Instructional Strategies

Linda Kreger Silverman, Ph.D.

The Gifted Development Center

How are teachers of the gifted different from other teachers? Teaching strategies used by teachers of the gifted, regular classroom teachers, special educators, and early childhood educators have been compared. The specific instructional strategies found to be most effective with gifted students will be shared, along with instructional variables.

One of the main causes of underachievement in gifted children is the mismatch between their learning styles and traditional teaching methods. Many creatively gifted children, highly gifted children, gifted children with learning disabilities, and gifted children from Asia, Latin-America and many other cultures, are visual-spatial learners. Techniques will be offered for identifying these learners and meeting their needs in the classroom.

Teaching the gifted is an art, rather than a science; it is as difficult to capture the magic of expert teachers in an article as it is to describe artistic talent in any other field. In working with teachers who are drawn to gifted education in the United States, I have learned that they usually have an emotional sensitivity to the burdens of being gifted which comes from their own experience. They teach from the heart and soul more than from the textbooks. They take delight in the discoveries of their students and learn with them and from them. They are a very special group of people with deep appreciation of the beauty of the human mind.

Characteristics of Gifted Teachers

A teacher does not necessarily have to be in the intellectually gifted range to teach gifted children, but he or she certainly has to be gifted at teaching. Gifted teachers, regardless of whether or not they are working with gifted students, share some identifiable traits and tend to use similar instructional strategies. Each teacher also has his or her own unique personal and professional strengths and passions. The three-ring identification model described by Joseph Renzulli (1978) is actually more applicable to the selection of teachers of the gifted: *above average intelligence, creativity and task commitment*. Teachers who work with this population must have sufficient intellectual power to be able to follow the gifted child's thought processes. Creativity and flexibility are both essential characteristics. And novice teachers soon learn that teaching this group of children is more demanding and time consuming than working with less able children. Therefore, dedication and a capacity for hard work are both requisites. The importance of these traits is supported by others who have studied the characteristics of successful teachers of the gifted. Maker (1975) summarized these qualities as follows:

- highly intelligent
- flexible and creative
- self-confident
- wide variety of interests
- a sense of humor
- fairness, firmness, patience
- sympathy with the problems of gifted and talented children
- clear self-understanding and understanding of the teacher's role
- willingness to devote extra time and effort to teaching
- enthusiasm about teaching and the subject matter
- willingness to be a facilitator rather than a "director of learning"
- enjoyment in working with gifted and talented children

A study was conducted by Dubner (1980) of what high school students felt the function of the gifted/talented teacher should be. The following roles emerged in order of importance:

- guide
- facilitator
- liberator
- supervisor/administrator

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- psychologist
- friend
- creator/originator
- generalist
- evaluator
- instructor
- scholar
- wit/enthusiast
- counselor

The role of "guide" received almost twice the number of citations as any other category: 222 as compared to 122 for the role of facilitator. Liberator and supervisor/administrator each received over 100 citations. Instructor and evaluator, close to the bottom, received only 36 and 38 citations respectively. Yet, these are the major roles played by most classroom teachers. One student wrote:

Every teacher is different; his or her talents, skills, and interests vary. To be most beneficial, the teacher should perceive not only the needs of the individual student, but his or her own capability to fill those needs. Just think for a moment of history's great teachers; Socrates, Christ, John Dewey, Annie Sullivan. Each had adapted his or her talents, in effect, his or her giftedness, to the pupil. (quoted in Dubner, 1980, p. 143)

One additional quality deserves mention in this section: mental health. Teachers who are emotionally mature and mentally healthy do not compete with their students. They are not threatened by students who surpass them in knowledge. It is far more important to be able to assist the students in finding the information they need on their own than it is to know more than they do. Teaching gifted children is very exciting, but it is definitely hard work.

Teaching Strategies

The teaching strategies described in this section were gleaned from a qualitative analysis of teachers in four different disciplines. For several years, I had the opportunity of supervising student teaching and field placements (student teaching at the graduate level) in elementary education, special education (learning disabilities), early childhood education, and gifted education. I observed master teachers of the gifted and compared these impressions with observations of master teachers in other areas of education. The form I constructed to evaluate novice students allowed me to capture both their verbal and nonverbal interactions with students. I used the same form to try to capture the techniques of master teachers so that the students could compare their performance with that of their mentors.

The first step in the evolution of the supervision evaluation form was to record all verbal and nonverbal behaviors of both master teachers and practicum students. My copious notes were then organized into categories. The four categories that emerged were: *Instructional Techniques, Questioning Techniques, Feedback Techniques, and Personal Interactions.* Instructional techniques involve *statements* that the teacher makes for instructional purposes. Questioning techniques indicate the type of questions that the teacher asks. Feedback techniques are ways in which the teacher responds to student responses. Personal interactions are those behaviors which cement the relationship between the student and the teacher.

Instructional techniques include:

- ♦ giving directions
- ♦ providing materials
- ♦ demonstrating
- ♦ direct assistance
- ♦ providing information
- ♦ providing suggestions
- ♦ answering questions
- ♦ solving problems
- ♦ reviewing
- ♦ integrating concepts

Questioning techniques include:

- ♦ convergent questions ("What is 6 x 4?")
- ♦ divergent questions ("How many ways can you arrive at 24 as an answer?")
- ♦ idea generation ("What are all the possible causes of pollution?")
- ♦ clarification and expansion of responses ("What did you mean by...?")
- ♦ attempting to find out how the child thinks ("How did you arrive at that answer?")

Feedback techniques include:

- ♦ positive feedback
- ♦ negative feedback
- ♦ acceptance--no feedback

- encouraging questions
- encouraging involvement
- validating perceptions
- giving encouragement
- repeating student responses
- focusing attention
- control

Personal interactions include:

- welcoming
- saying goodbye
- discovering with students
- discussing non-school related topics
- revealing personal information
- observing
- listening

The subsets in the first category, instructional techniques, tended to be the same for all groups: educators of gifted, learning-disabled, early childhood, or elementary students. However, differences were found in the *amount of time* devoted to actual teaching during a class period. Gifted/talented teachers tended to do less talking. They provided less information, had fewer demonstrations, and were less willing to solve problems for the student. Instead of answering all of the students' questions, they tended to reflect student questions back to them, with questions such as, "What do *you* think?" More class time was spent questioning and less time was spent on instruction.

Questioning skills differentiated master teachers of the gifted from teachers of other groups. Gifted/talented teachers tended to ask many *divergent* questions (questions with many possible answers), whereas other teachers asked almost exclusively *convergent* questions (questions with only one right answer). The ratio of divergent to convergent questions also distinguished between the master teachers and the novices in gifted education.

Master teachers facilitated student discussions by posing intriguing problems or asking stimulating questions, such as, "What would happen if...?" They stretched the students' thinking further by their responses to the students' ideas. They would ask clarifying questions in order to get the student to elaborate or crystallize a thought, such as "Do you mean...?" Or they would ask the group a question that further expanded a student's concept: "If Bibiana is right, what would be the effect on ...?" They attempted to draw the information they wanted to teach from the students themselves.

Excellent early childhood educators and gifted educators both used Piagetian-type questions in attempts to understand the student's thought process. Questions such as, "What made you think that?" helped them see how a child had arrived at a given conclusion. Few novices or teachers in the other groups asked this type of question. They were more likely to correct an incorrect response or approve an accurate response than to try to understand the reasoning process behind the response.

Even greater differences were found in the feedback techniques. Most teachers rely heavily on feedback. They respond verbally and nonverbally to every student response. However, master teachers of the gifted responded significantly less often. Some intentionally avoided giving feedback to students. They found ways of accepting students' responses, rather than reacting to them. Their behavior was similar to that of a counselor: They appeared attentive and interested, but nonjudgmental. The effect of this strategy was usually more interaction of the students with each other and more student self-evaluation. The students were less dependent on the teacher for reinforcement.

When master teachers of the gifted gave feedback, they did not use stilted, stereotypic response patterns. Their feedback tended to be natural and varied, with many questions. Discussions resembled adult conversations instead of question-and-answer periods. Teachers encouraged the students to comment on each other's ideas. Gifted teachers were effective counselors, responding to the students' feelings as well as to the content of their responses.

It is instructive to note the types of feedback that master teachers of the gifted avoided. Less skillful teachers had habitual forms of feedback, such as head nodding, "yes," "uh=huh," "very good," or repeating to the class everything any student said. Master teachers rarely repeated student responses. If a student did not speak in a loud enough voice for everyone to hear, the teacher would ask, "Ban Eng, could you hear what Jan said? ... No? Jan, would you repeat that so that Ban Eng can hear you too?" They also avoided chastising and blaming students. They seemed to have fewer control problems, and when they did, they found unobtrusive ways of refocusing the students' attention on the task at hand, such as humor and nonverbal cues. They tended to include themselves among the culprits with statements such as, *We* had better get back to the subject or we

won't get finished with this section today," rather than "*You* had better get back to work!"

There seemed to be more equality among gifted students and their teachers than is usually seen. The teachers enjoyed their students as interesting people and vice versa. This was evident in conversations that occurred before and after class and at transition periods. They often discussed issues unrelated to school, freely exchanging viewpoints. The most significant difference I observed was the extent to which these teachers revealed personal information to their students. There was obviously a high level of trust.

When I ask groups of teachers who have taught in both the regular classroom and gifted education what they notice as different about themselves when they are working with gifted children, two responses are offered regularly: humor and revealing personal information. Gifted children have a sophisticated sense of humor and they often draw out their teachers' sense of humor. They also ask very personal questions about a teacher's life, family, political beliefs, etc. They recognize that their teachers are people rather than roles, and some students seek personal friendships with their teachers.

Instructional Variables

Programming can be modified in a number of ways to meet the needs of gifted learners in the regular classroom and in special placements. The following instructional variables can be used as a basis for providing qualitatively differentiated educational opportunities for the gifted.

DIAGNOSTIC ASSESSMENT. It is important to determine students' level of mastery before teaching them. It wastes students' time and destroys their innate love of learning to reteach them what they already know. Continuous assessment can be accomplished through standardized tests, interviews with students, discussions with parents, work samples, opportunities to test out of course work, taking end of the year tests at the beginning of the year, taking end of chapter tests at the beginning of chapters, trying the hardest problem on a page, etc. When a student scores very well on a standardized measure, a higher-level test should be administered to ascertain the full extent of his or her capabilities. For example, elementary students scoring at or above the 95th percentile on group achievement tests should be given high school achievement tests. Results of standardized achievement tests should be used in programming appropriately for the students.

CONTINUOUS PROGRESS. Students should be allowed to progress as fast as they can as far as they can go in any discipline. This is standard procedure in the development of world class talent in the arts and in sports; the same principle needs to be applied in all academic areas. The concept requires adaptation of the school curriculum to the learning needs of the child. Children who are developmentally advanced need advanced course content and accelerated learning experiences.

ABILITY GROUPING. The most efficient and effective method of educating gifted children is grouping them together for instruction. Flexible ability grouping facilitates fast pacing of instruction, introduction of advanced material, abstract concepts, and continuous progress of the students. Grouping patterns need to be re-evaluated several times each year to enable all students to move at their own pace. Ability grouping also enhances the social development of gifted children since they develop better social skills with children who have similar interests, values, and intellectual abilities (Silverman, 1993).

LEVEL OF ABSTRACTION. Many average students cannot process abstract information well; their thinking processes require more concrete experiences. They tend to view situations as having one right answer and they have difficulty understanding different perspectives. Gifted students, however, can engage in hypothetical reasoning, discuss complex issues, make abstract inferences, and utilize systematic procedures in their quest for knowledge. While other children are learning facts, advanced learners can handle systems, applications, and transformations. Teaching strategies should involve higher level thinking skills, such as critical analysis, creative synthesis, and evaluation. Material containing several levels of meaning, such as metaphor, analogy, and paradox, is ideal for the abstract minds of the gifted.

DISCOVERY LEARNING. Discovering patterns or relationships is a natural facility for the gifted. Guided discovery is an inductive approach to learning; the student is presented with several illustrations of a rule and is asked to infer the underlying principle. In deductive learning, the principle is presented first and the student is asked to apply the rule to several specific examples. Exercises that require the student to "guess the rule" use the inductive approach. Discovery learning heightens the gifted child's ability to perceive and express abstract relationships, and to analyze, hypothesize, and verify hypotheses.

TYPE OF SUBJECT MATTER. Interdisciplinary studies are well suited to the complex minds and synthesizing abilities of the gifted. These students can wrestle with social and ethical issues too complicated for other students to grasp. They can search for solutions to real problems and assimilate accelerated content several grade levels above their placement.

PACING. The most critical element in differentiated programming for the gifted is the pace at which material is presented. Instruction for gifted students should be paced rapidly to suit their learning style. When the tempo of instruction is increased, students become more alert and responsive, and they are able to learn the material in far less time than it takes to teach it to the others. Self-paced individualized instruction is less effective than fast-paced group instruction. Most individualized materials are written for average learners and their repetitious presentation format often bores gifted students.

TELESCOPING. Covering the same amount of material in less than the usual time is called telescoping or compacting. The assessment process reveals areas in which students can spend less time learning the basic curriculum. Because they require less repetition to master concepts, gifted students should be able to *skip most drill exercises*. Since many gifted children retain information permanently the first time a concept is presented, drill can be insufferable for them. Instead, they can be asked to answer only the most difficult questions on each page of exercises. Telescoping gives gifted students more time for enrichment activities suited to their needs or enables them to accelerate, covering advanced content.

TIME ALLOTMENT. Gifted students take half the time or less to cover the basic, required material (Hollingworth, 1930; Renzulli & Reis, 1991). When the curriculum is standardized, gifted children should be allowed to complete it in less time rather than waste precious learning time waiting for others to catch up. They can benefit from using the time saved to pursue independent or group investigations that are of personal interest to them.

STUDENT INTERESTS. Many gifted students have their own agenda for learning. They become fascinated with one topic at a time, such as dinosaurs or outer space, and want to learn all that they can about one subject before they go on to another area. There needs to be time allotted regularly for children to explore topics of their own choosing. Learningthat is continuously teacher-directed and group oriented tends to dampen a gifted child's natural enthusiasm for learning.

DEPTH OF STUDY. For gifted students, depth is preferable to breadth. Many brief studies are not recommended, because the information explosion may make obsolete whatever superficial knowledge a student is able to obtain. The process of studying a topic in depth is more challenging for the gifted and a better fit for their learning style.

INDIVIDUAL EDUCATIONAL PLANS. Gifted children are often asynchronous in their development; they may be very advanced in one area, such as mathematics, but delayed in another area, such as handwriting skills. They need an Individual Education Plan (IEP) which takes into account their readiness for advanced content in one subject, their difficulties mastering skills in other areas, and their need for social interaction with like-minded peers.

INDEPENDENCE. The gifted are capable of greater independence of thought and action than are most people. This attribute should be encouraged through independent study. Opportunities to learn research skills that will facilitate high level performance should be made available.

RANGE OF RESOURCES. Gifted students should have access to more advanced level resources than average students. Twelve year olds, for example, can be given college library cards and taught to use university resources. Human resources also should be used to a greater extent. Mentorships have been found to be critical to the development of high level abilities.

SOPHISTICATION OF PRODUCTS. Gifted students generate higher level products than do their age mates, even for regular assignments. The quality of student products is the most remarkable result of gifted programming.

LEVEL OF EVALUATION. Evaluation presupposes high levels of reflective judgment. Gifted students should be asked to formulate criteria upon which to base their judgments. For example, they may be asked to determine the bases for the grading of independent study projects.

DISSEMINATION. High quality student products should be shared with the community in some way—through science fairs, editorials, speeches to parents, learning centers for others classes, publication, and so on. Gifted classes in various schools may wish to share

their projects with each other. These dissemination activities increase the level of student evaluation.

COMMUNITY SERVICE. Childhood opportunities to be of service to others helps gifted children learn to use their gifts for the betterment of society. The most effective community service projects are those that have been self-selected. Students can discover areas of need (a problem finding exercise) and design ways in which they can help. When children conceive beneficial activities, they learn that they can make a difference in the world, and they are better prepared to take the difficult road that leads to an ethical, self-actualizing adult life.

Teaching Visual-Spatial Learners

Achieving gifted children are usually good sequential learner; they favor the sequential mode of learning or have balanced sequential and spatial modalities. Gifted underachievers, however, tend to have high spatial abilities coupled with underdeveloped sequencing skills. They tend to have difficulty with much of the sequential work in primary grades and to become more and more capable as the work becomes more complex and challenging in secondary school.

Spatial and sequential dominance are two different mental organizations that affect perceptions and apparently lead to different world views. Information deemed central to one viewpoint appears irrelevant from the other perspective. These different mental organizations appear to be innate. Western and Eastern philosophies and cultures provide dramatic examples of these differences. Western thought is sequential, temporal, analytic; Eastern thought is spatial and holistic (Bolen, 1979). Cause and effect sequences are stressed in Euro-American ideation, whereas synchronicity of unrelated events is appreciated from an Asian world view. Western languages are constructed out of non-meaningful elements—letters of the alphabet; Eastern languages traditionally have been composed of pictorial representations.

Temporal, sequential and analytical functions are thought to be left-hemispheric strengths, while spatial, holistic and synthetic functions are considered right-hemispheric strengths (Dixon, 1983; Gazzaniga, 1992; Springer & Deutsch, 1989; West, 1991). However, most researchers agree that integration of both hemispheres is necessary for higher-level thought processes. We all use both hemispheres, but not with equal facility. Highly gifted individuals show strong integration of sequential and spatial functions, but most of the gifted children we have assessed seem naturally to favor one or the other mode.

The sequential system appears to be profoundly influenced by audition, whereas the spatial system relies heavily on vision and visualization. Auditory-sequential learners are extremely aware of time but may be less aware of space; visual-spatial learners are often preoccupied with space at the expense of time. Sequential learning involves analysis, orderly progression of knowledge from simple to complex, skillful categorization and organization of information, and linear, deductive reasoning. Spatial learning involves synthesis, intuitive grasp of complex systems (skipping many of the foundational "steps"), simultaneous processing of concepts, inductive reasoning, active use of imagery, and idea generation by combining disparate elements in new ways.

Although one can gain more facility with one or the other mode through learning, it is unlikely that a person with sequential dominance can learn to perceive the world in exactly the same way as an individual with spatial dominance or vice versa. Instead of trying to remake one or the other style of learning, we need to accept these inherent differences in perception, and appreciate their complementarity since we inhabit a spatial-temporal reality. When these differences are not understood, there is dissension; when they are honored, they enable an exchange of information that forms a more complete conception of reality than can be gained by either perspective in isolation.

Identifying Characteristics

Individuals who exhibit stronger visual-spatial abilities than auditory sequential abilities are considered *visual-spatial learners* (Silverman, 1989). They do extraordinarily well on tasks with spatial components: solving puzzles, tracing mazes, duplicating block designs, counting three-dimensional arrays of blocks, visual transformations, mental rotations, envisioning how a folded and cut piece of paper would appear opened up, and similar items. The Block Design subtest of the *Wechsler Intelligence Scales* (WISC-R, WISC-III, WAIS-R) is an excellent indicator of the visual-spatial learning style. The Abstract Visual Reasoning section of the *Stanford-Binet Fourth Edition, The Matrix Analogies Test,* and the Raven's *Progressive Matrices* also assess spatial abilities. The *Mental Rotations Test* has been used in several studies to detect children with extremely strong visual-spatial and mathematical talents.

Visual-spatial learners perceive the interrelatedness of the parts of any situation. Their learning is holistic and occurs in an all-or-none fashion. They are most likely to experience the "Aha!" phenomenon, when all of a sudden they "see it." Many have a photographic visual memory: They can visually recall anywhere they have ever been and how to get there. This type of learning does not take place through a series of steps. Sequential skills are usually reserved as a back-up system when they cannot grasp a concept through their preferred mode of apprehending the entire gestalt. They may create multi-dimensional visual models of reality.

As toddlers, these children like to see how things work, and they enjoy pulling things apart to see if they can reconstruct them. When given an ordinary toy, they will play with it long enough to figure out how it works, and most likely never touch it again. They enjoy novelty and challenge. Visualization is a key element in the mental processing of visual-spatial learners. If they are introverted, they will rehearse everything mentally before they attempt it: walking, talking, reading, riding a bicycle, etc. These children are usually fascinated with puzzles and mazes, and have expert facility with them. They will spend endless hours building with construction toys (blocks, lego sets, tinker toys) or other materials, and their constructions are often quite sophisticated and intricate in design. Given the opportunity, these children often begin quite young to have a lifelong love affair with numbers and numerical relations.

Strategies for Instructing Visual-Spatial Learners

Spatial abilities underlie both mathematical talent and creativity, and are essential in a number of fields: mathematics, science, computer science, technological fields, architecture, mechanics, aeronautics, engineering, and most creative endeavors (visual arts, music, etc.). Unfortunately, visual-spatial learners may dislike school because of the overemphasis on lecturing, rote memorization, drill and practice exercises, and the lack of sufficient stimulation of their powerful abstract visual reasoning abilities. Lectures are more appropriate for auditory sequential learners unless visual aids are used. Rote memorization and drill are effective strategies for concrete auditory sequential learners, but they are counterproductive to the learning style of visual-spatial learners. Learning, for visual-spatial learners, takes place all at once, with large chunks of information grasped in intuitive leaps, rather than in the gradual accretion of isolated facts, small steps or habit patterns gained through practice. For example, they can learn all of the multiplication facts as a related set in a chart much easier and faster than memorizing each fact independently. Once learning takes place, it creates a permanent change in the child's awareness and understanding. In this case, practice does not make perfect; it is completely unnecessary for the student's learning style and it deadens the child's natural interest in a subject.

The following strategies have been found to be effective in teaching children with visual-spatial strengths:

- Use visual aids, such as overhead projectors, and visual imagery in lectures.
- Use manipulative materials to allow hands-on experience.
- Use a sight approach to reading rather than phonics.
- Use a visualization approach to spelling:
  - ♦ show the word;
  - ♦ have them close their eyes and visualize it;
  - ♦ have them create a vivid picture in their minds that calls attention to the part of the word they have difficulty remembering;
  - ♦ have them spell the word *backwards* (this demonstrates visualization);
  - ♦ then have them spell the word forwards;
  - ♦ have them write the word once.
- Have them discover their own methods of problem solving (e.g., instead of teaching division step-by-step, give them a simple division problem, with a divisor, dividend and quotient. Have them figure out how to get that answer in their own way. When they succeed, give them a harder problem with the solution already worked out and see if their system works).
- Avoid timed tests and allow them more time for classroom assignments.
- Avoid rote memorization. Use more abstract, conceptual or inductive approaches.
- Avoid drill and repetition. Instead, have them perform the hardest tasks in the unit.
- As these students may suffer from deficits in mechanics (spelling, punctuation, grammar), give more weight to the content of papers than to format.

- Give them advanced, abstract, complex material at a faster pace even if they haven't mastered the easier, sequential work.
- Allow them to accelerate in school.
- Emphasize mastery of higher level concepts rather than perfection of simpler concepts in competition with other students.
- Emphasize creativity, imagination, new insights, new approaches rather than acquisition of knowledge. Creativity should be encouraged in all subject areas.
- Group gifted visual-spatial learners together for instruction.
- Engage students in independent studies or group projects which involve problem-finding as well as problem-solving.
- Allow them to construct, draw, or otherwise create visual representations of concepts.
- Use computers so that material is presented visually.
- Have the students discuss the ethical, moral and global implications of their learning and involve them in service-oriented projects.

Visual-spatial learners are more attentive if they understand the goals of instruction. They are more cooperative at home and at school if they are allowed some input into the decision-making process and some legitimate choices. Discipline must be private, as these children are highly sensitive and easily humiliated. If they are respected, they will learn to treat others with respect. In the right learning environment, where there is a good match between their learning style and the way they are taught, visual-spatial learners can actualize their potential to become innovative leaders.

Conclusion

Gifted students perform their best when they are presented with questions and situations that have many correct answers and many paths to solution. They respond exceptionally well to *discovery techniques* that provide them with the opportunity to be detectives, hypothesis testers, and problem solvers. They feel challenged when they are exposed to advanced material at their own pace of learning. However, the difficulty of the task must not exceed the child's confidence level. The artistry in teaching is selecting material on the cutting edge of the students' level of mastery so that they understand what is expected of them and learn something new in the process.

When a student with powerful abstract reasoning abilities is asked to use only the simplest mental facility of rote memorization, much of the potency of the child's intelligence remains unused. When the gifted child is given more stimulating, advanced, complex material to learn, and the material is presented at a faster pace, then the child's natural gift of abstract reasoning is exercised and developed. Gifted learners thrive on abstract concepts, complex ideas, inductive learning strategies, multidisciplinary studies, holistic methods, and activities requiring synthesis; they are natural pattern finders and problem solvers. When educated according to their learning style, they are capable of original, creative thought. Most of all, gifted children need teachers who appreciate and respect them.

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Linda Kreger Silverman, Ph.D., is a licensed psychologist and Director of The Gifted Development Center and the Institute for the Study of Advanced Development, in Denver, Colorado. Editor of the journal, *Advanced Development,* she has also edited the new textbook, *Counseling the Gifted and Talented* (Love, 1993). For nine years she served on the faculty of the University of Denver in gifted education and counseling psychology.

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