways of helping." She also described it as, "Trying to find some way of giving [the students] that information so that they are able to do something with it." Asked what makes a good parent, she responded in words markedly similar to her view of the good special educator, "You have to be interested in kids and what they are doing, and you have to be able to treat them like real people." In our final conversation, she summarized her approach as, "Humanist, with probably a combination of a lot of different philosophies, backgrounds." It could be said that she saw herself, in the role of teacher, as a facilitating humanist.

#### Learning as growing.

The teacher expressed different, but interrelated, images of learning. When she was asked what learning meant to her, she

answered, "It's growing. It's developing. It's putting together information and making something out of it." She then elaborated, "It is a mental process, but it's probably using all of your senses. It's taking in information from all directions, with all of your senses and putting it all together in some way that's meaningful and its useful." These phrases provided encapsulations of two of her ways of understanding learning: as growing, and as putting together. Her understanding of learning as putting together will be considered later.

Evidence of her view of learning as growing reappeared when she was asked to consider similarities between teaching and learning. She thought that teaching and learning shared similar goals, "To grow and develop and progress and become independent," and had implied that learning is growing. She also reported seeing a similarity between special and regular class teachers in that, "They're all working towards helping children to develop." Asked what being a teacher meant to her, she answered, "It means helping children grow, helping them to develop. . . . Finding ways of helping them fit into the world in general, trying to help them learn the skills they need to manage outside school." This particular example was especially noteworthy: not only did the teacher's response evoke the image of learning as growing; it suggested her understanding of the teacher as helpful parent, and connected the two concepts, as well.

In another conversation, she again related the roles of teacher and parent to the concept of learning as growth. While drawing a

parallel between parenting and teaching, she said that as a teacher, "You try to create situations where [children] can learn and grow and develop, and parents do that." There was evidence that a feature of the teacher's understanding about learning was her concept of learning as growth, and that she tied her understanding of the teacher as parent to her sense of learning as growing. As she talked, she created an image of the teacher as a helpful parent supporting the child's growth, or learning.

#### Learning as traveling forward.

In discussing ways in which teaching and learning were the same, the teacher identified: "They're both involved with taking a person and hopefully moving them from point A to point B. There's growth involved. They're progressing." The teacher thought that persons without mental disabilities learn "by exploring their environment, and discovering things, and testing things out." Later, when asked what learning was like, she responded, "Learning is fun. Learning is an adventure. It's exciting."

Talking about teaching students with mental disabilities, she said, "Sometimes the best way to let them learn is [for the teacher] to be passive and to give them space to explore, to experiment with things." Of the ability of these students to learn, she said, "Nobody knows what their potential is, but you try to get them along as far as you can." Later, she added that, "Eventually they learn things. It takes a while but they get there." In these extracts, the teacher

talked about learning as an experience like traveling to a new place, an exploration, an adventure, a growing or progressing forward.

Teaching as simplifying, learning as putting together.

The teacher reported that if she were to find students were not learning, she would "go back to what my original goals were and look at where I went wrong. I [would] sort of fall back on an earlier stage, . . . and reinforce that until they were more comfortable with it." She speculated about ways in which students could have difficulty. "Sometimes I'm asking them to do too many steps at once, or sometimes they're missing a prerequisite skill. So I have to back up and make sure that they really understand that skill." She went on to explain that if stepping back did not work, she might make the lesson into a game, use new materials, or try a different motivator. Evidence from the teacher's conversation suggested that she understood teaching to involve pulling back to a simpler step. As these examples demonstrated, when the teacher mentioned the concepts of falling, stepping, or pulling back, she usually tied them to the concept of a stage or step. In this imagery was the implication that learning occurred in stages.

The teacher's understanding of teaching as involving stepping back appeared to be connected to the concept of "breaking down tasks into sizes [the students] can handle." For example, she related that as a teacher, "Sometimes you have to fall back and break up what you're trying to do into smaller pieces so that [students] can assimilate." She continued:

If I'm trying to teach [the students] something and I can tell that they're just not going to get it, then I feel like I'm falling back to an earlier stage. I have to break the task apart and give them the small parts first, and then go back to what I was trying to do.

As this example demonstrates, as well as conceiving teaching as stepping back, the teacher understood it as something that can be broken into smaller components.

As she talked about teaching students who were having difficulty in learning, there were indications that her understanding of teaching as simplifiable by stepping back a stage or breaking down a task was connected to one other concept. This was the concept of learning as putting information together. For example, when she was asked what learning meant to her, she replied that it meant growing or developing, but she also said, "It's putting together information and making something out of it." She then elaborated:

It's taking in information from all directions, with all of your senses, and putting it all together in some way that's meaningful and useful, and that's the hard part with these kids. The part where they need to generalize this information they're taking in, and make sense of it. They can learn specific bits of information, but it's putting it together and making something new out of it that they have trouble with.

Talking about learning in this way, as a process of putting together, led to an image earlier identified: the teacher imagined the learner as putting together pieces of sensory information in order to form

meaning. This image was analogous to her earlier conception of the teacher as problem solver.

Later in the conversation the teacher explicitly suggested an image similar to the image of learner as problem solver. After she outlined her view that people generally learn by exploring and experiencing, she offered the idea that learners seek to organize new-found information using a kind of biological filing system: "They categorize things in the brain, and when they come across something new they decide where to put it. If it doesn't fit anywhere then they have to create a new category."

There were indications that the teacher understood teaching students with mental disabilities as the taking apart of information, in order to help students put together, or learn, that information. Within the teacher's explicit descriptions of teaching as stepping back, breaking down, or rebuilding was an implicit metaphor of learning as something constructed or developed. Notably, this concept closely related to her metaphor of learning as growth, and to her understanding of the teacher's role in developing an understanding about a student.

### A Summary and Discussion of This Section

The teacher demonstrated an understanding of students with special needs as students with problems. Her descriptions of students with mental disabilities also revealed that she conceived student problems as being identifiable and understandable. She viewed the special educator as a caring problem solver, and thought

that by developing an understanding of a student, the teacher could teach the student more effectively. She described the process of forming an understanding of a student as a process of adding, building or putting together.

She also understood the role of a special educator to be like that of a parent. She identified the qualities of fairness, helpfulness, and caring with these analogous roles. She talked of learning as an adventurous journey and as growth, and of teaching as helping the student to develop. A concept closely related to her understanding of the teacher as problem solver and learning as growth was her understanding of teaching special needs students as taking information apart, and of learning as putting information together. She viewed learning as something to be constructed or developed.

The teacher's understanding of learning could be clustered under three main metaphors. She viewed learning as growing, as a journey forward and as putting information together. She also tended to connect these ideas when she talked, seeming to understand these three concepts as interrelated. While discussing similarities between teaching and learning, for example, she overtly connected the ideas saying, "There's growth involved. They're progressing." She also said about learning, "It's growing. It's developing. It's putting together information and making something out of it."

Her metaphors for learning, though closely related, carried somewhat different implications. The idea of learning as growth could evoke the image of a developing learner, bringing to mind an image of the teacher tenderly caring for the learner, giving

nourishment and warmth. The language she used to express this understanding even exhibited rhetorical images of growth. Given her interpretation of learning as growth, it was not surprising that the teacher understood her role to be like that of a parent.

Though related to her metaphor of learning as growth, the teacher's conception of learning as a journey created ideas and images different from those created by the first concept. This metaphor evoked a sense of movement and change. A learning journey could be understood as routine, adventurous, or exploratory. The teacher's statement that her students' learned "By exploring their environment, and discovering things, and testing things out," and her declaration that, "Learning is fun, learning is an adventure," provided examples of this way of understanding.

The metaphor of learning as the putting together of information generated another set of images and ideas. This metaphor encouraged comparisons with sleuthing or puzzle solving. With this imagery, the learner could be imagined searching for clues or looking for meaning. The learner could also be understood as considering pieces of information, searching for patterns or for the whole picture. For example, when the teacher talked about her way of learning about her students, she explained, " You go through all these different aspects of their personality . . . . You put it all together and it all adds up one way or another. You've got a picture of the kid." The language the teacher used when discussing her understanding of learning as growth, journeying, or putting together, provided evidence that each metaphor evoked different

words, images, and ideas. Each metaphor offered different, but connected, ways for the teacher to construct an understanding of learning. She understood growth as being more than an unfolding: it had a forward momentum, as well. For her, development was progression. She conceived learning, the making sense of information, as the propellant of this motion.

The teacher's sense of learning as putting information together was also connected to her understanding of the special education teacher as a problem solver. As well, her sense of the special education teacher as problem solver was tied to her thinking that the teacher developed an understanding of a student. She thought that to solve what she described as the student's learning problem, the special educator needs to understand the student. She described ways to do this that were in effect recommendations that the teacher put information together about the student. For example, she said that the teacher had "to be able to play detective and find out what makes the student tick," and suggested that the teacher could learn about the student by observing or collecting information.

In summary, the primary conceptions that the teacher held about learning and teaching were metaphors and images that could be tied together. The key ways in which she understood learning were metaphors of growth, an adventurous journey, and a putting together of information. Her core ways of understanding the special educator were as a nurturer, a problem solver, and a detective.

Each of these interrelated ways offered different words, images, and ideas for constructing her understanding of learning and teaching.

Was There Evidence of the Psychometric, Developmental, Behavioral, or Information Processing Perspectives in Her Understanding?

Evidence for the psychometric approach.

There was little evidence of the psychometric perspective in the teacher's conversation or writing. When the teacher referred to her students in categorical terms, she tended to talk about them in the context of their problems, needs, or complexities. Only once did the teacher refer to the level of cognitive functioning of her students. Her few references to cognition were expressed in developmental terms. Her description of curricula centered on individuality, meaningfulness, and utility, rather than cognition.

Evidence for the developmental approach.

The theme of learning as growth or development was strong for this teacher. She explicitly mentioned the concept in both conversation and writing, in her deployment of metaphors of growth and parenting. Other indications that the teacher conceived aspects of teaching and learning from a developmental perspective could be seen in her use of the metaphor of stages and steps.

There was also evidence that the teacher thought that contextual experiences in real environments promoted learning, another

developmentalist idea. In the first activity, the teacher wrote that students with mental disabilities require, "concrete or real materials, and real situations." She repeated this thought in her last activity, writing that they need "concrete or real situations," and a "positive, comfortable, stimulating, but not distracting, environment." In her second conversation she stated that most people learn "by exploring their environment and discovering things," and later that parents try "to create a healthy, happy environment for their kids." She talked about her experiences with her children at home in our final conversation, "I made sure they had materials to be creative with, and I encouraged them to make models, and explore things, and build things in the sand, and do developmental-type things."

Implicit in the teacher's discussions about learning, and descriptions of teaching, then, were the developmentalist understandings that learning may be conceived as growth and moves through stages, that learning moves or progresses over time, that development occurs at individual "speeds," and that environment and contextual experiences influence a student's learning.

#### Evidence for the behavioral approach.

Some characteristics of the teacher's understanding about teaching and learning could be interpreted as behaviorist. However, the simple occurrence of ideas that possibly indicated a certain perspective did not necessarily establish that the teacher approached teaching or learning from that perspective. For

example, the teacher reported using observation when learning about a student. Observation of behavior could be interpreted as a behaviorist instructional strategy. She talked about observing the child, however, and not the child's behavior: for her, observation was not a precise tool for analyzing behavioral stimuli and responses, but rather a way to gain an understanding of a child.

On occasion, the teacher related that providing a different motivation might help students to learn. She noted, however, that "if they're having trouble learning, a plain reward won't work, that just puts pressure on them." She went on to explain that if children fail to understand the activity, or cannot not perform it, "They would never earn their reward." As this example demonstrates, though aware of the behaviorist concept of reinforcement, the teacher uses it in a sophisticated fashion. Discussing a student with whom she felt that she had been successful, for example, she wrote that she "set up a structured program with the classroom as the reward." She explained about another student that he "loves to draw so we let him draw after he's finished his work." She reported that while working with a child who had a poor self image, "My solution was to find ways to let her know she was succeeding." The teacher went on to say that she adjusted the difficulty of the work, had the student help others, or gave her a set of photographs showing her doing a task well.

These examples demonstrated the teacher's understanding that a reward works best by helping the child feel successful: "[The students] need a lot of positive reinforcement, a lot of ego boosting.

Sometimes I think that's the most important part of the program, findings ways of letting them know they're O.K., and making them feel good about themselves." Though the teacher understood the concept of reward from a behavioral perspective, as something that externally stimulated or motivated the student, she used the idea within the context of her understanding of the child's self esteem and ability, and the nature of the task to be performed.

The teacher talked about breaking tasks down into smaller sizes, but she explained that she does this in order to simplify information so that the student can "assimilate" it. As she talked about her way of directing students in practising activities, she used the concepts of meaning and function, rather than of breaking a task into pieces for the student to practice separately, as a behaviorist might. Though the teacher clearly expressed the idea of learning as something that can be put together, it was less clear that this was evidence of the behavioral approach. Her understanding of the concept "putting together" seemed rather to center on the idea of making sense, rather than of building skills: "They need to generalize this information they're taking in, and make sense out of it. They can learn specific bits of information, but it's the putting together and making something new out of it that they have trouble with." As this quotation demonstrates, her metaphor of learning as putting together seemed more an expression of the information processing approach than of the behaviorist approach.

Evidence for the information processing approach.

The concept of information appeared in a variety of ways. The teacher described information as something that can distract or overwhelm the student. Discussing the ways in which students find learning difficult, for example, she identified, "the amount of information, the complexity of the information I'm trying to give them, and the way in which they're being given the information" as reasons why a learning situation can be difficult.

She labeled information, describing, for example, the role of the teacher in discovering "which type of information [students] can use, which type of message they can internalize best, whether it's tactile, or auditory, or [otherwise]." She also objectified information, describing it as something that the teacher can give to the student. For example, she said that the teacher's task was to "find some way of giving [students] that information so that they are able to do something with it." She talked about learning as information that can be collected and put together, saying, for example, "They get information from every experience. They get different kinds of information, and they put it together." Students "learn specific bits of information, but it's putting it together and making something new out of it the they're having trouble with." This particular concept--learning as putting information together--was a major aspect of the teacher's understanding of learning. All these conceptualizations of information could be identified as evidence for an information processing approach to learning and teaching.

The teacher expressed several ideas that could be identified as examples of the information processing approach. In our first conversation she presented this picture of learning: "They classify things. They categorize things in the brain, and when they come across something new they decide where to put it. And if it doesn't fit anywhere, then they have to create a new category." This metaphor implied the concepts of memory as information storage, and of information as something that can be categorized. She also explicitly recognized the concept of learning as processing, and the idea of sensory input. "[Learning] is a mental process, but it's using probably all of your senses. It's taking in information from all directions, with all of your senses and putting it all together in some way that's meaningful, and it's useful"; In this example, the teacher has combined both ideas. She even hypothesized that the reason a certain student experienced problems learning was that she had difficulty "processing the information."

Clearly, the teacher objectified information, imagining it as being given, gathered, internalized, broken into bits, put together, processed, and categorized. There was strong evidence that she approached the idea of information from an information processing perspective, and incorporated aspects of this approach into her understanding of learning and teaching.

### A Summary and Discussion of This Section

There was little evidence of the psychometric perspective in this teacher's conversation or writing. The teacher expressed one

concept that could be identified as behavioral, that of reward, but she placed the idea within considerations about self esteem, ability, and the nature of the task. She also expressed the concept of information in such a way that it could be seen to be representative of the information processing perspective. She expressed a number of concepts that could be labeled developmental: She conceptualized learning as growth and as a thing progressing in stages over time, described development as proceeding at individual rates, and argued that environment and context influence student learning.

The primary ways in which the teacher understood teaching and learning could be labeled as examples of either the developmental or the information processing approach. These two perspectives seemed integrated into her understanding, though there was no evidence that she explicitly recognized them.

#### Was the Research Experience Meaningful to the Teacher?

The first interview began with her comment, on being questioned as to her feelings about research, that she generally finds it "boring." She reported that she tends not to use formal research results in her teaching practice. She had participated in one other research project, and expressed positive feelings about that experience. Her first comment on the present research occurred during the second conversation: "I think everybody should sit down once in a while and think about what they think about learning."

At the end of the final interview, the research process was discussed with the teacher. Asked to comment on the experience, she replied that it was "interesting to look at what you're doing and sort of rationalize what you're doing and why." She later commented that it was also "interesting to hear how other people hear you, and see how other people perceive you, sort of have your thoughts reflected back. So that's certainly worthwhile. It's been a pleasant experience." Asked if she had learned anything from the experience, she replied negatively. She went on to say that she found that the experience "gives you an idea of where you're coming from. Day to day, you don't usually sit down and think about, quite that way." She said that she had found this process "worthwhile." In the final written exercise of the study the teacher was asked to consider what she had learned. She wrote: "I had the opportunity to think about my personal philosophy and to have it reflected back to me. I was forced to try to put into words my thoughts about learning and teaching and how they relate to each other." Her written answers to the same questions asked before and after our conversations were consistent, though she provided more detail in her final answer. To summarize, the teacher did not evidence a change in awareness as a result of the research process, but displayed a positive reaction to the experience.

A Presentation and Discussion of the Findings  
for the Second Teacher

An Introduction to the Second Teacher (Elementary)

This teacher graduated from university with a degree in English and then received her teacher training at a Teacher's College. She had been a teacher for fourteen years at the time of the study. She had taught regular elementary grades for seven and a half years, and special education classes for seven and a half years. She reported considering herself to be a special education teacher. She has taught students with mild and moderate mental handicaps, as well as students with behavior problems. She has also served as an itinerant special education resource teacher. She reported being an extensive reader of research journals about special education.

At the time of the study, she had been teaching her present class for two years. Her students, who ranged in age from five to twelve years, met the school district's criteria for placement in the class as students with moderate mental disabilities. The class was located in a regular elementary school. The teacher thus met the established criteria for inclusion in the study.

What Did the Reported Experiences and Thoughts of the Teacher Reveal about Her Understanding of Learning and Teaching, and the Ways in Which She Constructed that Understanding?

Learning as progress or growth.

The teacher was asked to speculate on the reasons for a particular student's difficulty in learning. She answered:

He's made no progress this year. Why? Behavioral. Why the behaviors at that time? I don't know. I guess you could say he's not comfortable, or he's not feeling confident enough when he goes into it. It may be that I don't have enough patience.

In a later conversation, she was asked how she could tell if a student was not learning. She said that "usually the frustration starts" in herself. She went on to explain that she feels this frustration "when I'm stuck at a certain part for a certain while." These responses were significant for two reasons. By identifying herself as a source of knowledge about the student's learning, she highlighted her understanding of the teacher as an active player in student learning. Secondly, embedded in her speculation was her view of learning as making progress. She literally described a student's learning difficulty as making "no progress." She also explained her own frustration as "[being] stuck at a certain part," evoking the idea that lack of progress equals lack of learning. The concept of learning as progress appeared to be an aspect of the teacher's implicit understanding of learning.

There were other examples of this way of talking about learning. Describing a number of unsuccessful teaching approaches that she had tried to implement with a student, she said that she had "got nowhere," implying that lack of progress equalled lack of learning. When asked to write about another student she had found

challenging, she again said, "I got nowhere." She described a success that she had had with a student that had affected his family, by metaphorizing it as movement: "At the end of two years, the whole family was moving." In discussing two particularly needy students, she described their learning as movement from one kind of activity to another: "What we were trying to do was get them from solitary play to parallel play. That was the aim during those times." At the end of our first conversation, she framed learning as a moving thing, "fluid and spontaneous and wonderful and loving."

The teacher discussed the qualities of a good teacher: "You have to be willing to be open, and receive, and change and therefore grow and be a learner yourself." Later she defined her own role as "working with the kids, helping the kids grow." In these two examples, she again implied that learning equals growth. Finally, when she was asked what learning meant to her, she replied that learning is "knowing something you didn't know before. Being able to do something you couldn't do before. Or changing a behavior from what it was before to something more acceptable." On further questioning, she repeated that it meant "a change in some way." She said that the question was difficult to answer, but she concluded by saying, "It's growth." Though she had difficulty responding in a way that she felt was satisfactory, her attempts were consistent in one way: the recognition that learning means change. These examples all indicated that the teacher implicitly understood learning as progress, or growth.

Teaching as an exciting journey.

The teacher was asked to describe her classroom. After providing a long and very detailed answer, she explained that her classroom arrangement "ties in to where I want to take the kids, which is kids who can function with as much independence as possible within the world." In another conversation she talked about working in her classroom, "We can go in any direction. Our space is such that we can fly anywhere." She added, "But we just have to be willing to take off."

While talking about her teaching assistants she said, "I value someone who can go with the moment, who can be spontaneous, [and] who can keep the principles of the classroom." She had described this quality as being able to "fly off in a direction with me." When considering the differences between a special and a regular educator, she remarked that a special education teacher has "that willingness to go off on the less travelled road." Her written answers also attested to her value for flexibility and spontaneity: "It is necessary to know where you're going and how you'll get there, but be flexible within each day to take advantage of naturally occurring teaching situations."

She identified the best teaching moments as "the ones that just happen and you go with them: All of a sudden you're on fire. You're just so excited and you're so happy and you're just going with the whole thing." When asked to define a special education teacher, her first response was to say, "Somebody who is willing to fly by the seat

of their pants." She elaborated that as a regular class teacher with a curriculum:

You know roughly where you're starting. . . . And you know where you're going. . . . Basically you've got a map that other people have made of how you're going to get there. . . . [However] when you're teaching a special education class, you walk in and you have no idea what's going to be in that room. . . . It's a lot more exciting, a lot more fun.

In these extracts the teacher talks of working in the classroom, creativity, making curricula, and teaching special needs students as being like going on an adventurous journey. Her language elsewhere retained this implicit metaphor. For example, in identifying her teaching goal as independence, she said that it is "where I want to take the kids." In writing about the importance of being open, she described the goal as the thing that lets the teacher "know where you're going and how you'll get there." In each of these examples she framed the concept of goal as a place to journey to with her students.

She conceived the curricula of regular teachers to be like a map, and connected this concept to the idea of travelling. With it, she said, regular teachers knew where to start, where to go, and how to get there. She spoke of the excitement that special educators can feel in meeting the adventure of each day without such a map. She even expressed an image of the special educator as a person willing to journey down new roads. These examples demonstrate a major and consistent characteristic of the teacher's implicit

understanding of teaching, her conception of teaching as journeying, moving, or flowing.

The special educator as a helper.

The teacher reported becoming aware of children with special needs very early in her teaching career. She related that she was teaching grade four in her first year as a teacher and had a few students who could not read fourth grade books. She went to the principal:

He expected me to actually take these four or five kids and teach them from grade one books, in a grade four class. I found that inconceivable. And then he explained that . . . this was life, and this was reality. It was the first time that I realized that not everybody goes to university someday.

She remembered finding it "amazing" that students could not learn material that was placed in front of them: "And I just started to really feel a lot of empathy for these students."

The teacher reported that it was this "empathy," and a wish to work with children as individuals, that had first led her into teaching a special class. She had found that after teaching in the same school for a few years, "I was starting to get this feeling like I didn't know these kids. I had twenty-five of these kids, and they all had these amazing problems because it was the inner city." She returned to her early experience in a later conversation explaining, "I've always wanted to help the ones who couldn't do it." She found that "there wasn't enough time in a regular class to help the kids

who really needed it." When three of the children in that class were going to be placed in the school's special class, "It just seemed logical to me that I would go with them."

She related that her empathy for students with special needs had developed partly because she has a brother who is mentally disabled. She revealed that as she and her brother grew up, her family had denied his condition. Through her experience as a teacher, she reported, not only did her approach to students with learning difficulties change, but her "attitude towards him changed a lot, too." She felt that this change "probably had a lot to do with me being a special education teacher." She said that "a big thing that I work with with parents is accepting and loving their kid."

The teacher carried this sense of caring to her understanding of her present role. For example, in her first writing activity, while discussing the ways in which a student with mental disabilities learned, she wrote, "Above all love, kisses, and cuddles are needed in abundance." In her last exercise she wrote something similar: "These children . . . need to feel loved and successful." In conversation, when she was asked what it meant to be a teacher, she revealed how important the role was to her. "It's a very essential part of my being . . . . A lot of my self worth is tied up in being a teacher." She underlined the helping aspect of the role: "It means working with people. It means helping people. It's my contribution to society." Near the end of our second conversation, while talking about the differences between regular and special educators, she reiterated this idea: "I am working with the kids,

helping the kids grow. I'm making them more functional. I'm making them less reliant upon the social security system." Her reply underlined the aspect of her understanding of teaching that has been highlighted in all of these examples, her metaphor of the teacher as an empathetic helper.

#### Special education teaching as a creative act.

When the teacher was asked to fill in the phrase "Learning is like (blank)," she reported finding it difficult at first. After a few false starts she replied, "Learning's like filling in an artist's canvas. You're never quite sure what the final picture's going to be. You get the paints. You fill it in. You end up with a nice picture." She said this with some humor, and reported feeling unsure about it. As she considered further she added, "But learning in a regular classroom is paint by numbers! I just realized that. And I do mean that analogy." She continued with the thought. "In a special education classroom they give you the palette full of colors and you're not quite sure what you're going to end up with." She began expressing what at first appeared to be an idea about learning, but ended in expressing a thought about teaching. She first said that learning was like making a picture, but as she went on it became clear that her metaphor described her experience of teaching a special class. On both occasions that she was directly asked to consider learning, she reported difficulty in responding.

In contrast to the difficulty that she expressed in answering direct questions about learning, she discussed teaching fluently. For

example, when asked what teaching was like, she quickly replied, "Art. Creative. Drawing something, painting," and elaborated: "It's a creative process. It's trying to figure out how to get what you want or to teach them something, in as creative and as fun way as possible. It's just creating. It's fun." Her answer to this query was almost identical to her response about learning. There was evidence in both her conversation and her writing that one feature of her understanding of teaching was her sense that it is a creative act. Her response to the first writing activity provided a further example of this understanding. Asked to write an imaginary letter to a friend outlining her understanding of teaching and the ways in which students with mental disabilities learn, she wrote that teaching was an "interesting experience" that was "emotionally involving." She expressed ideas about curricula and development, suggesting that her students were comparable to four year olds, and recommended that teachers respond appropriately:

[The students] want to play. So play. Hands on. Make it real. Throw out the abstract. Wallpaper over your blackboards. Wear your blue jeans to school and have fun! Anything can be made into a game with a little imagination. Find out what the kids like and go with it.

Implicit in this statement was her understanding that the special educator's role is active and creative. Her idea that the special education curricula offer more freedom for the teacher connected to her understanding of special education teaching as creative.

Evidence of her understanding that teaching was creative can be found not only in her expressed understanding of the active and creative role of the special educator and in her understanding of the special education curricula as less confining, but also in her spoken discussion of the creative nature of teaching. She described her understanding of a creative moment in teaching as a moment:

when you really don't know what you're going to do, and all of a sudden, the idea comes to you. And everything goes into place, and you just know how to approach that kid, and you're doing it . . . [using whatever material] and you don't know where the thought came from.

Calling it a "burst of energy," she explained that her own classroom is arranged so "that when the moment hits, I suddenly can go 'Wow! Why don't we do this, kids! This'll be really neat.' [And] I want to be able to find the thing." She explicitly labeled this experience as an example of "a really creative moment." She later compared these feelings to her feelings before going on the stage to act. She related her experience of the first time she went in front of a class:

It just hit me. "This is it!" It was the same anxiety, and the same stage fright, and all those same feelings of the adrenalin flowing and that, that used to rev me up before I went on stage. [They] were there in a classroom.

#### Learning occurs through play.

In an exercise the teacher wrote: "Always play. That would be my advice to anyone doing this. You're working with three and four

year olds in their mind." Thus the teacher explicitly stated her understanding of the importance of play in learning. When asked to think of something she was trying to teach the whole class, the teacher mentioned the success she had had in teaching social skills through modeling and role play. She explained that her reasons for using the approach were that it worked and "We had fun doing it." Asked to speculate on why it worked she replied: "Most people basically work on liking and wanting to be liked." The teacher thus viewed her success as the result of employing activities that were fun and motivating to do.

At the end of our first conversation the teacher was asked to imagine what her students might say about the way in which they learn. She said:

By playing. By having fun. When they didn't feel threatened. When they weren't frightened. They'd say, "Make it fun. Make us comfortable, Give us lots of comfort when we're frightened. Don't expect us to learn anything when we're frightened or we're upset or we're frustrated. Look after our emotions first, and then we're going to be able to learn something."

In this way, she had expressed the idea that learning should be fun for her students. In her conversations, as well in her written responses, the teacher demonstrated her explicit understanding that play helped children with mental handicaps to learn.

#### Teaching and learning as sending and receiving knowledge.

When the teacher was asked how she thought teaching and

learning were different, she briefly indicated an explicit understanding she held concerning these activities. She said:

Teaching, you're sending messages. Learning, you're receiving messages. They're interrelated. They're reliant on each other. Teaching isn't successful unless the learning's successful. The learning's not successful unless the teaching's successful. So they're interrelated, but one's sending and one's receiving.

As she explored her understanding further, she identified the possibility that a teacher and learner may "switch roles." She said that "The teacher can become the learner," "sending out the knowledge that the other person learns," but thought that, "as a rule, I would say the teacher's the director. They're kind of in charge of the situation a bit more than the learner." To be a good teacher, she said, "You can't be so closed that all you're going to do is send out. To be a good teacher you have to be willing to be open, and receive, and change and therefore grow and be a learner yourself." The teacher demonstrated that she understands teaching and learning to be analogous to sending and receiving.

Teaching as reaching a balance between emotion and intellect, through prayer.

The teacher explicitly identified her "Christian belief" as a "a very strong thing with me in a special education classroom." "I've always considered myself a Christian as I kind of stumble along through life." She said that most mornings, before beginning teaching, she

prays. "[I] just hold up the classroom, and just ask for peace and contentment, and ask that we work together well." She said that she prays to reach a balance between "an emotional state and an intellectual working, figuring it out, planning it, scheduling it." She went on to explain that this balance is important because "being intellectual, the scheduling it, doing your directed teaching, doing your incremental teaching and all that, don't work at all well with special education kids, unless you bring the emotional component in."

A little later she repeated that in praying she asks "for calmness and patience." She elaborated that her prayers are typically for a state of mind rather than for ideas, and that she has "a big bag of tricks, but sometimes . . . you've got to stay really calm or you can't reach into your bag of tricks. You can't remember." The teacher's discussion of prayer provided evidence for two aspects of her understanding about teaching: her understanding that Christian faith plays an important role in her life, and her understanding that teaching students with special needs requires reaching a balance, through prayer, between emotion and intellect.

She related that she turns to prayer for guidance. Before accepting her present job, for example, she "just prayed and prayed and prayed and got this feeling that it was meant. That the whole accident [of applying for one job and getting another] . . . was put in place because that's the way I was supposed to go. I just had this really strong feeling." Later, she said that through prayer she gets "strength, and that comes from the faith" in God. She also reported

understanding her faith as something that supports her. "It keeps me going," she said, adding that it provides her with the means of reaching equilibrium and problem solving:

When things are really going wrong in my class with these kids . . . I will go down to the nurse's room and pray for a minute or two. And then I come back and I'm fine, and the [teacher assistants] will say, "Gee, I don't know how you stay so calm!"

Her sense of the need for balance in teaching was repeated in the final writing exercise. Asked to describe what she understood about teaching a student with mental disabilities, she wrote: "Teaching is both an art, a science, and an emotional involvement." The teacher's faith in God and prayer, with her striving for balance between the heart and the intellect, formed another characteristic of her explicit understanding about teaching.

#### A Summary and Discussion of This Section

The teacher implicitly conceived of learning as progress or growth. She described learning difficulties as lack of progress or being stuck, and described learning as fluidity or forward movement. She also demonstrated an implicit understanding of teaching as flying, flowing, or journeying, especially when she talked about creativity, independence, and teaching in the classroom. She described curricula as maps, and imaged the special educator as a traveller following uncharted roads.

She discussed the role of the special educator as empathic and helping, saying that the role was a very important aspect of her

sense of self. She also revealed an understanding of special education teaching as creative, explicitly discussing the creative nature of teaching, and describing aspects special education as freeing. She implicitly expressed an understanding of the special educator as a creative player in student learning.

She thought that young students with mental handicaps learn better through play than by practising skills. She also explained that teaching could be understood as giving knowledge and learning as receiving it, and that teaching and learning were reciprocal acts. She reported that Christian faith played an important role in her life, and that teaching students with special needs required reaching a balance between emotion and intellect. She thought that her faith provided a way for her to reach that balance and to receive the guidance she needed to solve problems.

The teacher's understanding of learning as progress, of teaching as a journey, and of the special educator as a helper may be conceived of and expressed as a single idea. It can be said that the teacher viewed learning as progressing forward, and herself as a helper traveling with her students. The root metaphor of these related conceptions is the idea of learning and teaching as an adventure. It is likely that this implicit metaphor evoked the teacher's images of teaching as setting goals, mapping, and following paths, as well as her view of it as exciting and enjoyable. Explicitly, however, the teacher connected learning and teaching in another way. Evoking the images of learning as information receiving and teaching as information broadcasting, she stated that she saw

teaching and learning as similar to transmitting and sending messages.

The teacher's two ways of understanding learning and teaching both set the teacher in the role of active helper, but demonstrated different though related aspects of her understanding of learning and teaching. The metaphor of a journey was her way of expressing her understanding that learning and teaching involve moving forward. The radiographic metaphor of message reception and transmission was her conception of the way in which that movement occurs. She likely conceived of the moment when a student received a message as the moment when progress, or learning, occurred.

The teacher explicitly stated the importance of play, but this expression was also an example of her implicit understanding of teaching as a creative act. In this way, the two ways of understanding were connected. For example as the teacher imagined talking to another teacher about the ways of teaching students through play, she painted a picture of the creative teacher: "Throw out the abstract. Wallpaper over your blackboards. Wear your blue jeans to school and have fun. Anything can be made into a game with a little imagination." Her sense of the creativity of the teaching act was related to her idea of teaching as an adventure. Like a voyage of discovery, the idea of creativity brings with it a sense of excitement, risk taking, and the possibility of expansion or growth.

The teacher commented in the final written activity that through participating in the present research study, she had learned that "teaching is both an art, a science, and an emotional involvement," a notion that she elsewhere related to the concept of balance. There was strong explicit evidence that she understood the best way of reaching this balance was through prayer. The teacher's understanding of teaching as a creative act, her sense of learning and teaching as a journey and as the transmission and reception of messages, and her understanding of the need to balance craft, practice, and feeling, stood out as the core ways in which she constructed her understanding of teaching and learning.

Was There Evidence of the Psychometric, Developmental, Behavioral, or Information Processing Perspectives in Her Understanding?

Evidence for the psychometric approach.

The teacher rarely made reference to concepts from the psychometric perspective. The few references that did occur provided inconclusive evidence for use of the approach. For example, while explaining her reasons for using a particular teaching strategy, she stated that her students were "functioning lower" than students who could learn to read. It was not clear, however, if she was referring to cognitive or academic ability. She discussed her view that teaching must change in time with a changing world, saying, "We've got to prepare kids to compete at

whatever level they're able to compete at." Again, however, it was not clear that she meant a level of cognitive functioning. Finally, she discussed "levels of learning," an undefined concept that seemed to suggest the individual's ability to learn. These few ambiguous references gave little evidence of the psychometric approach in the conversation or writing of this teacher.

#### Evidence for the developmental approach.

The teacher expressed some explicit awareness of the developmental approach. For example, while writing directions to an imaginary teacher she recommended: "Look developmentally, not chronologically." She then explained that in order to teach her own students, it was best to see them as having the minds of very young children. She repeated this thought in conversation: "Always play. That would be my advice to anyone doing this. You're working with three and four year olds in their mind." There was some indication that the teacher understood her students by their developmental stage, rather than by their chronological age.

She also expressed the developmentalist concept of learning as progress and as a process related to growth. For example, she described a student's learning difficulty as "going nowhere." She also described her students' learning as moving from one type of play to another. She identified the role of the special educator as "helping the kids grow." When she said that a good teacher must be willing to "change and therefore grow and be a learner yourself," she again implied that learning was growth. At one point she even

stated, "Learning is growing." These were all examples of her conception of learning as growth or progress, and were evidence of a developmentalist approach.

Since they implied that the teacher understood children with mental disabilities to learn through natural experience, her comments that such children learn best through play was further evidence of a developmental approach. When she said, for example, that "some children can't formulate the idea of playing with legos unless they can see the legos," she was stating a belief that these children could only comprehend when faced with the material thing. She gave other examples of this understanding. For instance, when she imagined the ways in which her students might describe their ways of learning, she thought that they would say, "By playing. By having fun. When they didn't feel threatened." She repeated this thought in a further written exercise.

The final example of evidence for a developmental approach to learning was the teacher's expressed goal of functional independence, an idea related to the concept that real experience promotes learning. The teacher reported wanting her students to "function with as much independence as possible within the world, [or] at least within this environment." While discussing curricula she stated that she felt "a lot more comfortable . . . being able to give the kids what they needed instead of giving them what they're supposed to have." In a later conversation she restated that her primary teaching goal was "developing kids to function to the best of their ability in society." The teacher's recognition of developmental

stage, her concept of learning as progress or growth, and her belief that future independence in the adult community could be promoted by teaching functional activities could all be seen as evidence of developmental thinking.

Evidence for the behavioral approach.

There was also evidence that the teacher conceived behavior from a behavioral perspective, as an object that could be recorded, rewarded or modified. For example, when asked to imagine that she was talking to a substitute teacher about her class, she described each student's behavior and offered suggestions for responding to that behavior. Occasionally, she mentioned keeping data on student behavior, but she also said, "I don't keep a lot of records because that stops you. If you're busy with paper and pencil in your hand, you're not involved with the kids, you're involved with the pencil and paper."

The teacher reported using some teaching techniques that could be said to be derived from the behavioral approach to learning. She said that she occasionally used "time out," a technique for modifying behavior developed from behaviorism. She also used the behavioral concept of a reward as something that could reinforce certain actions. She related, for example, that she and her assistants sometimes ran "around with stickers in our pocket" to reinforce a student's behavior, and that "we really concentrate on rewarding." She also indirectly recognized the behavioral concept of secondary social reinforcement, stating that "most people basically work on

liking and wanting to be liked," and recommending that students with mental disabilities be provided with "lots of praise, lots of love." These examples provided evidence that the teacher used some behaviorist teaching techniques, and that she understood some aspects of learning from a behavioral perspective.

Evidence for the information processing approach.

Evoking the image of information input and output, the teacher's brief discussion of learning and teaching as receiving and sending knowledge was a classic example of an information processing approach to learning and teaching. This use of metaphor was one of two examples of ideas that could be seen as evidence of the information processing approach. The teacher also occasionally used the concept of sensory modality channels, another idea related to the information processing approach. For example, she described a student as "very visual," and her approach as teaching "to the [student's] visual strength." In the third writing exercise, when asked to describe the ways in which each of her students learns, she used sensory modes exclusively. She wrote a description of one student, for example, as "Tactile and visual. She touches and puts everything into her mouth." She wrote that another student was "Visual. Easily distracted by movement. She can watch things, but not listen to them. Color coding works to teach her." In the final written exercise, she wrote that one thing she understood about children with mental disabilities was that they are "more tactile and visual than auditory." There were some indications that

the teacher understood aspects of teaching and learning from an information processing perspective.

### A Summary and Discussion of This Section

There was little evidence of the psychometric approach in the conversation or writing of the teacher. Her reported use of certain teaching techniques and her objectification of behavior could be said to be derived from the behaviorist approach. Her description of learning and teaching as receiving and sending knowledge and her use of the idea of sensory modalities were the two concepts that could be identified as examples of the information processing approach. The teacher's recognition of developmental stages, her conceptualization of learning as progress or growth, and her understanding of the need for teaching functional activities were all evidence of developmentalist thinking.

There was evidence of three of the four historical perspectives on learning in the teacher's writing and conversation. The developmental approach was most strongly represented, as it could be identified in one of her core metaphors. The information processing perspective could also be identified in another of her central metaphors. While these two perspectives were represented in her expressed understanding, the behaviorist perspective was apparent only in certain of her teaching strategies. As a result, it could be said that aspects of her understanding about learning and teaching could be interpreted primarily as evidence for

developmental or information processing approaches. All evidence for these approaches was implicit.

### Was the Research Experience Meaningful to the Teacher?

As the study began, the teacher was asked to discuss her feelings and thoughts about participating in a research activity. She said that it was "not something that I would go out of my way to get involved in," and joked that, "I've come not only with an open mind, but with an empty mind." She reported that she had participated in a paid research project while at university, but did not remember anything significant about it.

Her first comments about this study were made in the second conversation, after my comment that the conversation was interesting. She responded, "I'm finding it interesting too. I'm going, 'Oh, wow! That's how it works!' " At the end of this conversation she said, "I'm looking forward to reading that paper and finding out what I said. I found that my head was kind of aching a bit at the end of the last session, and it is now, too. It's hard." Five months after the present research study was concluded the teacher initiated a comment to the effect that she had found the research process a positive and enjoyable experience, and reported continuing to reflect on those conversations. She said that she often catches herself teaching or thinking in a certain way, and says to herself, "I know why I'm doing that!"

Evidence from the third conversation could not be presented; it was recorded at an inaudible level and could not be transcribed.

There was a record of the teacher's written comments after the final conversation, however. Asked to comment on what she had learned during the study she wrote, "I do know what I'm doing." She went on to write a summary of what she had learned:

Teaching is both an art, a science, and an emotional involvement. I am very structured and that structure is designed to create an area [or] atmosphere in which anything can happen. I can take advantage of the moment and want assistants who can too.

The understanding of teaching expressed in the final written exercise was consistent with what the teacher had written in the first exercise. There were differences in her way of discussing learning in these two exercises, however. In the first written exercise, when asked to write about how a student with mental disabilities learned, she detailed the teacher's possible behavior toward her students. In the final exercise, when asked the same question, she was more specific about her students' ways of learning. To summarize, the teacher reported feeling positive about the research experience and finding it affirming. There was evidence that she expressed her understanding of teaching and learning more explicitly at the end of the study.

### A Presentation and Discussion of the Findings for the Third Teacher

#### An Introduction to the Third Teacher (Secondary)

This teacher's original university training was in elementary education. She also earned a certificate in physical education, and

considered physical education an area of specialty. Over the years she has taken many courses in special education. She had been a teacher for eighteen years at the time of the present study. Four of those years were spent teaching regular junior high school. For seven years she taught students with mental and physical disabilities in a segregated school. For another seven years she has taught a special class for secondary school students with moderate mental disabilities. She also served two years as a physical education specialist for students with special needs. She confirmed that she identifies herself as a special education teacher.

The students in her class at the time of the study, fourteen to eighteen years old, met the school district's criteria for placement as students with moderate mental handicaps. The class was located in a regular school. She had been teaching this class for six years. The teacher thus met the established criteria to be included in the study.

What Did the Reported Experiences and Thoughts of the Teacher Reveal About Her Understanding of Learning and Teaching, and the Ways in Which She Constructed That Understanding?

Learning as absorbing information.

When the teacher was asked what learning was like she answered:

A sponge. Soaking up water or something. So that if the

environment or the person waiting to learn is primed enough, and you do that through getting their interest, they're stimulated to pay attention or whatever, then they soak up the information like a sponge.

Thus she objectified information as a thing that could be absorbed, and offered an image of learning as a process of information intake. She also implied that teachers create student interest. In an earlier conversation, she gave a similar answer when asked what learning meant to her: "Learning means that you are acquiring new information. And it potentially could be exciting and fun to bring in this new information." The metaphor of learning as acquiring, bringing in, or absorbing information was a significant aspect of this teacher's understanding of learning.

The idea appeared both in writing and in conversation. The teacher explicitly spoke of learning as "information being absorbed," and, in the final writing activity, as being "like a sponge." More often, she implied the metaphor of learning as absorption. She noted, for example, that since the placement of her class in a regular school "the kids have, sort of through osmosis or whatever, just picked up" appropriate social behavior. As she talked about a specific teaching project, she reported that "some of the kids definitely picked up on that . . . sort of like osmosis, they sort of absorbed it." She used other, related, images as well. In her writing, she consistently described learning as "acquiring," "bringing in," or "soaking up" information. In her conversation, she

talked of information as "sinking in," or being "gathered," "picked up," or "taken in."

Closely related to the idea of learning as absorption was the concept of sensory information input. This idea also appeared as an aspect of the teacher's thinking about learning, especially in her discussion of the way in which students with special needs learn. She said for example:

I really think that people . . . have strengths and weaknesses as far as taking in information. And for analyzing it and using it. And I really think that we learn better through certain senses than we do others. Some people are very visual. Some people are very auditory. . . . And I think very much people with special needs learn through their senses and if certain senses are deficient, like vision or hearing or whatever, then they have to rely on their other senses.

The idea that people with mental disabilities have certain "sensory deficits" and need to use their other sensory modes to learn was repeated during the course of the study. She wrote, for example, that students with mental disabilities learn "visually, tactilely, [and] auditorially." She recommended that teachers attend to a student's sensory modality: "You need to zero in on their specific strength, their learning mode, as the other senses may be diminished." This idea also appeared in her discussion of specific students. For example, when asked to write a description of each student's ways of learning, she made a list of what she saw as their strongest sensory input modes. She used this approach in

understanding her own learning as well. When asked how she likes to be taught, she answered, "I think I learn best through a multi[media] approach."

Her understanding of the concept of memory was also related to her understanding of learning as information absorption. When speaking or writing of memory, she usually used the concept "retaining information," implying an image of memory as a place where absorbed information is stored or kept. For example, she argued that students must utilize information or "they're not going to retain it. They're not going to keep that information and are not going to be able to use it." Talking about the effect of a particular teaching approach, she said that she hoped "that [the students] are really retaining [the information] and that they can use that again someday." She evoked an image of information being banked, withdrawn, and used again, and consistently mentioned retaining information when referring to the concept of memory.

#### Special students learn best practising useful information.

The teacher reported using traditional teaching materials such as phonics workbooks, readers, and math books when she began teaching students with special needs. Eventually, she wondered, "Is this really useful information for them?," and decided that her students were "at school to learn useful information, skills, whatever, that will be of benefit to them along their life." She reported thinking at the time of the present study that for students with mental disabilities to learn, "It has to be interesting to them. It

has to be meaningful to them in some way." Her focus in these quotations on beneficial, interesting, and meaningful information revealed an explicit understanding about the way in which students with mental disabilities learn. This understanding centered on the meaningful practice of useful, motivating activities.

The arrangement of her classroom provided an example of her understanding about the importance of meaningful practice. On request the teacher described her classroom, actually two rooms. "One room is . . . the computer room [and] academic work area, where you can work at individual goals. . . . The other room, it's more like a work area, kitchen area, . . . where students can work on a variety of projects." She went on to describe the activities that take place in each room. Her description of her classroom by its functions was a representation of her view that activities for students with mental disabilities need to be useful. There were other manifestations of this understanding, as well. For example, while discussing attempts to integrate subjects rather than teach them separately, she explained that she uses this approach "so that it makes sense and has meaning to them in a practical way." While explaining her use of physical activity, she said that she hoped that by "using this approach with the kids, that they are retaining information, and [that] is useful to them." The teacher's detailed description of the functional curricula she offered was further evidence of her understanding that useful and meaningful activities influence the learning of students with special needs.

She drew a connection between meaningful practice, useful information, motivation, and learning. While explaining the concept of useful information, for example, she highlighted the roles that motivation and practice played in the learning of students with mental disabilities:

If the information that students are gathering . . . isn't practiced, or from their point perhaps, seen to be motivating or interesting for them, [then] they're not going to retain it. They're not going to keep that information, and are not going to be able to use it. She implied that students find useful information motivating, and suggested that information, to be remembered, must be practised. She also recognized the teacher as a motivator. She felt that the "onus is on the teacher" to find ways to motivate the student to learn. If the teacher can make "the lesson, the activity, really interesting, really multi-sensorial so that [the students] just are really getting involved in it. Then, hopefully, that information is being absorbed." There was evidence that a significant characteristic of the teacher's understanding of learning and of students with mental disabilities was her sense that they were most motivated, and learned best, practising activities that they perceived to be useful and meaningful.

#### The special educator as manager.

If a new teacher was coming to take over your class, the teacher was asked, what would you want to tell that person? She began by identifying the functional activities of her students--what her

students could do. She then talked about the positive experiences she had had with group work; how she had found that one to one was not the best way for her students to learn. She went on to discuss the adult staff working in the program. "Basically you have to just really be organized for the day and know what you want everyone to be doing." She described a system that assigned staff to students by time blocks, and related that she found it "more efficient" if she "became a manager in a way, managing the support staff." She told of having "adopted a team approach," listening to the concerns of the staff and creating consensus. She also said that she had had to organize work experience, integration into regular classes, and visits from peer tutors. She called her scheduling system a "time manager," a moment later remarking that her classroom routines "organized people." In another conversation she recognized and accepted that however well-planned she is, each day brings something unpredictable. The role of teacher as manager of staff and time was an explicit aspect of this teacher's understanding about the ways in which teaching works. Her scheme was founded on the implicit understanding that time and staff management are the important features of organization, that organization promotes efficiency, and that an efficient classroom aides learning.

#### Understanding can evolve.

The teacher traced a gradual change in her understanding of teaching students with mental disabilities. She related that when she began teaching children with mental disabilities she tried "to

run the class like I would any other regular education class. . . . I tended to be more a traditional type teacher. The kids had to sit at their desks." She had also thought that "the best work was done one on one." Later on she found that students with special needs can learn in groups, which she described as "more of a natural learning environment." She also reported that at the time of the study she tried to integrate learning topics, rather than teaching them traditionally as separate subjects. When she began teaching, she said, she used "a published curriculum that would work through all these steps, [but] . . . since having done it that way, I realize kids with special needs don't necessarily progress in exact developmental sequence." One other change she identified was in her way of understanding a student's behavior. Rather than interpreting behavior as something designed to distract her, she reported having learned to determine what the behavior might indicate about the student's needs. In summary, she reported changes in the way she offered instruction, in the content of her curricula, and in her reading of a student's behavior.

As she talked about these changes, her understanding of her way of approaching change was revealed. Though she acknowledged many changes in her teaching, she typified her general approach as organized and methodical. "I like to know what I'm doing, and I like to feel comfortable in what I'm doing in a particular situation. Then I can go from there more easily into trying new things." She described herself as flexible but cautious: "little bit adventuresome."

It takes me quite a while to sort of get out of my track and maybe

try to go off on another branch, because I feel comfortable in the track I'm in, and to go off this route, well, I don't know. But [she might think to herself] let's give it a little bit of a try.

She commented that "I'm not one of those people that just will just jump on the bandwagon for the latest technique or approaches." If a new approach seemed likely to benefit a student, she reported that she would be more likely to try it.

The teacher used metaphors of travel to describe changes in her teaching practice. She liked "to feel comfortable . . . in a particular situation," or to know where she was. Only then could she "go from there" and enter "into new things." She reported following a comfortable "track" rather than a "bandwagon." If she thought that a new "branch" would take her toward helping students to learn, she might "go off this route," but she reported making such changes in direction with caution. Apparently, she used these metaphors of travel and location as a means of understanding her own changes. These metaphors appeared again in her discussion of her ways of developing educational plans. Because she saw teaching as helping or guiding students to learn, and a new approach as a potential change of direction or movement into new territory, she did not want to take new roads unless she sure of her destination.

#### The special education teacher as helper.

The teacher related having had the desire to teach since she was young:

I was in grade seven or eight at the school, and I remember just

being really interested in the teachers and the job they did. I remember sometimes the teachers would give me responsibilities to go in and supervise the grade one or grade two class for a few minutes. . . . And I remember that very specifically, just really enjoying it. For some reason, I always wanted to be a teacher since I was in elementary school.

She saw teaching as "like life," and elaborated that, "Life is a series of events, and experiences, and interactions with people, and exciting things, and not so exciting things." She then concluded, "Teaching, I guess, is teaching students about life." In a later conversation she remarked that a teacher is "kind of like a friend that's helping the student learn and find out about their world." Adding a little later, "As a benevolent adult in their life, I see my role as making their learning experiences enjoyable, fun, helping them cope with their lives, their situations, learning to get along with others." Implicit in these statements was a vision of the teacher as a guide who helps the student to discover life.

Her original interest and experience was in teaching elementary age students in regular classes. However, when the opportunity to work with students with special needs arose, her urge to help turned her toward working with these students. Her first interactions with people with disabilities led to:

an initial fear, or some sort of reaction, because it's so strange and unusual, or you don't know how to handle the situation. You don't know how to deal with it. But once I got working in the situation. . . . I realized, "Hey! They're just like everybody else."

They just look a little bit different or act a little bit differently . . . and then I found I had real empathy for them and I wanted to help out as best I could.

Asked what a special education teacher was, she answered that he or she was someone who had an interest in students with special needs and worked with that population using special teaching techniques. Underlining her sense that the special educator offered something unique, she said that her experience as a special educator could allow her to teach a regular class, but that a regular class teacher would probably find it hard to teach a special class. Considering the differences between regular and special educators, she began with the thought that "the similarities are greater than the differences." She noted that both care about students and "want children to learn"; however, she proceeded to identify many more differences. An exploration of these differences provided indications of what she thought made the special educator unique.

She thought that the goals and curriculum for the regular and special education teacher are different. The regular education teacher is compelled to follow a curriculum, "Whereas with my students it's very individualized, . . . you are always looking to the future and what they're going to be doing on graduation." Regular education teachers "teach [students] their lesson, and have their groups going, and give them their work. A special education teacher would be giving more individual attention to the students in her class, partly because she's got fewer kids." A special educator is also "more tolerant of certain behaviors," and has "more physical

contact with the kids. . . . In a regular classroom, I think a teacher is much more apart from the kids." She thought that the regular class teacher probably also has a "different mind set" toward special needs students. That teacher might feel less accepting of the student:

Whereas in the special education class the teacher is very focused on these kids. They're there for a reason. She knows they've got problems. . . . She wants them to be part of the group. She wants them to be there. She wants them to be able to manage these problems.

Embedded in these comparisons were some conceptions that the teacher had about teaching students with disabilities. The teacher saw the role of teachers as a helping and caring one, but also viewed children with special needs as requiring a special sort of help. They need, in her view, not only specific techniques and individualized, functional programs, but teachers who feel tolerance, acceptance, hope, and a desire to help as well. She seemed to value these affective qualities over and above the need that she noted for a special educator to have special skills or programming abilities.

#### Long term goals as signposts.

The teacher commented that when planning for a student with special needs, "You are always looking to the future and what they're going to be doing on graduation." She also identified an "underlying goal" of ensuring that her students enjoy their lives. When asked if

she had any overall goal for her students, she answered: "The older they were, the more we wanted them out in the community, and out into the rest of the school. We didn't want them spending all their time in the classroom. That was the broad goal." There were indications that she carries this sense of direction with her as she plans, and that she frames her teaching with a few simple goals, signposts to remind her of the direction in which she is guiding her students. This approach to the concept of goals was another feature of her understanding of teaching.

Her primary goal for her students seemed to be independence. An example of this goal lies in her description of the process of planning for students. She described the importance of knowing of what her students are capable, and of trying to identify what they need to know. Based on this information, she explained, she meets with parents, identifies functional goals, and devises individual educational plans. As she talked, she placed this description in a broader, future-oriented context, explaining that she looks for "what I felt they needed for the ultimate goal of independence," and that she said she tries "to have them work on practical, functional things that they could use, currently in their lives, and hopefully . . . when they graduated." She reiterated in another conversation that, "My long term goal is for [students] to become as independent as possible."

Her commitment to the goal of promoting independence appeared in several slightly different forms. For example, she has

noticed that a number of students with mental disabilities have developed learned helplessness. She explained some means through which she has taught some of her students about goal, and related a story about one student who developed her independence. "I could see a change in her from when she first came into our program to the end of the year. She had goals." The teacher learned from this experience the importance of having an "underlying goal for all my students to, in some way, start making decisions, having goals for themselves." She saw the process of teaching students to set their own goals as another way to promote their independence.

The concept of goals was a significant feature of the teacher's understanding about teaching for two reasons. The frequent appearance of the idea of goal in her discussions about, and in her descriptions of, teaching suggested that she used goal setting in actual practice. Her depiction of the general goal of independence was particularly interesting. She stated that she uses this goal to provide herself with a sense of where her students may go, and what she needs to teach them to help them get there. She understood the idea of the long term goal, then, as a signpost to guide her in her efforts to help students discover life.

The special education teacher should make learning a joy.

The teacher described herself as a specialist in physical education as well as a special educator, reporting that she "enjoys

working with kids in a physical activity setting." She described physical activity as a way for students with special needs to:

have a lot of fun, . . . have a sense of accomplishment, . . . and at the same time they're developing coordination skills and visual perception skills and visual perception skills and all these other things that kids with special needs are deficient in because of the mental and physical problems they have.

She underlined that she enjoys working at improving her students' skills in this way, and appreciated the benefits that accrued to them in other areas. She described physical activity as "a very unique learning environment" because it combines mental and physical skill development, a sense of achievement, enjoyment, and social experiences. Her feelings about physical activity and teaching and her recognition of the teacher's potential to bring happiness to her students' lives were evidence of an understanding of teaching that became more clearly defined as other examples were considered.

In another conversation, she was asked to identify the most important thing that she does for her students. She answered, "I think what I want them to do is to enjoy their lives. For me that's an underlying goal." She recognized the importance of meeting learning goals, but felt "that their lives are already very difficult for them. . . . I just want them to enjoy their time at school, and learn while they're there. [It] . . . boils down to having enjoyment of life." Her conception of the importance of happiness in her students' lives revealed itself throughout our conversations.

It was revealed in her way of viewing her role as a teacher: "As a benevolent adult in their life, I see my role as making their learning experiences enjoyable, fun, helping them cope with their lives, their situations, learning to get along with others." It appeared in her description of the meaning of learning as well: "It potentially could be exciting and fun to be bringing in new information." When she was asked to imagine what her students might say about learning if they could talk to her, she again said that, "They would learn things when it's fun." The teacher thought enjoying an activity would help a child to learn it. This recognition was another understanding that she brought to her teaching.

The teacher is responsible for the student learning.

The teacher had some trouble thinking of a student who had difficulty learning, saying, "All my students are learning." This seemingly flip statement was actually one example of another understanding that she held about teaching. Eventually, she was able to name a student. When asked to speculate on why he was having trouble, she responded: "Maybe I wasn't using the right approach to help him learn it. And also I think my expectations maybe were too high. And I think he maybe wasn't capable of these expectations from a behavioral point of view?" Confronted with a student with difficulty learning, she did not recognize it as a problem involving the student's learning, but rather defined it as a teaching problem.

Because a student with mental disabilities often cannot judge the importance of information, the teacher thought that "the teacher has to be the determiner of whether or not this information is useful for the student. . . . If the teacher can, through her teaching techniques and strategies, impart the information or the knowledge that she thinks the student needs." She understood that enabling the student to practice this information usefully would make it more likely to "stay with [the student]." Explicit in these statements was the thought that if the teacher provided useful information, appropriate teaching strategies, and opportunities for practice, learning would be promoted. What the student would bring to the situation was not mentioned. If the student were to have difficulty, the teacher would be the identified problem and not the student. She later stated this explicitly:

If a student isn't learning, the blame shouldn't go on him by saying, "Well, he's too distractible if he isn't paying attention. " I think you have to find ways to motivate him, or find approaches, or find a learning activity, so that he can meet success and he can learn. For the most part, I believe the onus is on the teacher.

Other evidence for this understanding appeared throughout the research. For example, as she talked about a student that exhibited difficult behavior, she described trying to "set up her approach so that hopefully he would be learning something," exhibiting her sense of responsibility for changing the student's behavior. The teacher explained her way of developing educational plans for her students, saying that she knows "where they were at, and what their

learning capabilities were, and what I felt they needed" to achieve what she called "their ultimate goal," independence. Another dimension of her understanding of teaching, then, was her sense that the teacher was responsible for the learning of the student.

### A Summary and Discussion of This Section

When speaking or writing of learning, the teacher evoked the image of information being absorbed. In doing so, she objectified information as a thing that can be transferred. She expressed the idea that students use sensory modalities to absorb or learn information, and posited that students with mental disabilities had sensory deficits. The teacher's understanding of memory as information retention was related to her understanding of learning as information absorption. She drew a connection between useful information, meaningful practice, motivation, and learning, laying stress on the role of interesting, functional information.

The teacher explicitly expressed her conception of the teacher as a time and staff manager, a concept founded on the implicit understanding that organization promotes efficiency and that an efficient classroom aides in learning. She reported, however, that many of her ways of teaching students with mental disabilities had changed. There were indications that she understood these changes using travel and location metaphors. For example, she described new teaching approaches as changes in direction and movements into new territory.

The teacher discussed her view that students with special needs require a unique kind of help. In her conception they need specific techniques and individualized programs, as well as a special educator that is a caring and tolerant helper. She implicitly expressed a vision of the teacher as a guide helping the student to discover life. There were indications that she used specific goals to remind her of the direction she was working toward. Her primary goal was independence, which she understood as the signpost guiding her in her efforts to help students discover life. She had a desire to help her students lead enjoyable lives, and thought that enjoying an activity would help a child to learn it. Implicit in these views was the thought that the teacher is responsible for providing what the student needs.

The teacher's idea of learning as the absorption of information was the only one of her thematic clusters to address student learning, and this metaphor was her primary way of constructing an understanding of learning. The teacher built her understanding on the core idea of information as an object that could be received, stored, and transmitted. The appearance of this conception of information in the teacher's conversation and writing demonstrated that the metaphor of learning as absorption served a constructive function for her, allowing her to build other concepts on this founding metaphor.

The idea of learning as information input, for example, was implicit in her description of the sensory modalities that she thought her students used in order to learn. It also appeared in her

postulate that special needs students have difficulty learning because of sensory information deficits. The conception of information as something useful figured prominently in her discussion of the things that she felt her students should learn, and the concept of information retention appeared in her description of her students' memory process. Implicitly influencing her way of constructing her understanding of learning, the metaphor of learning as information absorption was a core feature of her understanding of learning and teaching.

The teacher stressed the concepts of management, efficiency, and organization: the importance of a smoothly run classroom. However, she also recognized that whatever plans were made for management of the day there are "some days you don't get that covered at all because of all the kinds of things that have happened." While she described new teaching approaches as moving into new territory, she said that she preferred to be familiar with her teaching approach, and moved cautiously toward change. Her descriptions implied that she perceived change as necessary but disruptive. Her cautious approach could be viewed as a way to manage the unpredictability of change. Resolving unpredictability with order was another unifying concept of some of the understandings she held about teaching and learning, both her understanding of change as movement and her understanding of the special educator as manager were connected to her understanding of the teacher as helper by the idea of managed unpredictability.

Describing teaching as "like life," she portrayed it as vibrant and busy, "a series of events, and experience, and interactions with people, and exciting things, and not so exciting things." She drew a picture of the student being guided through life's complexity by the teacher. Her conception of the teacher as a guide toward learning was connected to her idea of managed unpredictability, and to one other concept, her sense of the long term goal as a signpost. The conception of managed unpredictability, another core feature of the teacher's understanding of learning and teaching, linked her understanding of change as an evolving journey, her understanding of the special educator as a manager and guide, and her understanding of the goal as a signpost.

### Was There Evidence of the Psychometric, Developmental, Behavioral, or Information Processing Perspectives in Her Understanding?

#### Evidence for the psychometric perspective.

A computerized search of the teacher's transcripts for terminology reflecting a psychometric perspective identified two concepts possibly related to the psychometric approach: level and capacity. There were indications that the teacher thought the ability of students with mental disabilities limited. For example, as she talked about the organization of her classroom, she said, "This year I had kids with such varying ability levels that I couldn't really run [the classroom] the same." Earlier in the same conversation,

while discussing a learning activity, she said that, for some students "it was a bit over their heads." When describing the development of individual education plans for students, she described attempting to determine "what their learning capabilities were," a phrase suggesting that she saw learning as an ability with limits. She thought that there were similar limits to students' ability to behave. When speculating on the reasons why a student was not learning, one reason she offered was, "I think maybe he wasn't capable of these expectations from a behavioral point of view." She also suggested that ability could be tested. Commenting that she occasionally finds it frustrating and challenging to help her students remember, she said, "I guess there needs to be a lot of testing done to see if they really are as capable as we think they might be."

Although there were indications that the teacher's practice included the concept of capacity in relation to ability, learning, and behavior, her explanation was less evident. Other than one reference to the psychometric concept of mental age, made in discussing the learning of social skills by students with special needs, she did not identify the factor or factors that she thought determined a student's ability, learning, or behavioral capacity. In summary, though the concept of capacity was implicitly expressed, there was not enough convincing evidence that this concept played a large role in her teaching practice. If used to express a level of cognition or of capacity, the concept of level may be evidence of the psychometric approach. Though the teacher mentioned levels of ability, she more often referred to levels of academic training or

grade. Thus the teacher's expression of a few ideas related to this approach offered little evidence that the psychometric perspective figured prominently in the teacher's understanding of teaching and learning.

Evidence for the developmental approach.

The teacher rejected the concept of developmental stages. Even before the first conversation, she wrote, "Learning is specific, not necessarily sequential, or following a developmental model." She later reiterated this verbally. In our second conversation she stated, "Kids with special needs don't necessarily progress in exact developmental sequence. And especially older kids."

Although she explicitly rejected the idea that learning develops sequentially, she did present two concepts related to the developmental approach. The idea with the least supporting evidence will be presented first. From the developmental viewpoint, learning is seen as progressing or moving over time, and talked about as being delayed or accelerated. In writing that people with mental disabilities "progress at a slower rate," the teacher presented a minor indication that she perceived learning as moving over time. The other idea that could be seen as developmental was her explicit comment that meaningful practice promotes learning. She said that students with special needs are "at school to learn useful information, skills, whatever, that will be of benefit to them along their life," and said that for students with special needs to learn, "It has to be interesting to them. It has to be meaningful to

them in some way." There was strong evidence that the teacher thought meaningful practice of useful, motivating activities promoted learning in students with mental disabilities.

The reported arrangement of her classroom mirrored this understanding, as she explained its organization to facilitate the practice of functional activities. Her reported curricula and the teaching activities that she presented were also grounded in the concept of function. She also identified her program as oriented toward practising life skills, and reported that her teaching approach had evolved into a "whole experience approach" where she integrated learning topics, rather than presenting them as discrete subjects. Because the developmental approach argues that learning may be facilitated through experiencing activities in real life contexts, this aspect of the teacher's understanding could be said to be reflective of the developmental approach.

#### Evidence for the behavioral approach.

The teacher evinced some awareness of the concept of objectified behavior. For example, while identifying differences between special and regular education teachers, she remarked that the former "are more tolerant of certain behaviors . . . because often the students [that they are] working with have acting out behaviors." Describing her own students as "simple and endearing," she noted that "when you work with kids with behavioral problems, then it's not simple. It's quite complicated." She also reported thinking that students behave differently in the classroom and in the community.

Before our first conversation, she wrote that one thing that she understood about teaching students with special needs was that "behavioral considerations may affect learning." Thus the teacher's comments about behavior were general rather than specific in nature: though she had an awareness of behavior as an objectified entity, she did not express behaviorist concepts as she wrote or talked about behavior.

She reported a few teaching practices that could have provide evidence of a behavioral approach. For example, she recognized that providing motivation helped a student to learn, but placed this concept in the context of meaningful practice, and not within the behavioral framework of reward and consequence. Similarly, the teacher briefly mentioned observation, noting for example that "[I] rely on my observing skills quite a bit to detect and notice all kinds of things"; however, she did not report using these skills in a precise, programmed, or analytical way. She did not, that is, report applying them as a behaviorist would. Setting learning goals can be an expression of a behaviorist perspective, and the concept of goal setting appeared as an aspect of her understanding about teaching. She reported setting educational goals in consultation with parents and staff before planning for her students, and her descriptions of teaching indicated use of goal setting to give her a sense of educational direction. In the sense that she used the concept of goal setting to break tasks into specific learning targets, her approach could be identified as behaviorist. However, the evidence indicated an understanding of goals as signpost or teaching guides,

an understanding that was more contextual than mechanical in nature.

Evidence for the information processing approach.

The teacher explicitly mentioned some ideas that could be said to be derived from the information processing approach, although she did identify them. For example, when considering the ways in which teaching and learning are different, she said: "Teaching is outputting and learning is inputting. . . . You're putting out information. You're teaching it, and then the learner is hopefully taking it in." In another conversation, she remarked: "The problem is, with these kids I think they can take in the information. But then if they have processing problems or memory problems, then they may not remember, or what they take in may be garbled." These two examples express ideas from the information processing field: the concept of information input and output, memory, and processing. More often, however, the teacher expressed information processing concepts indirectly.

Objectifying information as a concept, the teacher implicitly identified learning as the intake and retention of information, defining learning as "acquiring new information" and as "soaking up the information like a sponge." She expressed many other conceptualizations of information that suggested an information processing approach to learning. She considered information to "bombard" students as "they go through their life and make critical or good decisions about this information that's coming at them," and

viewed it as being "gathered" as students participate in classroom activities. She expressed the idea that information should be useful to students, seeing her role, for example, as "trying to enable [students] to keep this information for their use as they mature." She also expressed the understanding that there are different varieties of information. She thought that "work[ing on certain] social skills . . . That's practical information that you're passing on to the kids," and said that when "you're teaching math, science, reading, writing, you're passing that information on." There was strong evidence that the teacher objectified information as a concept.

Her understanding of learning as the absorption of information was also manifested in many ways. She described learning as "taking in information, and then analyzing and using it," and as "being open to taking in the information." She also described learning as "information that is being absorbed," as "soak[ing] up information like a sponge," as not "sinking in," as being "acquired," and as being "sort of like osmosis." Throughout her conversation and writing, she evoked an image of learning as information input, an idea that can be directly tied to the information processing approach.

There was further evidence of the information processing approach in the teacher's use of the concepts of information retention and sensory input. She stated, for example, that students must practise information or "They're not going to retain it. They're not going to keep that information and are not going to be able to

use it." Once she even directly expressed the image of memory as a place where information was stored, saying that teaching "enlarged [a student's] knowledge bank of information." The idea of memory as information that can be stored and retrieved was evidence of an information processing approach to learning.

The image of information inputting through sensory channels that was omnipresent in her thinking was also evidence of the information processing approach. For example, she used the idea of sensory modes to explain learning strengths and weaknesses:

I really think that we learn better through certain senses than we do others. . . . And I think very much people with special needs learn through their senses, and if certain senses are deficient, like vision or hearing or whatever, then they have to rely on their other senses.

This comment exemplifies another idea derived from the information processing perspective, the concept that students with mental disabilities have sensory deficits. The teacher's conceptualization of information as a knowledge object, her understandings of learning as information input, memory as information retention, and teaching as information output, were all evidence of the information processing perspective.

### A Summary and Discussion of This Section

Although there were indications that the teacher thought students with mental disabilities to possess limited abilities to learn or perform, there was not enough convincing evidence for terming

this way of thinking an example of the psychometric perspective. The teacher explicitly rejected a primary concept of the developmental approach, the idea of stages. Except for one minor indication, the only concept expressed that could be labeled developmental was her understanding that meaningful practice could promote learning. There was also little evidence of the behaviorist approach. Though she mentioned some concepts that could be identified as behavioral, a consideration of her way of expressing those ideas indicated that they were not evidence of a behavioral approach. The teacher expressed a number of concepts that could be labelled as examples of an information processing approach to teaching and learning. These included the conceptualization of information as a thing that can be inputted, retained, and outputted, the identification of learning as information input, and the ideas of sensory input and sensory deficits. One of the two core features of the teacher's understanding, the metaphor of learning as information absorption, could be described as representing an information processing approach to learning.

#### Was the Research Experience Meaningful to the Teacher?

During the second conversation, the teacher spontaneously reported that she was finding the experience enjoyable and interesting. In the final conversation, she discussed the experience of hearing an observer's summary and interpretation of the information that she had provided: "It's nice to hear your analysis of what I'm saying, little snippets here and there. It's sort of a

reaffirmation for me of what I'm thinking about but in your words, and that's interesting." She added:

It's very interesting to hear my thoughts in your words, and it makes me feel good about what I've been doing the last eighteen or sixteen years. That's why I say I'm sitting here deciding whether I like all this. I'm deciding that I do like the way I've done things, or my approach to things.

Asked in the final writing activity to record what she had learned, the teacher simply wrote that the experience clarified her teaching approach, and made her feel more comfortable with her teaching style.

In the first and last written exercise, the teacher was asked to write about what she understood about teaching a student with mental disabilities, and the ways in which she thought that these students learned. A comparison of her first and last statement revealed that though she provided a more detailed answer in her first response, they were essentially the same.

### A Presentation and Discussion of the Findings for the Fourth Teacher

#### An Introduction to the Fourth Teacher (Secondary)

This teacher earned a Master's Degree in Rehabilitation of Developmental Disabilities. He has taught for fifteen years, all of them as a special educator. He confirmed that he identifies himself as a special education teacher. For eight years he taught in a

segregated setting, and for the last seven years of his career he has taught a special class in a secondary school. At the time of the present study, the students in his class ranged in age from thirteen to twenty years of age. The teacher had experience teaching students with a broad range of developmental disabilities, including students with moderate to severe mental disabilities, physical disabilities, and autism, as well as behavior problems. The class of students that he was teaching at the time of the study met the school district's criteria for placement as students with moderate mental handicaps. The teacher thus met the established criteria to be included in the study.

What Did the Reported Experiences and Thoughts of the Teacher Reveal About His Understanding of Learning and Teaching, and the Ways in Which He Constructed That Understanding?

The environment affects student learning.

The teacher recognized that his teaching approach had changed over the years. He outlined that he had moved from an approach whereby specific skills were taught within a rigid classroom schedule, to a more "global" approach in which a few core skills were identified and then incorporated into the entire day. He stated that as often as possible he teaches his students in the community rather than in the classroom. The idea that environments facilitate learning in individuals with mental disabilities was a key aspect of the teacher's explicit understanding

of learning. As he put it: "In the proper environment, that's the only way the kids really learn."

In the first writing activity, the teacher was asked to identify ways in which a student with mental disabilities learns. He wrote that, among other things, the student learns best "in the environment that he needs [the] information for." In the final written activity of the study, in which he summarized his understanding about teaching students with special needs, he wrote about the importance of focusing on what a student needed to learn, and then "set[ting] up the environment" to make it happen. In conversation, he also evinced ideas about the relationship between environment and learning, saying, for example, that students with special needs require "an environment in which they're going to use a skill, as opposed to sitting in a classroom."

The teacher defined "environment" as a situation, external to the classroom, in which learning can take place: "The place he's going to learn is in Thrifty's or Safeway's. He's not going to learn here in the class." He tended to interchange the concepts of environment and community, saying, for example, that students with mental disabilities learn best in "the environment in which they're going to be. . . . [The functional skills are] something they're going to have to learn. They can only learn it in the community, so that's where we teach it." He described his job as:

an environmental psychologist. Each day I go out there I have to spot all the things . . . everything that might detract the student from being able to learn, whether it's the lighting or the noise or

too much confusion in product display on the shelves. I have to do all that as well as pay attention to the student actually walking through.

The teacher portrayed himself as an active user of the environment: he "provided the necessary learning environment," or tried "to look at how I can adapt the environment and use my knowledge to raise their level." He described his role as mediating between a student and his or her environment: "to filter out of the environment all the extraneous stuff," and "to focus on the best way for them to pick up the information." He indicated that he applies his understanding about environments to his teaching, and described in some detail his use of environmentally-based activities to teach students.

#### Teaching as focusing.

The idea of focusing was an aspect of the teacher's explicit understanding of learning and teaching. It appeared in his discussion of his ways of planning teaching activities, when he then tended to use the concept to indicate selecting learning goals or teaching strategies: "I've first got to focus on what it is the kids need to learn, and then I have to focus on the best way for them to pick up the information." "Now I'm at the point [in my teaching] where I concentrate on some very specific things, behaviors, or needs of a student." "The focus isn't on curriculum planning and testing . . . but [on] looking at a small group of handicapped students and how they think."

The idea of focusing also appeared in the teacher's description of his teaching practice. He outlined the need for a student with mental disabilities to be focused upon a specific goal: "These special needs students have to focus on very specific things in order to . . . to get to the next link." He said as well, "I go out in the community, and if I see a stop sign, and that's what they're learning, then I try to get [the students] to focus." Most often, however, focusing was tied to the idea that extraneous distractions can disturb a student's learning. For example, he said, "I began to realize that [in order to learn] the kids . . . had to focus on specific things, and they couldn't. So I had to get rid of the extraneous." He also said:

It took me time to get to the understanding that you couldn't just sort of cram [things students needed to learn] into them. You had to separate out all the extraneous noise, visual distractions and all that, in order to get them to focus on a specific thing. Or you had to motivate them so highly that they picked it up.

The teacher described the way in which he might focus a student toward the goal of getting a shopping cart. He related that after entering a store the conversation might sound like this: the teacher asks, " 'What is it you need?' [The student then] might say 'I need the list,' or 'I need the money.' [I might then ask,] 'What is it you need when you walk in the store?' If they still don't get it, then [I might ask,] 'What is it you need to carry the groceries?'" He continued with the comment that "in that process you have to select what to identify for them to do." There was an implication in these statements that teachers play an active role in reducing distractions.

The teacher portrayed himself as actively intervening, progressively providing more specific cues, in order to get the student to complete the task. He stated elsewhere that, "A teacher is someone who provides the necessary learning environment, and understanding, and motivation." The teacher conceived focusing as the means by which a teacher may ensure effective learning within the community environment.

Learning as absorbing information.

When the teacher was asked to fill in the phrase "Learning is like (blank)" he answered, "Learning is like absorbing the world around you, with as much vibrancy as you can possibly provide." Asked to elaborate on the word "vibrancy," he explained that it was "enough energy to pick stuff up. What's going on around you, exciting things, all the various facets of what we do every day. . . . Learning is everything. You're constantly learning. Your mind is constantly absorbing stuff."

This image of learning as dynamic absorption made a variety of explicit appearances during both his conversation and writing. This image, however, emerged not only explicitly, but also implicitly. For example, the teacher talked about assimilating, grasping, absorbing, or retaining information. He reported working hard to "assimilate enough information" to teach a certain subject to students. In another conversation, he discussed a particular student, saying: "I think there's a possibility that he can grasp it, because he does grasp other things." He wondered, "He can retain knowledge on

some things, why not others?" Explaining a difference between a student with mental disabilities and one without, he said that the student with mental disabilities was "not able to absorb as much as a regular student." He described some students with special needs as environmentally, economically, or mentally, deprived and as a result "not being able to absorb it all."

His most common metaphor for learning was "picking up information." For example, he discussed his job this way: "I've first got to focus on the best way for them to pick up the information." He told of his "sense of satisfaction when I see students have actually picked something up, learned something." He answered the question "How do you tell if a student is learning?" with the response, "If he is able to pick up and understand immediately or generalize that information." He even explicitly defined learning as "picking up information that you can use." The manifestation of this metaphor both explicitly and implicitly suggests that it is powerfully evocative for this teacher.

#### Learning and teaching as an exchange of information.

The teacher was asked to talk about the differences and similarities between teaching and learning. His answers provided examples of a distinctive aspect of his understanding of these activities. One primary difference that he identified between the two was that he learned more when teaching, having found that as teacher he had "to know the knowledge, and, work out a way of turning it around and presenting it." This explanation framed

teaching as an active knowing and giving, and highlighted knowledge as the medium of exchange; when asked how teaching and learning were the same, he described learning as "imparting or taking in knowledge," portraying the student as a receiver of information. He commented that "teaching and learning . . . are the same thing. The difference is one person is giving out information, or giving out a way to collect information, to another person. But both people are learning." This perception seemed to be a significant aspect of the teacher's understanding of teaching and learning.

A few further examples will underline the teacher's understanding of the role played by information in learning and teaching. Describing his way of determining that a student is learning, he stated that if the student is learning he or she is "obviously able to pick up and understand immediately or generalize that information." During another interview he stated, "Learning to me means picking up information that you can use currently or in the future." In these phrases, he equated learning with acquiring, gaining, or picking up information, and again expressed the idea that information was the essence of learning. This teacher viewed teaching and learning as an exchange of information, with the teacher providing information, and the learner receiving it. This image seemed to be a distinguishing metaphor of this teacher's understanding.

Teaching students with mental disabilities requires structure.

Responding to a request to describe a typical day, the teacher closely detailed the day's schedule, and ended by declaring that the program was "totally structured." He declared that all of the staff had to "work in concert in order for the student to learn." He later explained that because of the number of adults working in the program, "It simply can't work without structure. The more detailed the structure the better organized everybody is. . . . Everything needs to be detailed. It ends up being a very complex program." The teacher equated structure with scheduling and organizing: whenever the concept of structure appeared, it indicated spatial or temporal organization.

For example, talking about his early days as a teacher he discussed having practised a "very structured type of teaching,' rigidly fitting curricula into a timetable. Discussing teaching students with special needs, he remarked that "some kids love structure,' and suggested that it can be a motivator. Outlining similarities between special and regular educators, he noted that the "superimposed structure," the scheduling and classroom space, was the same in each situation. Talking about the importance of structure to his teaching, he said: "I like it because it gives me a base. It gives the kids a base. . . . We all need structure." But he added that, for himself, structure was not a requirement: that he could be flexible when required. When speaking about special educators he said that "as a whole, they are very structured. They want to get from A to B."

The idea of structure as a temporal or spatial ordering, whether an organization, a routine, a source of security, a foundation, or a linear way of working, was another quality of the teacher's understanding. The teacher understood the present research study in this way: he reported appreciating that the study provided "a structured program . . . a structure within to think," and he saw the research process "set up [as] a structure for discussing teaching." His believed that thinking could be stimulated by a structured program.

#### The special education teacher as manager.

He described teaching his class as a complex experience, "highly detailed and crisis oriented":

My mind is jumping between any number of things all day long. I've got the kids to deal with. I've got the teaching assignments that I do. I've got other students that I have to program for, and then the programming for all the adults [that work in the classroom].

He explained that this complexity was one reason why he enjoyed "sitting down and talking to [the researcher]. It begins to rebuild the scattered thoughts, and clarifies them."

He reported creating a "uniquely structured program" had been built to manage this complexity, but declared that because of the unpredictable nature of the students it "breaks down almost immediately," and ends up "being a bit of crisis management":

"Maybe crisis management is a bit strong. It's not like a police station where you are just waiting for a call. But there are a lot of things that have to be dealt with immediately that aren't in the schedule." He used this image of a station on other occasions as well. For example, asked to fill in the statement "Teaching is like (blank)," he replied, "Right now, teaching is mainly like teaching in Grand Central Station."

A special educator needs empathy and insight.

The teacher said that his need to "know exactly what I was doing" when teaching led him to earn a Master's degree in Special Education. Though he still saw himself as a specialist at the time of the study, he reported that his ideas about this aspect of being a special educator had changed. "When I started out I felt I needed a lot of very specialized information. . . . [and] The way you get more specialized is to take courses and certificates." He said he realized that "it doesn't take a highly specialized person to teach these kids. I think it takes someone with insight into how people think, because these kids think differently, and definitely [it takes] a nurturing instinct." He reiterated: "You can have the skills necessary to teach someone, but if you don't have the empathy for the student" you cannot be a good teacher. These two qualities, empathy and insight, were aspects of the teacher's explicit understanding about learning and teaching.

Occasionally he discussed these qualities separately. He offered the "observation that we as special education teachers have to look

for that kernel that will sort of turn the page for the student." He described himself as having "intuitive ability to understand where the person is coming from, . . . how he's feeling," and said that he valued a caring attitude toward students. He also found empathy to be an important quality to bring to his contacts with the parents of his students.

He situated the concept of empathy close to the idea of understanding, or insight. For example, he defined a teacher as "someone who provides the necessary learning environment, and understanding, and motivation." Asked to explain "understanding," he said that he meant: "understanding of the students' needs. You really have to be empathic with these kids to be a good teacher." He used the concepts understanding and empathy synonymously in his writing as well as his conversation. During the first writing activity, he was asked to record what he understood about teaching a student with mental disabilities. He wrote that, depending on the student's disability, "You generally have to watch the student and try to get into his thoughts, and look at his background both in education and environment." He listed the use of observation, empathy, and thoughtful insight as important ways to understand individuals with disabilities. Empathy and insight formed another dimension of the teacher's explicit understanding of learning and teaching.

Knowing a student's background builds understanding of the student.

The teacher reported finding it useful to know about his students' background: "You've got to look at this context in order to be able to teach them." He mentioned "background information running through my head," educational background, and "the background curriculum [that] is set for you," but more typically he mentioned the concept of background in relation to his students. He thought that a "background understanding" of a student could help to bring the teacher to the "focal point where [he or she is] teaching the kids." From that perspective, he defined background, in writing and in conversation, as his students' experiences, education, significant others, and "the environments they live in or have lived in." He interposed the concepts of background and environment.

Some evidence for the teachers' application of this approach appeared when he was asked to write about his most challenging student and the one he found most memorably successful. In both instances, he began by laying out a history of the students' schools and programs. He then built on this to describe their present needs and programs. Thus, in portraying his students, he turned first to a description of their backgrounds. His understanding of his students was thus at least partially constructed from his knowledge of their backgrounds, in practice as well as in discussion.

### A Summary and Discussion of This Section

The teacher explicitly stated his view that the environment could facilitate learning in students with mental disabilities. He described himself as actively adapting, using, and providing the environment for the student, generally conceptualizing environment as the community outside of the classroom. He also thought of himself as an agent filtering or focusing information from the environment to the student. His understanding of focusing was related to his concept of environment. The idea of focusing appeared in his discussions of his ways of planning and teaching and selecting goals and strategies.

The teacher conceived information to be the essence of learning, and his most common metaphor for learning was the "picking up" of information. The concept of learning as absorption emerged in many explicit and implicit ways. He also drew an image of learning and teaching as ways of exchanging information. While comparing learning to teaching, he described the teacher as an information giver, and the student as the recipient. Both, in his view, were learning.

The teacher conceived of structure as spatial or temporal organization. He understood teaching his class as a complex experience. He described his attempts to structure the program as attempts to manage this complexity, but found that the unpredictability of the students made this management task difficult.

He thought that in order to teach special needs students with complex learning needs, the special educator needed to understand the student. He considered it to be more important for the teacher to understand than to have specialized skills: empathy and insight were important qualities to bring to teaching the student. He thought that gathering a background understanding of a student's acquaintances, experiences, education, and past environments would help in teaching the student.

The teacher's understanding can be summarized or condensed to eight metaphoric themes, some of which appeared to be closely connected. For example, the teacher conceived environment as something that had the potential to facilitate learning. He framed himself in relation to his depiction of environment, describing himself as filtering or focusing information from the environment. He also framed learning within his understanding of environment, stating that learning was the absorption of information from the environment.

His understanding of learning and teaching as information exchange demonstrated the key feature that tied all these themes together: the role that he gave to information. The teacher's understanding of the environment, the teacher, the learner, and teaching and learning, were all implicitly constructed on the founding metaphor of information as a thing that could be adapted, absorbed, or exchanged. He understood the environment as an information source, the teacher as an information adaptor, the

learner as an information absorber, and teaching and learning as information exchange.

Was There Evidence of the Psychometric, Developmental, Behavioral, or Information Processing Perspectives in His Understanding?

Evidence for the psychometric approach.

In the second conversation, the teacher described his approach to educational planning as founded on attempts to "define three or four things the student . . . has the capability of learning," and the effort to "incorporate" these things into the student's entire day. In essence, the teacher reported that in selecting what to teach, he considered the student's ability to learn, but that in order to teach what he had selected he considered environment and function. He later described his students as "kids with real deficits in their ability to learn." The appearance here of the idea of learning as ability--a psychometric concept--could lead to the conclusion that the teacher's words were evidence of that approach. However, by stressing the importance of environment and function, he placed this within a developmental framework.

Depending on how it is used, the concept of "level" can imply many things. If the student is seen as functioning at a certain cognitive level, the word "level" exemplifies the psychometric perspective, but if the student is seen as moving through developmental levels, the word "level" exemplifies the

developmental perspective. A computerized search of the teacher's transcripts was used to determine that the concept "level," though used often, was used primarily in only single way: the teacher used it to denote a student's location on a hierarchical scale of function, and he applied the word as a label. Only two levels were identified, high and low, in statements such as, "Eight years ago, the level of student was much higher than . . . today," "We've got kids or have had kids that are really high functioning and kids that are extremely low functioning"; and, "Unless they're fairly high level or until they become more mature," were but a few examples. On a few occasions "level" indicated a location within the educational system. The phrases, "They teach at the high school and at the university level," "We taught kids who have survived at almost the minimum essentials level," and, "At the elementary level, you've got grade one and grade two teachers," were examples of this. He also mentioned levels of organization, teaching, excitement, conversation, and concept, but the context and infrequency of these references indicated that they were of little significance to the question being explored here.

Use of the concept "level" in this way suggested that the teacher labeled his students from a psychometric perspective. However, the psychometric perspective strongly emphasizes cognition. This teacher did not use cognition for his categorical criteria, he used the developmental idea of function: what first appeared as evidence of the psychometric perspective upon closer investigation appeared to be evidence of the developmental perspective.

Overall, analysis suggested that this teacher occasionally used ideas from the psychometric approach, but did so mainly in order to categorize his students. Their use was tempered by the developmental perspective.

Evidence for the developmental approach.

Although cognition, maturation, and biological function are primary aspects of the developmental perspective, the approach also presents environment as an important influence on learning. The teacher did not refer to cognition, and rarely mentioned development or growth. His few uses of the notion of development referred to the development of teaching strategies, or employed the term "developmental disabilities" as a label. He mentioned growth only in reference to his own process of growing up. However, the concept of environment appeared to be a prominent feature of his thinking about teaching and learning, and he often stated explicitly that environment was important to the learning of students with special needs. His reiterated understanding that environment could facilitate learning represented a developmental perspective.

The teacher saw his role largely in terms of managing the learning environment:

Each day I go out there I have to spot all the things . . . everything that might detract the student from being able to learn, whether it's the lighting or the noise or too much confusion in product display on the shelves. I have to do all that as well as pay attention to the student actually sort of walking through.

His idea that proper environment assists student learning was developmental in nature, but his contention that an environment contains stimulus distractors, and that a teacher must work to reduce stimulus input and focus the student, were also evidence of the information processing perspective.

The teacher's sense of the importance of meaningful, functional activities was another aspect of his understanding of environment that related to the developmental approach. He reported selecting learning goals from a functional perspective, looking at "whatever it is [student] need to know for their future life."

#### Evidence for the behavioral approach.

Aspects of the teacher's understanding were allied with the behaviorist approach. Behaviorist imagery, terminology and concepts occasionally appeared in his language. For example, the teacher was asked to talk about his first experience teaching a special needs student. He said:

That summer classroom was my first experience. I was curious to see how I could cut down on the self [stimulation] and organize the boy on track or on task . . . trying to see if I could take what he was doing and manipulate him, or manipulate that behavior, into a learning process.

He described his first day in that class: "I was just thinking about surviving and making sure that everything was running smoothly."

In each of these accounts the teacher isolated the behavior from the

student. He labeled the behavior, objectifying it and the student as things to reduce, organize, or manipulate.

The teachers remarks revealed that much of his graduate education was founded upon the behaviorist approach. When he discussed his experience at graduate school he mentioned learning to analyze tasks in detail, identify stimuli, build step by step programs, use such teaching approaches as chaining, and "all the rest of the neat little tricks, then I got into behaviors and how to, probably confine is the best word, some really violent behaviors." He employed a mechanistic language of isolating, breaking down, analyzing, programming, and sequencing learning, and described instruction as a series of more or less effective stimuli. These images were evidence of a behaviorist approach.

While speaking about graduate school, he added that he has since moved away from a dependence on data taking and detailed task analysis. He recognized that he continues to use this approach, but that he now does so more judiciously, "I'm at the point where I concentrate on some very specific things, behaviors or needs of the student." He noted that he had formerly called himself a "people programmer," and reported that he had moved away from that approach as well. As he talked about these changes, he stated his perception that the behaviorist approach tended toward objectification. He noted that as the change occurred:

I began to see the students as, I hate to say this, but more human. If you're taking data on them all day, they become subjects, just like in University. You're not working with people. You're

working with subjects, and I guess that natural empathy that I have . . . was opened up again, so my empathy towards the individual started to appear in the way I worked with the kids.

However, the behaviorist approach remained apparent in descriptions of his present teaching experiences: in the concept of motivation, for example. He thought that for the exchange of teaching and learning to work, both teacher and learner needed to be motivated, and noted that "with the special needs kids, often you have to provide the motivation." He presented behaviorist images and ideas such as: "focusing on a chain of events," using "behavior modification techniques," "extinguishing behavior," "fading out" cues over time, and "controlling" a student to stay on task before receiving a reward. He also asserted that in order to teach special needs students, "You have to break all the different tasks down in your own mind and then sort out how you're going to present those tasks to that student."

#### Evidence for the information processing approach.

The teacher suggested that one difference between teaching and learning is that, "One person is giving out information, or giving out a way to collect information, to another person." He also said that teaching is different than learning because the teacher must decide how to present the information to the student. In its simplest configuration, the information processing approach describes learning as a mental process involving information input and output. This teacher's depiction of the student as a recipient, of the teacher

as information presenter, and of forms of teacher presentation as sensory modes, complied with the information processing approach to learning and teaching. There were indications that the teacher constructed his understanding of teaching and learning from aspects of the information processing approach. One indication was his description of the concept of personal energy as a thing the teacher outputs, as a motivating or overwhelming stimulus that the student can input. Another example was his portrayal of the environment as a potential source of distracting stimuli.

The images of environment as distractor and of himself as a stimulus filter, or focusing agent, appeared during a discussion of his role in a student's program. He expressed these concepts explicitly: "I began to realize that [in order to learn] the kids . . . had to focus on specific things, and they couldn't. So I had to get rid of the extraneous." The integrated concepts of filtering, focusing, and absorbing, connected to the idea of extraneous stimuli, could be considered further evidence of the information processing approach.

#### A Summary and Discussion of This Section

The teacher expressed the ideas of learning as ability, and of level as a placement in a hierarchy. These concepts seemed at first to be evidence of the psychometric perspective, but he placed them in a developmental framework by stressing the role of environment and function. His ideas that environment, meaningful activities, and experience could facilitate learning were further examples of a

developmental approach. Behaviorist imagery, terminology and concepts appeared when he discussed his past training, most often in relation to present practice when he discussed a specific behavior or objective. He reported that though he continued to use behavioral approaches he had learned at university, he did so judiciously. His accent on the role that information plays in learning, his description of environment as a source of distracting stimuli, and his conceptualization of learning as absorption and teaching as focusing and filtering, could all be identified as examples of an information processing approach to learning and teaching. There was evidence in the teacher's conversation and writing of three of the four historical perspectives on teaching and learning. Though his primary metaphor for teaching and learning, that of information management, was drawn from information processing, the teacher blended, or integrated, approaches from all three perspectives into his reported thinking and practice.

#### Was the Research Experience Meaningful to the Teacher?

The teacher commenced his part in the present study with a positive attitude toward educational research. He had some past experience in research, having participated in a project at university. He reported having enjoyed that experience, as well as continuing to apply what he learned.

As this study began, the teacher reported anticipating that it would stimulate, refresh, and clarify his thoughts, and hoping that it would contribute to knowledge about teaching. He continued to

evinced this positive feeling throughout the study. He spontaneously remarked that he appreciated the opportunity to reflect on his teaching, and to have "someone such as yourself come in with a structure within [which] to think." At the end of the research cycle he reiterated this: "I've enjoyed being able to expand on some of my thoughts. It gave me a format to think about what I've been doing, as opposed to the classroom situation where it's minute by minute." During the final conversation, he reported responding positively to the experience, noting again that it had helped him to clarify and synthesize his thinking. He suggested that the study could benefit other teachers, and expressed an interest in doing a follow up in the new school year.

A comparison of his first and final statements about what he understood about teaching students with mental disabilities, and the ways in which he thought such students learn, revealed essentially similar answers. This, and his remarks about the study, suggested that the research process did not significantly change his awareness of his understanding of learning and teaching. In summary, the teacher carried his positive feelings about research throughout the research study. The research experience seemed to affirm his understanding of learning and teaching, rather than to change it.

## An Overall Summary and A Concluding Discussion

### A Summary and Comparison of Results From All the Teachers

By analyzing each special education teacher's written and spoken statements, it was possible to identify and examine aspects of his or her understanding of learning and teaching. These aspects could be clustered into groups and summarized thematically. The teachers exhibited an average of seven central themes. For each teacher, some themes were connected, and branched to a few core metaphors or images. These metaphors were stated explicitly and implicitly. Overall, fourteen of the teachers' total number of metaphors were explicit and eight were implied. Seven metaphors were both explicit and implicit.

Learning as growth, as an adventurous journey, and as a putting together of information were the first elementary special education teacher's core metaphors for learning. Her core metaphors for the special educator were those of parent and problem solver. These metaphors were all closely connected. The second elementary teacher's root metaphors for learning and teaching were those of journey and of the transmission and reception of messages. Her core understanding of teaching was that it is a creative act, requiring the balance of craft, practice, and feeling.

The core conception of learning of the first secondary special education teacher was that of learning as information absorption. The primary feature of her understanding of teaching was her sense that it involves managing unpredictability. Linked to this feature

was her conception of teaching as a journey, and of the special educator as a manager and helper. The second secondary teacher stated that students with special needs require empathy. He viewed learning as information absorption. The root metaphor of information as an exchange between teacher and learner appeared in his discussion of environment, teaching, and learning. Another key concept was that of teaching as a complex act requiring the creation of structure.

A comparison of the teachers' core metaphors revealed several patterns. For example, a few of the teachers' ways of understanding could be sorted by the grade levels that the teachers taught. The elementary teachers exhibited a common metaphor of learning as progress or growth, and both saw either teaching or learning as a journey. The secondary teachers also demonstrated some common metaphors. Both said that learning was absorbing information, and understood the teacher as a manager. There were also commonalities among some of the metaphors demonstrated by the secondary and elementary school teachers. One secondary teacher said that learning should be enjoyable, for example, while an elementary teacher thought that children learn best through play. In addition, one secondary teacher discussed learning and teaching as an exchange of information, while an elementary teacher described learning and teaching as receiving and sending knowledge.

The teacher as helper was a metaphor common to all of the teachers. One elementary teacher saw the teacher as a helper, and

the other saw the teacher as a parent, while one secondary teacher also saw the teacher as a helper and the other valued empathy with students who had special needs. Finally, when asked to speculate on the ways of learning of students with mental disabilities, all the teachers generally talked not about the students' ways of learning, but about the ways in which they were taught.

Each special educator's understanding was compared with four historical perspectives on learning and teaching. All the teachers exhibited features that could be identified as representing at least one of these perspectives. One elementary teacher integrated aspects of the information processing and developmental perspectives into her understanding. The understanding of the other elementary teacher also exhibited aspects of the information processing and developmental perspectives, as well as, to a lesser degree, the behaviorist approach. The developmental perspective was the most apparent, however. Aspects of the first secondary teacher's understanding could be identified as representing an information processing view. The understanding of the other secondary teacher integrated aspects of the information processing, developmental, and behaviorist approaches.

To summarize these findings on evidence for four historical perspectives, evidence for the information processing approach appeared in all of the teachers' metaphors for understanding. Evidence for the developmental approach appeared in the metaphors of three of the four teachers. Two teachers integrated aspects of more than one perspective: both elementary teachers

demonstrated aspects of the information processing and developmental approaches, though in varying degrees.

Finally, the teachers' responses to the similar questions asked before and after the research process were compared. The teachers were unanimous that participating in the study was a positive experience, and in appreciating the opportunity for reflection on teaching and learning. The teachers' responses did not demonstrate that a change in awareness had occurred between the first and last written exercises. Though it was hypothesized that teachers might become more aware of their understanding by participating in the study, it is important to underline that the study was exploratory and designed to discover teachers' understanding, not change it. The teachers did tend to report that the research process had affirmed or clarified their thinking. The final written responses of two teachers were more specific than their original ones, but the reason for this increased specificity was unclear.

### A Concluding Discussion

The present study has examined some special educators' ways of understanding of learning and teaching. Based on the suppositions that a teacher constructs understanding out of a personal landscape of knowledge and experience, and that language represents this sensemaking process, this study has investigated not only the content of each teacher's understanding, but the way in which that understanding was expressed and constructed as well. Previous research findings have indicated that images and metaphors are

some of the ways in which meaning is constructed. The present study has postulated that these findings would be confirmed, but that such metaphors would appear implicitly as well as explicitly. Finally, the study has proposed that the reported thoughts and experiences of experienced special educators would provide fertile ground for an exploration of the nature of teachers' understanding of learning and teaching.

The present research findings demonstrated that each special education teacher's reported experiences and thoughts offer a unique topography for exploring the ways in which understanding is constructed. A thorough consideration of the teachers' spoken and written language revealed some of the metaphoric content of each teacher's understanding, and located some of each teacher's ways of constructing meaning. Support was provided for the idea that the way in which a teacher constructed meaning could be determined through an examination of the teacher's language.

Results indicated that as each teacher's ways of sensemaking were identified through an analysis of his or her written and spoken responses, his or her ways of understanding could be clustered into groups. Each group represented a metaphor that could be described with a thematic phrase. These metaphors were primarily fundamental (core) or connected with other metaphors (branch). A few were neither core nor branch, appearing in isolation. Like the Russian matrohska doll that opens to reveal a similar but smaller doll nested within, the central themes of each group of ways of understanding could be unpacked to a few core metaphors. Resting

as they did at the center of the teacher's understanding, these core metaphors and images appeared to represent the primary ways in which each teacher understood learning and teaching.

This pattern, appearing throughout the analysis of the research findings, provided support for the supposition that understanding could be conceived as a construction. The themes sifted from each teacher's understanding could be viewed as the teacher's framework of understanding, while the teacher's core metaphors could be seen as the foundation of this construction. There was also evidence that each teacher's understanding had a personal contour determined by the relationships between the various metaphoric and thematic aspects of that understanding.

The findings demonstrated that the teachers' explicit and implicit metaphors for understanding could be gathered from their reported thoughts and experiences. Though these metaphors could be labeled explicit or implicit, they could be more accurately described by their proximity to a teacher's borders of awareness. Some metaphors, explicitly stated by the teacher, could be described as existing well within the teacher's awareness. Some understandings were stated explicitly and also implied, and could be conceived of as being located at the border of the teacher's awareness. Particular metaphors that were both explicit and implicit were at the core of particular teachers' ways of understanding though they were not identified as such by the teachers and not apparent until analyzed. Other metaphors were not stated explicitly, but evidence for them was implicit in what a

teacher said, and/or in the way in which it was said. These metaphors could be conceived of as being located beyond the teachers' borders of awareness. As well as being related, then--being branch or core metaphors--a special educator's metaphors for understanding could be placed along a continuum of awareness.

There was evidence that each teacher constructed his or her understanding individually, rather than inheriting a pre-packaged point of view. When each teacher's understanding was considered in comparison with four historical perspectives on education, many metaphors for understanding could be labeled as representative of one or more of the perspectives. However, there was insufficient evidence that the teachers were influenced by these schools of thought. Though the information processing and developmental approaches were best represented, for example, it was only through the application of content analysis that evidence for these approaches appeared: it is unclear that they would have emerged inductively from the teachers' language, and there was minimal explicit evidence that the special education teachers embraced any particular perspective. It could be argued that the eclecticism of the aspects labeled as evidence for certain perspectives, the perspective-blending exhibited by some teachers, and the lack of evidence that the teachers explicitly embraced particular perspectives, were all evidence that the teachers were not molded by any one of the four perspectives. Each teacher, rather, incorporated certain aspects of at least one of the four perspectives into his or her personal approach to learning and teaching. It

appears that schools of thought about learning exert less influence upon special educators than the teachers' own ways of constructing understanding.

To summarize, an interpretation of the overall findings reinforced the idea of understanding as a personal and individual construction. The evidence indicated that understanding can be conceived of as having a contour, a framework and a foundation. Both framework and foundation could be seen to be formed from thematic groupings and nested metaphors. The configuration of this construction of understanding appeared to be determined by the relationships between branch metaphors, core metaphors, and themes, and by the relationships between each group of understandings and the teachers' borders of awareness. These relationships were well-defined and could likely be rendered as a blueprint or a kinship chart.

When asked to describe the ways in which a student learns, the teachers inevitably answered with a description of the ways in which the student was taught. This commonality suggests that these teachers assumed a close connection to exist between teaching and learning. A similarly intimate relationship must exist between a speaker's understanding, what the speaker says, his or her way of saying it, and the actual event or experience. The present study demonstrated a strong connection between what a special education teacher said and the ways in which it was said. It was also demonstrated that the special educator's primary ways of speaking of understanding was with metaphor. It must not be assumed that

metaphor is only an analog for meaning. Rather, a teacher's ways of understanding cannot be easily separated from his or her actual understanding. Perhaps teachers' ways of making meaning are inseparable from the meaning itself: it could be that the experience, the perception, the conception, and the expression are one.

### Some Implications of the Investigation

#### Some Implications for Teaching Practice

Not surprisingly the teachers in this study mentioned having little opportunity to engage in conversation about learning and teaching. The pragmatics of day to day teaching rarely leave room for in-depth collegial conversation, and the teacher education approaches that teachers meet are often biased toward changing or reforming their practice (McKibbon, 1978-79; Bransford, Sherwood, Vye and Reiser, 1986) rather than affirming it. Clandinin noted, "Teacher education with a reflection component allows a student to reach deeply into his past through bringing up his imagery for inspection " (1986, p. 173). The findings reported here, and their interpretation, have similar implications for teacher education.

The present study was exploratory and designed to facilitate special educators' descriptions and thoughts in order to form a picture of the teachers' understanding about learning and teaching. This required a reflective interview process. During interviews the

teacher's words were quoted, paraphrased, clarified or summarized, but they were not challenged. Given that the teachers in this study uniformly valued this opportunity to affirm their understanding of practice, and that the findings indicated that special education teachers individually construct understanding, the need for teachers to reflect on what and how they think appears indisputable.

However, a designer of a teacher education activity that chooses to incorporate reflection should plan carefully. The teachers' positive response to the approach used in the present study indicates that reflective activities should be teacher-centered and motivate teachers to choose to reflect. Reflective activities perceived by teachers to be imposed or overly intrusive would likely be ineffective.

A format encouraging collegial reflection upon educational matters, perhaps involving the entire staff of a school, might be especially powerful. In sharing their knowledge and understanding with others, teachers would likely move toward fresh perspectives and toward deeper learning interactions amongst themselves, as well as with their students. Because of its demonstrated success, a refined version of the research design could serve as the framework for facilitating a deeper collegial reflective process among educators. For example, an analysis of the interview schedule used in this study indicates that verbal, general, and present tense questions about education were most evocative of themes for the participating teachers. Questions that asked the teacher to speculate, compare, define, or draw analogies were somewhat more evocative than

questions that asked the teacher to describe, be specific, or talk about the past. Using an analysis of the interview schedule from the present study, a version of the study's research design, and an interpretative process similar to the one followed here, it would likely be possible to develop formally a self-directed activity, instructional process, or interactive computer program by means of which teachers could reflectively describe and explore understanding of learning and teaching.

Occasionally in his or her career, a teacher may be challenged to change his or her understanding of learning or teaching. At the very least, encouraging teachers to reflect about what they know and understand would be an important first step toward enabling them to decide what, how, and why they may want to change. Good and Brophy (1974) have discovered that it is possible to change teachers' behavior simply by making them aware of what they do. Schon (1983) has found that "by the very act of describing their understanding of a task, the teacher could sometimes restructure it" (p. 321). Other investigators have also supported this point of view (Smyth, 1982; Keller & Grontkowski, 1983; Clark & Lampert, 1986). Shulman (1988) has noted, "Teachers will become better educators when they can begin to have explicit answers to the questions, 'How do I know about what I know? How do I know the reasons for what I do?'" (p. 33). Perhaps teachers involved in a change process could be supported with an approach that not only assists educators to identify what they understand but encourages them to consider the ways in which they understand.

### Some Implications for Future Research

An obvious topic for future research is the creation and eventual evaluation of ways of promoting reflective adult education practices, but the present study raises other potential topics for future research as well. It has been demonstrated that a teacher's ways of constructing understanding from experience and thought are revealed by an analysis of his or her spoken and written language. The factors that determine the development of this construction, however, were not identified by the present study, nor were the reasons for commonalities among the teachers. The formulation of a deeper comprehension of the evolution of constructed understanding could prove useful to the development of teacher education practices, given that one goal of teacher education is the facilitation of teacher understanding.

Information about the way in which the construction of understanding evolves might also shed light on the way in which understanding changes. The present study indicated that understanding is recognized with different degrees of awareness. It is likely that implicit understanding evolves into explicit understanding, but this likelihood could not be confirmed by the present study. It is possible that explicit understanding becomes implicit over time. Research that would investigate whether understanding moves closer to or further from awareness, whether a certain direction of movement is more desirable than another, and

the ways in which this emergence or evolution would occur, and could be best facilitated, might prove valuable.

A longitudinal study of a teacher's understanding might be one means of clarifying which aspects of the topography of a teacher's understanding, if any, are maintained or changed across time. A study that would consider a teacher's understanding before and after significant events such as a dramatic change in teaching assignments or the integration of a student with mental disabilities into the class of a teacher who has previously taught only regular class students, could also indicate whether a teacher in such circumstances changes his or her understanding, or maintains his or her understanding while re-arranging aspects of it. Perhaps, for example, a teacher's core metaphors do not change easily, while branch metaphors do. Perhaps a change in a teacher's metaphor merely represents that the teacher found a better way to express the idea. Research efforts such as these could generate findings that indicate the stability of various aspects of understanding, and could lead to improved educational practice, and a richer understanding of learning.

The present study explored the nature of understanding on the supposition that understanding informs action. This relationship requires further investigation.

Repeating the present study with alternative populations could significantly broaden understanding of the nature of comprehension, and perhaps provide answers to the questions raised above. It might be fruitful, for example, to compare the ways in which

parents, students, and education administrators understand learning and teaching. It might be also be worthwhile to compare the ways of understanding of teachers of special classes to those of teachers of regular classes, or secondary to elementary teachers. A matched sample of these teachers might not only determine similarities and differences, but also inform understanding of the role of differing experiences in teachers' creation of meaning. A consideration of the understanding of women and men, teachers who are beginning or experienced, and people who have or have not raised children or who have or have not had siblings with mental disabilities would no doubt prove interesting as well. Research findings from the present study indicated that historical schools of thought about learning play a small role in forming special educators' understanding of learning. Perhaps listening to the voices of people as they reflect upon what they know and understand about learning and teaching would allow a fresh paradigm of learning and understanding to emerge.

#### Reliability and Limitations of the Research Findings

To determine whether each teacher was responding consistently during the investigation, similar questions about teaching and learning were planted in the first two interviews. In the first interview, the teacher was asked to fill in the blank to the statement, "Teaching is like (blank)." In the second interview, the teacher was asked, "What does teaching mean to you?" Located in

another part of the first interview was the question, "What does learning mean to you?" In the second interview the teacher was asked to fill in the blank to the statement, "Learning is like (blank)." My analysis of their responses confirmed that in every instance the teachers gave similar or comparable answers to each set of questions. The consistency of responses to these planted questions provided a measure of assurance that the verbal information gathering method employed in this research study was valid. There was a similar consistency of response to similar questions planted in the first and last written exercises.

The evocative power of the interview schedule could be empirically determined. It was a measure of its strength that forty-two percent of all the verbal and written questions about learning and teaching provoked statements about understanding in either three or four of the teachers.

A strength of this study was its acceptance of the principle that research cannot be conducted without some measure of human involvement. The researcher's potential involvement was not denied, but rather controlled. It could be argued that acting as both researcher and interpreter could bias the research process. This possibility was lessened in the following ways.

A wide variety of question types was employed, and both written and spoken samples were gathered. Information was collected over an extended period of time. A specific investigation format and interview schedule was followed to reduce the possibility of respondents being influenced by the interviewer. To guarantee the

accuracy of the spoken material, conversations were tape recorded and transcribed verbatim. Multiple research strategies were employed to develop a representative sample of each teacher's ways of understanding.

Multiple approaches were also applied in the interpretation of the teachers' material. The interpretative process was designed to be both deep and broad. Four complete, and numerous subsidiary, reviews of the material were undertaken. Three intensive analytic strategies, inductive, content, and comparative were performed. Finally, the teachers themselves were asked to review and comment on a preliminary interpretation of their provided information. The number of times and ways in which the materials were studied also provided some measure of assurance that the most significant aspects of the teachers' understanding had been identified. However, there is a small possibility that a metaphor a teacher had expressed only once or twice might have been overlooked.

Finally, it is impossible that all aspects of understanding have been determined, given the small sample size of the present study. The sample size also limited interpretation of the teachers' understanding from the perspectives of gender and the ages of their students, and might limit the generalizability of the findings to other teacher groups. However, the study was intended to be exploratory rather than exhaustive. It is likely that what has been learned here about the nature of understanding will grow as further research is performed. Seen from this perspective, the limitations of the study are acceptable.

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## Appendix A.

The Letter to the Superintendent of the School District

Dear Mr. or Mrs. (name included here),

I am currently a teacher in the school district. I am also working toward a Master of Arts degree in Educational Psychology at the University of Victoria. To complete this degree, it is necessary to complete a research study and write a thesis. I am writing to obtain your permission to perform research in the district.

You will find enclosed a detailed information sheet on the study. Briefly, I will be researching special education teachers' understanding of learning and teaching. To do this, I will interview teachers experienced in teaching students with mental disabilities. They will be asked to talk and write about their thoughts and experiences around teaching and learning. No more than five teachers will be interviewed. All responses will remain anonymous. The district, of course, will receive a copy of my final report.

I hope to complete my interviews in May in June. Before I can obtain the permission of the University, I am required to obtain your written permission to perform research in the school district. For these reasons, may I ask to receive a reply within the next ten days?

Thank you for your attention to this request.

Sincerely,

## Appendix B.

The Letter to the Participant

Dear Teacher,

Before beginning this research study, I would like to provide you with a brief description and explanation of the study. This research is being done as a part of the requirement for obtaining a Master's Thesis. The goal of the study is to learn what special education teachers' understand about the teaching and learning of students with mental disabilities. By mutually exploring this topic, I hope that we will learn something new.

This study consists of three conversations, and four short written questions. You will be asked to talk or write about some of your teaching experiences, and to express your thoughts about teaching and learning. Each interview will be about a week apart, and will last approximately an hour and a half. As this is a voluntary activity, as we go along you may choose to answer each question with as much detail as you like, or you may choose not to answer a question.

All of your responses, written or spoken, will remain anonymous. All information that may identify individuals, or your school, will be deleted. To assist transcribing, it will be necessary to audio record our conversations, however, after being transcribed the tapes will be destroyed. Copies of complete transcripts of our conversations will not be distributed to anyone without your written permission. If you are interested, a copy of the thesis will be made available for you to read. Finally, before we begin, would you please sign the permission statement on the reverse of this letter?

## Appendix C.

The Permission Statement

I agree to participate in Steven Toleikis's research study. I understand that all of my responses will remain anonymous, and that I am not compelled to participate in any aspect of this research.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Appendix D.

Writing Activity Number One

Imagine you have just received a letter from a teacher friend. Your friend will soon be teaching a student with mental disabilities for the first time, and wants your advice. She has asked you to talk about two things:

a.) what you understand about teaching a student with mental disabilities, and b.) the way(s) you think such a student learns. She has also asked you to give reasons for your answers. Please take just a few moments to prepare the notes for your reply.

What do you understand about teaching a student with mental disabilities?	What are your reasons for saying this?
What way(s) do you think such a student learns?	What are your reasons for saying this?

## Appendix E.

Interview Schedule for the First Conversation

## Part One

1. (a) What are your feelings, and ideas, about participating in research?

(b) Have you ever been involved in any other research?

2. (a) Given the intent of this study, is there anything you anticipate learning from this experience?

3. (a) Do you have any expectations of me as the researcher?

(b) Is there anything you'd like to ask?

(Here the researcher explains:

Before turning to the main part of this meeting, I'd like to gather some general information about you and your class.)

4. How long have you been a teacher?

5. (a) Would you consider yourself a special education teacher?

(b) What is a special education teacher?

6. Briefly tell me about your professional history as a teacher:

(a) training,

(b) classes taught,

(c) years in each class, and

(d) areas of specialty (e.g., student disability, age of student).

7. (a) What kind of class are you presently teaching?

(b) What is the age range of the students in this class?

8. How long have you been teaching the class?

## Part Two

1. Describe a typical day in your classroom.
2. Draw a map of your classroom and tell me about it.
3. Imagine I am an experienced teacher who is going to teach your class for the next month. Coach me about your students.
4. Please fill in the blank. Teaching is like \_\_\_\_\_ .
5. Think of a student who recently has been quite successful at learning something.
  - (a) Speculate the way, or ways, the student learned this.
  - (b) How did you know the student learned?
6. Think of a student who recently has been having difficulty learning something.
  - (a) Speculate on the reasons the student was having difficulty.
  - (b) How did you know the student was having difficulty?
7. Think of something you are presently trying to teach your class.
  - (a) How are you teaching it?
  - (b) What are your reasons for using this approach?
8. What does learning mean to you?
9. If your students could talk as peers with you, what might they say about how they learn?

## Appendix F.

Writing Activity Number Two

1. Reflect back over your career as a special education teacher, and think of the student you found the most challenging to teach. Tell about that experience.

2. Tell about your experience with a student you feel was one of your most memorable "success stories."

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## Appendix G.

Writing Activity Number Three

Carefully consider each student in your class. Using the chart below, briefly describe the way (or ways) each student learns. As you portray each student, try to explain your reason(s) for saying this.

First name of student	The way(s) the student learns	The reason(s) you say this

## Appendix H.

Interview Schedule for the Second Conversation

1. Tell me a story about the experience of teaching your first student, or first class, with special needs.
2. What led you to become a special education teacher?
3. What experiences have influenced how you think about teaching and learning today?
4. (a) How has your understanding about teaching, and learning, changed since your beginning days as a teacher?  
(b) Speculate on the reasons for this change.
5. (a) What are the ways you tell a student is learning?  
(b) In what ways can you tell a student is not learning?
6. What does being a teacher mean to you?
7. (a) How are special education teachers and "regular" teachers different?  
(b) How are they the same?
8. Please fill in the blank. Learning is like \_\_\_\_\_ .
9. (a) How are teaching and learning different?  
(b) How are they the same?

Appendix I.

Interview Guidelines for the Third Conversation

This conversation is open-ended, and focuses on three topics: clarifications by the teacher of the researcher's summary of the first two conversations, an interpretive dialogue about those conversations, and a consideration of the research experience.

## Appendix J.

Writing Activity Number Four

You are drafting notes for an imaginary letter to a trusted colleague about participating in this study. There are three things you want to tell her about: (a) what you have learned during the study, (b) what now you understand about teaching a student with mental handicaps, and (c) the way(s) you think such a student learns.

Please take just a few minutes to jot down your notes.

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## VITA

Surname: Toleikis

Given Name: Steven Neil

Place of Birth: Philadelphia, Penna. Date of Birth: October 30, 1950

### Educational Institutions Attended:

Temple University	1968 to 1972
University of Victoria	1976 to 1977
University of Victoria	1988 to 1991

### Degrees Awarded:

B. Sc.	Temple University	1972
Dip. Ed.	University of Victoria	1977

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Title of Thesis:

Architects of Meaning: An Investigation of the Ways Special Educators' Understand Learning and Teaching

Author



STEVEN TOLEIKIS

July 26, 1991