Gifted Development Center

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Strategies for Gifted Visual-Spatial Learners

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What is a Visual-Spatial Learner?

A visual-spatial learner is a student who learns holistically rather than in a step-by-step fashion (Silverman, 1989b). Visual imagery plays an important role in the student's learning process. Because the individual is processing primarily in pictures rather than words, ideas are interconnected (imagine a web). Linear sequential thinking-the norm in American education—is particularly difficult for this person and requires a translation of his or her usual thought processes, which often takes more time. With the exception of John Dixon's book, *The Spatial Child* (1983), little has been written to guide educators in working with children with this unique learning pattern.

Some visual-spatial learners are excellent at auditory sequential processing as well. They have full access to both systems, so that if they don't get an immediate "aha" when they are looking at a problem, they can resort to sequential, trial-and-error methods of problem solving. These students are usually highly gifted with well integrated abilities. However, the majority of visual-spatial learners we have found in our work have major discrepancies between these two processing systems (Silverman, 1989a). They are gifted in visual-spatial abilities but deficient in auditory sequential skills. This leads to a complex set of problems for the student that often results in underachievement. A definite mismatch exists between the student's learning style and the instructional methods employed by the student's teachers. This article provides strategies for successfully teaching and tutoring visual-spatial learners. The ideas have been implemented with approximately 300 students over the past 10 years.

Learning Characteristics

The characteristics in the table below are typical of visual-spatial learners. The most accurate means of identifying a visual-spatial learner is through psychological assessment by a competent professional who is aware of the pattern.

Learning Characteristics	
Strengths	**Weaknesses**
✓ *thrives on complexity*	✓ *struggles with easy material*
✓ *loves difficult puzzles*	✓ *hates drill and repetition*
✓ *fascinated by computers*	✓ *has illegible handwriting*
✓ *great at geometry, physics*	✓ *poor at phonics, spelling*
✓ *keen visual memory*	✓ *poor auditory memory*
✓ *creative, imaginative*	✓ *inattentive in class*
✓ *a systems thinker*	✓ *disorganized, forgets detail*
✓ *high abstract reasoning*	✓ *difficulty memorizing facts*
✓ *excels at math analysis*	✓ *poor at calculation*
✓ *high reading comprehension*	✓ *low word recognition*
✓ *excellent sense of humor*	✓ *performs poorly on timed tests*

Diagnosing the Visual-Spatial Learner

High performance on the Block Design subtest of the *Wechsler Intelligence Scale for Children-Revised* (WISC-R), or on similar tests of spatial abilities, such as the Block Counting item on *the Stanford-Binet Intelligence Scale* (Form L-M), is the strongest indicator of the visual-spatial learning style. The *Stanford-Binet Fourth Edition* contains an entire section assessing spatial perception and the Raven's *Progressive Matrices* require considerable spatial abilities. In addition, there are several tests of spatial visualization used primarily for research with adult populations that could be employed to assess the full strength of a gifted student's spatial abilities.

For the purpose of this article, the discrepancy between the student's spatial and sequential abilities is very important. Performance on the Digit Span subtest of the WISC-R or the Repeating Digits items on the Stanford-Binet (L-M) is a good indication of auditory sequential processing.

The type of gifted visual-spatial learner we are addressing in this article can be operationally defined as *a student who attains a score of 16 or higher on the Block Design subtest of the WISC-R or WISC-III and a Digit Span score which is at least 7 points lower.* The WISC has been selected in this definition since it has been the most widely used intelligence scale for over two decades (Cronbach, 1970) and a considerable number of factor analytic studies have been conducted with this instrument (Kaufman, 1979b). The seven

point difference in the definition reflects the fact that a seven point discrepancy between the highest and lowest subtest scores on the WISC-R is considered statistically significant (Sattler, 1988). Other portions of the WISC can also serve a diagnostic role. Coding is a visual sequencing task which requires motor speed, and Arithmetic requires short term memory of auditory sequences. These two subtests can be used to provide additional confirmation of sequential deficits (Bannatyne, 1971, 1974). The Verbal Comprehension Factor—Similarities, Vocabulary, Comprehension and Information—is a strong indicator of abstract reasoning (Kaufman, 1979a) and scores of 16 or higher on these subtests can provide additional confirming evidence of the student's giftedness. While gifted children's Verbal scores usually exceed their Performance scores, visual-spatial learners often have the opposite pattern: Performance > Verbal.

One type of spatial learner is difficult to identify: This is the student with visual-perception problems. Some students would naturally excel at spatial tasks if they could see clearly. Short-term vision therapy is often recommended for students who have major discrepancies between their Verbal and Performance scores (Hellerstein, 1990): Verbal > Performance by 15 points or more. Retesting on the Performance scales after vision training may reveal the student's real abilities in the spatial domain. Spatial learners who have both auditory and visual deficits have an extremely difficult time in school and their abilities are often buried under their disabilities.

Physiological and Personality Correlates

Visual-spatial learners who experience learning problems have heightened sensory awareness to stimuli, such as extreme sensitivity to smells, acute hearing and intense reactions to loud noises, a high incidence of allergies, and often an aversion to certain kinds of clothing. They are constantly bombarded by stimuli; they get so much information that they have trouble filtering it out. They frequently have a history of ear infections which, paradoxically, does not affect their auditory acuity—they tend to have excellent hearing but poor listening skills. Most of the 300 students described in this article had impaired auditory sequencing abilities. Their ability to retain and comprehend information presented auditorily was weak and they had difficulty with sequential tasks. Some parents reported that their children learned the alphabet backwards first. They could not sound out words, and their oral reading was labored and arrhythmic, although they could read and scan very well silently.

Gifted spatial learners also have greater awareness of the world around them, greater perceptiveness of others and heightened sensitivity. They are particularly sensitive to any hint of criticism. There is no such thing as "constructive criticism." If they hear ten positive comments and one slightly negative one, it is the negative one that is remembered, stewed over, and becomes the cause of a later outburst.

These children have a keen sense of justice and fairness and will often be noncompliant in situations they deem "unfair." Their acute sensitivities may be mistaken for various types of disorders (such as oppositional disorder), in which case they may be inappropriately labeled. They are highly perfectionistic, which means that they cannot handle failure. They usually refuse to attempt trial-and-error learning because they can't cope with the failure inherent in this technique. They have an all-or-none learning style (the "aha" phenomenon). They either immediately see the correct solution to a problem or they don't get it at all, in which case they may watch quietly (while pretending not to watch) or avoid the situation completely because it is too ego threatening.

Anyone who has observed these children or lived with one knows full well the depths of their perfectionism and competitiveness. They have such high internal standards and they are so competitive that they usually

cannot reach their goals. So, rather than try hard and fail, they refuse to try at all. However, with the right strategies (addressed in the section on Teaching Techniques), these charac-teristics can be harnessed to the tasks of learning.

Visual-spatial learners have amazing abilities to "read" people. Since they can't rely on audition for information they develop remarkable visual and intuitive abilities, including reading body language and facial expressions. Many of the students described in the article were so adept at reading cues and observing people that they could tell what a person was thinking almost verbatim. Oftentimes, in school, they sense a teacher's anxieties and ambivalent feeling towards them, and react with statements such as, "that teacher hates me," or that there's no way to please him or her. This can snowball into negative feelings between the student and teacher which occur on a sub-verbal level.

Traditional Education

In most cases, the visual-spatial learning style is not addressed in school, and these students' self-esteem suffers accordingly. Traditional teaching techniques are designed for the learning style of sequential learners. Concepts are introduced in a step-by-step fashion, practiced with drill and repetition, assessed under timed conditions, and then reviewed. This process is ideal for sequential learners whose learning progresses in a step-by-step manner from easy to difficult material. Sequential learners tend to be well organized, follow directions well, excel at rote memorization, handle details efficiently, and even enjoy some opportunities to practice what they have learned.

By way of contrast, spatial learners are systems thinkers—they need to see the whole picture first before they can understand the parts. They are likely to see the forest and miss the trees. They are excellent at mathematical analysis but may make endless computational errors because it is difficult for them to attend to details. Their reading comprehension is usually much better than their ability to decode words. Rote memorization and drill have little value for gifted students in general, but they are actually damaging for visual-spatial learners, since they emphasize the student's weaknesses instead of their strengths.

Concepts are quickly comprehended when they are presented within a context and related to other concepts. Once spatial learners create a mental picture of a concept and "see" how the information fits with what they already know, their learning is permanent. Repetition is completely unnecessary and irrelevant to their learning style. However, without easily observable connecting ties, the information cannot take hold anywhere in the brain—it is like learning in a vacuum, and seems to the student like pointless exercises in futility.

Teachers often misinterpret the student's difficulties with the instructional strategies as inability to learn the concepts and assume that the student needs more drill to grasp the material. When this happens, the student gets caught up in a spiraling web of failure, assumes he is stupid, loses all motivation, and hates school. To shield his ego from the inevitable bruising it will get if he tries to succeed at impossible tasks, he turns off completely. It is almost as if he were saying, "I can't win in this game so I won't try; therefore, I haven't failed because I haven't tried." Teachers then assume that the student doesn't care or is being "lazy," and behavior problems come to the fore. Meanwhile, the whole cycle creates a very deep chasm in the student's self-esteem.

In the traditional school situation the atmosphere is often hostile to visual-spatial learners and their skills. The students are visual, whereas instruction tends to be auditory: phonics, oral directions, etc. The students are gestalt, "aha" learners and can be taught out of order, whereas the curriculum is sequential, with orderly

progressions of concepts and ideas. The students are usually disorganized and miss details, whereas most teachers stress organization and attention to detail. The student is highly aware of space but pays little attention to time, whereas school functions on rigid time schedules.

So what can be done with these spatial children? Can they be educated in a school situation at all? The answer in many cases is "Yes" if the instruction is adapted to the skills, interests and learning style of the students. However, there are some cases in which the answer is "No." Visual-spatial learners vary in degree, and the most extreme cases require either homeschooling or alternative school situations. Some of our students who could not thrive in school showed the following characteristics: they were brilliant artists, but horrible spellers; they could not read orally, but were amazingly adept at context reading, without apparent ability to read many of the words; they were moody and unpredictable, unable to handle the slightest change in the classroom routine; they hated to show any of their work. (They can't show their work because they arrive at conclusions intuitively.) These students improved when they were placed in schools for the gifted or homeschooled, where there was more permission for them to follow their own style of learning. They also showed remarkable progress when they received tutoring with appropriate strategies.

Teaching Techniques

A technique which must be employed with gifted visual-spatial learners at every opportunity is Visualization. The ability to visualize is a unique strength of this population and it is rarely utilized in school. Students progress rapidly when they learn to capitalize on this strength. The techniques described in this section were developed for use in individual tutoring sessions. They also could be adapted for small groups.

Spelling

Almost all visual-spatial learners are poor spellers. Remedial work usually begins with teaching the student to apply the techniques of visualization to spelling. Spelling is a good introduction because, if approached correctly, great results can be achieved quickly. The same students who struggled intensely trying to spell lists of words through traditional methods can usually "see" words with 15 letters or more. Then, to the amazement of others, they can spell them backwards and forwards.

When students are trying to remember details about words, they are encouraged to "look up" to where the word was pictured in order to access the visual image. The technique employed here is to write the word in bright colors in large print and hold it at arm's length from the student. The student is then directed to picture the image—not memorize it, just picture it—and then the word is taken away. At this point most visual-spatial learners can easily see the word and spell it both forwards and backwards. Students have learned to spell such words as "existentialism" and "distributorship" forwards and backwards! This technique can also be employed with other learning styles, but has less dramatic results, because sequential learners usually lack the ability to hold an image for any length of time.

The following technique can be used to teach five to ten spelling words at a time. The words are written on cards. The student studies all of them and then turns them over on a table or the floor. A visual memory game ensues in which the student wins each word by locating the word through visual memory, spelling it, and then checking to see if the location and spelling are correct. Visual memory, a strength, is used to teach a skill which had been approached previously through auditory sequencing, the student's weakness. Visualization is an acquired skill, and, the more it is practiced, the more effective students become using it as a learning tool.

Visual-spatial learners usually love this technique because they're good at it, it works, and for once they excel at a school oriented task.

Mathematics

Next, visualization is employed to assist students in learning computational skills, as these are often weak. The student is asked to picture a number, then add a certain number to it, half it, subtract 3, double it or do some other extemporaneous mental calculations. Students can become quite proficient at these calculations, and, if they keep practicing, they can even do double or triple digit multiplication and division mentally. Complex mental arithmetic provides an arena where spatial learners can compete successfully with sequential learners. Visual-spatial learners can do elaborate mental calculations because they can retain visual images for an extraordinarily long period of time, whereas sequential learners tend to lose the picture and are unable to carry out these mental operations.

Again, by employing visualization, a former weakness—computation—can be turned into a strength. An additional benefit is that while visualizing, it's harder to be tense, and tension can be debilitating. These visualization exercises have turned many frustrated visual-spatial learners into veritable balls of fire in spelling and mathematical calculations almost overnight.

Reading

In younger children, reading is often the prime area of concern. Gifted spatial learners have difficulty with word recognition; however, if they understand 25% of the words, they can comprehend about 60% of the text (Freed, 1990). In addition, their oral reading is often arrhythmic. Rhythm is extremely important in developing fluency. When children miss the little words, it disturbs the natural flow of their reading and then they become tense. Phonics is an ineffective teaching tool because most of these students have auditory weaknesses. Also, if initially they are allowed to make an error in pronunciation, they almost always remember the wrong pronunciation of the word. To combat this, sounding out words is abandoned completely, and students are given any words they stumble over as they read aloud.

The perfectionism of gifted children can be harnessed by asking them to do very short assignments perfectly. They can be asked to read as little as one or two lines or just one paragraph without making an error. Eventually, this can be increased to one or two pages. This also focuses their attention on details, a skill in which they need much assistance. The child must feel that the size of the task is do-able, otherwise frustration sets in and undermines his or her self-confidence. A review of the "shaky" words would be done at the end of the session in order to teach the new vocabulary. These sessions should last no more than 15 to 30 minutes, as they are quite taxing on the child's energies, and it is hard to maintain quality interaction after that length of time.

A good combination activity would be for the student to then speed read ten or more pages in order to glean the main ideas from them. This is something that these students are usually good at, and speed reading, combined with the short, perfect, attention-to-detail reading, creates a good mix for successfully treating reading problems.

Language Arts

Here are some games that can be used with students in order to capture their enthusiasm and harness their competitiveness. The first game was developed to improve spelling, writing, punctuation, knowledge of sentence structure, and proofreading skills. The student and the tutor each pick a word from a list, perhaps the student's spelling list, and compete, each one trying to write the shortest complete sentence. After completing the sentences, the tutor and the student examine each other's sentences for errors in spelling, punctuation, or sentence structure, attempting to disqualify the other person. If no mistakes are discovered, the number of words is counted, and the one with the fewest words wins. This game often becomes highly competitive and the student becomes quite adept at the imbedded language arts skills.

Another game involves an elaborate point system and uses a list of perhaps 50 common words, many of which are similar (e.g., "still, till, chill, might, fright, could, would, should"). The student and the tutor compete to see who can identify the word from the list that the other has chosen. The point system adds to the fun: the fewer the clues, the more points they receive for an answer. For example, for the word "still," the clues might be: "It has 5 letters, with a consonant blend leading it off, only one vowel, and 3 tall letters." These four clues might be worth 4 points. The student must spend a great deal of time scanning the list attending to details in order to detect the subtle differences that distinguish one word from another. This game is undoubtedly one of the most popular among the students, and results in their learning to spell most, if not all, of the words on the list. Learning is enhanced by the students' high motivation due to the competitive aspect of the game.

Visualization and Stress

Tension is fatal to visual-spatial learners. Under stress, which most school situations present for these students, they have no systems to fall back on: no trial-and-error processes, no sequential cues. In addition, when individuals experience stress their eyes are pointed downward, the worst possible position to conjure up visual images and pictures. So at the times when these students most need it, they are robbed of their greatest asset—their ability to visualize. Reduced to rote responses, they fall apart and become labeled as "test anxiety cases" or view themselves as unable to perform under pressure.

Visualization actually can be used as a tool to reduce tension (Freed, 1990). As a method of stress reduction, students can do deep breathing and then visualize a peaceful scene—perhaps one of their favorite places. They should be asked to involve all of their senses in their imagery: imagine what it looks like, sounds like, feels like, smells like, tastes like. If students do this exercise for 15 or 20 days in a row, they can usually access that image at will during stressful periods, and re-experience the same sense of calm.

Conclusion

A key component in the recovery of motivation for visual-spatial learners is experiencing success. Individual tutoring should be sought to help these students learn to use their strengths and build their feelings of competence. Sincere praise works wonders. Spatial learners often excel at activities such as Legos, computer games, art or music. Any skill in which these young people experience success should be encouraged and nurtured. Their skill, interests and hobbies may lead to careers in adult life.

In adulthood, these individuals excel in fields dependent upon their spatial abilities: art, architecture, physics, aeronautics, pure mathematical research, engineering, computer programming, and photography. Frequently,

they develop their own businesses or become chief executive officers (CEOs) in major corporations because of their inventiveness and ability to see the relationships of large numbers of variables. We need individuals with highly developed visual-spatial abilities for advancement in the arts, technology and business. These are the creative leaders of society. We need to protect their differences in childhood and enable them to develop their unique talents in supportive environments at home and at school.

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