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ABSTRACT

This paper discusses the differences between spatial and sequential learning, characteristics of individuals who exhibit stronger visual-spatial learning, and strategies for teaching children with visual-spatial strengths. Techniques include: (1) using visual aids, such as overhead projectors, and visual imagery in lectures; (2) using manipulative materials to allow hands-on experience; (3) using a sight approach to reading rather than phonics; (4) using a visualization approach to spelling; (5) having students discover their own methods of problem-solving; (6) avoiding rote memorization; (7) avoiding drill and repetition; (8) finding out what students have already mastered before teaching them; (9) giving students advanced material at a faster pace; (10) allowing students to accelerate in school; (11) emphasizing mastery of higher level concepts; (12) emphasizing creativity, imagination, new insights, and new approaches rather than acquisition of knowledge; (13) grouping gifted visual-spatial learners together for instruction; (14) engaging students in independent studies for group projects which involve problem-finding as well as problem-solving; (15) allowing students to construct, draw, or otherwise create visual representations of concepts; (16) using computers so that material is presented visually; and (17) having the students discuss the ethical, moral, and global implications of their learning and involving them in service-oriented projects. (CR)

EFFECTIVE TECHNIQUES FOR TEACHING HIGHLY GIFTED VISUAL-SPATIAL LEARNERS

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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. 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, skilful 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. These diverse ways of relating to the world have had powerful ramifications throughout history in the development of various philosophies, religions, cultures, branches of science, and psychological theories.

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. Perhaps the greater facility of Asian children in the visual-spatial domain can be traced at least in part to the emphasis on visualization in the linguistic system.

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.

These different mental organizations appear to be innate. 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.

Characteristics

Individuals who exhibit stronger visual-spatial abilities than auditory sequential abilities are considered visual-spatial learners. 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 Scale for Children* (WISC) is one of the strongest indicators of the visual-spatial learning style. The Abstract Visual Reasoning section of the *Stanford-Binet Fourth Edition* 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 visual models of reality that are multi-dimensional.

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.

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. 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 spatial 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.

Strategies for Instruction

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

1) Use visual aids, such as overhead projectors, and visual imagery in lectures.
2) Use manipulative materials to allow hands-on experience.
3) Use a sight approach to reading rather than phonics.
4) Use a visualization approach to spelling: show the word; have them close their eyes and visualize it; then have them spell it *backwards* (this demonstrates visualization); then spell it forwards; then write it once.
5) 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).
6) Avoid rote memorization. Use more conceptual or inductive approaches.
7) Avoid drill and repetition. Instead, have them perform the hardest tasks in the unit.
8) Find out what they have already mastered before teaching them.
9) Give them advanced, abstract, complex material at a faster pace.
10) Allow them to accelerate in school.
11) Emphasize mastery of higher level concepts rather than perfection of simpler concepts in competition with other students.
12) Emphasize creativity, imagination, new insights, new approaches rather than acquisition of knowledge. Creativity should be encouraged in all subject areas.
13) Group gifted visual-spatial learners together for instruction.
14) Engage students in independent studies or group projects which involve problem-finding as well as problem-solving.
15) Allow them to construct, draw, or otherwise create visual representations of concepts.
16) Use computers so that material is presented visually.
17) 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 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. When they are placed 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.

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Note: For more information, please see Silverman, L. K. The visual-spatial learner. ***Preventing School Failure, 34(1), 15-20.***

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