Five years ago, Scott D. Thomson, executive director of the National Association of Secondary School Principals (NASSP), stated that "the ability to map learning styles is the most scientific way we know to individualize instruction" ("Students Learn," 1979). That same year, NASSP’s director of research, Jim Keefe, wrote:

Learning style diagnosis...gives the most powerful leverage yet available to educators to analyze, motivate, and assist students in school...it is the foundation of a truly modern approach to education. (1979, p. 132)

Since that time, many professional journals have published articles by various practitioners who reported dramatic successes with learning style based instruction (Ballinger & Ballinger, 1982; Cavanaugh, 1981; K. Dunn, 1981; Fiske, 1981; Hodges, 1982, 1983; Jenkins, 1982; Lemmon, 1982; & Pizzo, 1982). The popular magazine, Redbook, recently urged its readers to become intelligent consumers of education:

You can determine a lot about your own child’s learning style, share the information with teachers, challenge any facile diagnosis...or any remedial work that isn’t working...you can be instrumental in making educators realize that children of different needs need to be taught differently. (Ball, 1982, p. 76)

Given the influence of NASSP’s leadership, the corroboration of administrators and teachers who are finding learning style based instruction effective, and the gradually awakening support of popular writers, why hasn’t every board of education mandated such instruction as policy? Why hasn’t every instructional leader introduced selected aspects of the concept into their schools on, minimally, a pilot basis? Why hasn’t every teacher education institution redesigned its training program to reflect what is happening in lighthouse districts throughout the country?

Perhaps some of the lethargy revolves around unanswered questions concerning learning styles. Educators often are reluctant to experiment with innovations until "hard data" provide evidence that the new concept or process produces academic achievement at statistically significant levels. Although waiting for such corroboration is reasonable, it often takes years to design, conduct, evaluate, and report on experimental studies; getting that information published and then read is an even greater barrier to change.

That kind of information concerning the effectiveness of teaching students through their unique characteristics now is available through well-designed, carefully conducted, and often prize-winning research at all levels. It is the purpose of this manuscript to answer some important questions about learning styles so that more schools will become involved with that valuable system.

*Assisting Rita Dunn with this article were Patricia Brennan, Thomas DeBello, and Helena Hodges, all doctoral students at St. John’s University; Rita Dunn is professor, Center for the Study of Learning and Teaching Styles, St. John’s University.
Questions Concerning Learning Styles

1. What is learning style?

Prior to the mid-'70s, researchers experimented with cognitive style; their definitions were different but all were concerned with how the mind actually processed information or was affected by each individual's perceptions (Coop & Brown, 1970; Garder, Holzman, Klein, et. al., 1959; Kagan, Moss, & Sigel, 1963; Messick, 1969; Hill, 1971; Witkin, 1975).

In 1971 and 1972, Prentice-Hall published two books about the emerging concept of learning style (Kolb, 1971; Dunn & Dunn, 1972). Kolb’s well-thought-through conceptualization remained entirely in the realm of how the adult mind functioned. The Dunns posed a model that included 18 environmental, emotional, sociological, and physical student characteristics that they had learned to respond to in New York classrooms with 30-37 students, little money, and no aides. In 1979 the Dunns added elements of cognitive style to their model (Dunn, Dunn, & Price, 1979), and in 1980 that paradigm was revised to include hemispheric preference (Dunn, Cavanaugh, Eberle, & Zenhauern, 1982); in 1983 left and right cognitive styles were incorporated under simultaneous and successive processing. (See Figure 1)

The Dunns were not the only researchers developing learning style constructs. During the 1970s Canfield and Lafferty (1970), Gregorc (1979), Hunt (1979), Kolb (1971), Ramirez and Castaneda (1974) and Schmeck (Schmeck, Ribich, & Ramanaiah, 1977) all developed varied definitions, models, instruments, and techniques for assessing students' characteristics. In some ways those models differed, but their many strands revealed essential similarities and were mutually supportive (Dunn, DeBello, Brennan, & Murrain, 1981).

The essence of those models described similar phenomena observed from different vantage points—much like the blind men who were explaining an elephant by reporting only certain parts of

---

**Figure 1.** Diagnosing learning styles.

**Designed by:** RITA DUNN & KENNETH DUNN
its body. Thus, learning style is the way in which each person absorbs and retains information and/or skills; regardless of how that process is described, it is dramatically different for each person.

2. How good is the instrumentation to identify styles?

It is important to use a reliable and valid test or the data it yields may be inaccurate and potentially harmful. The Ohio State University’s National Center for Research in Vocational Education published the results of its two-year study of instruments that purportedly identified learning and cognitive styles (Kirby, 1979) and selected instruments were appraised as having “impressive reliability and face and construct validity” (p. 72). Certainly those would appear to be the ones most appropriate for school use.

Selected tests have been well-researched and reported extensively in the literature; others are the products of interviews by their developers, clinical applications, or only correlational studies. Instruments that have been validated through experimental investigations represent a better, more solid foundation. St. John’s University’s Center for the Study of Learning and Teaching Styles released a report summarizing the known reliability and validity data of many of the better known tests in the field; that report is available to interested persons (Learning Styles Network Instrument Assessment Analysis, 1983).

3. Can students identify their learning style?

Although Hunt uses an excellent observational format based on student reactions to systematic teacher-induced changes in structure, and Ramirez and Castaneda employ a direct observation checklist, Canfield and Lafferty, Dunn and Dunn, Gregorc, Hill, Kolb, and Schmeck all diagnose learning style through self-report inventories which reveal students’ preferences for selected elements (Dunn, DeBello, Brennan, & Murrain, 1981). One of the most frequently asked questions is, “Do students really know their own styles?” Having tested more than 350,000 youngsters, we can verify that most do, some don’t, and others do for only part of their style. Let us explain.

Researchers at our center have been experimenting with many elements of learning style including sound, light, temperature, design, perceptual strengths and weaknesses, intake, time of day, mobility, motivation, persistence, responsibility, sociological preferences, global/analytic, reflective/impulsive, field independent/dependent, and hemispheric inclinations. No one is affected by all those variables; most people respond strongly to between 6 and 14. When an element is important to a person, he/she can verbalize preferences and dislikes. When an element is unimportant, people are unaware of any reaction to it and, therefore, cannot respond knowledgeably to questions about it. In such cases, individuals are likely to respond, “It depends. . .” “It doesn’t matter!” or “I don’t know!”

Elements that are extremely important to a person are called strong preferences; those can be either positive or negative—and both are equally potent. For example, someone with a strong preference for sound would learn, study, concentrate, or remember more easily with music in the background; someone who needs quiet (a negative strong preference for sound) would find it difficult to learn with any kind of sound present. In effect, sound would prevent that individual from concentrating (Dunn, 1983a, 1983b, 1983c).

Many studies that used self-report instruments—questionnaires that ask students either about what they actually do when studying or what they prefer to do—placed tested populations into matched and mismatched situations where they then were taught and tested. Table 1 includes eight such research investigations that evidenced statistically significant achievement based on students’ perceptions of how they learned best. Apparently whenever an element is either a strong positive or negative preference, students can identify it. The Copenhaver (1979) (high school), Domino (1970) (college), and Pizzo (1981) (elementary school) studies also showed that improved attitudes toward school resulted from teaching through learning styles.

4. Is a preference a strength?

One of the instruments frequently used in doctoral research at our center is the Learning Style Inventory (LSI) (Dunn, Dunn, & Price, 1979). In various studies, students tested with the LSI who reported either strong negative or positive preferences for selected elements were placed into academic situations where they were taught and/or tested in ways that matched and mismatched their self-reported preferences. In every case, students who were matched with methods, resources, or environments that complemented their reported
Table 1
Can Students Identify Their Own Learning Styles?

<table>
<thead>
<tr>
<th>Researcher, Date</th>
<th>Population</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Cafferty, 1980   | 1,689 teacher-student pairs | 1. The greater the match between the student's and the teacher's style, the higher the student's grade point average.  
2. The greater the mismatch between the student's and teacher's style, the lower the student's grade point average. |
| Copenhaver, 1979 | 76 high school students | 1. Students' learning styles remained consistent regardless of the subject being studied.  
2. Significantly more positive attitudes resulted when students' styles were similar to their teachers'.  
3. A wide range of learning styles existed in each class. |
| Domino, 1979     | 100 college students | 1. Students taught in preferred styles scored higher on tests, fact knowledge, attitude, and efficiency than those taught in a manner dissonant from their orientations. |
| Farr, 1971       | 72 college students | 1. Individuals accurately predicted the modality in which they would achieve superior academic performance.  
2. It was advantageous to learn and be tested in the preferred modality.  
3. The above advantage was reduced when learning and testing were both in the non-preferred modality. |
| Krimsky, 1982    | 32 fourth graders | 1. Students who preferred bright light performed statistically better when tested in brightly lit areas; those who preferred reading in dim light did equally as well in a low-light setting.  
2. Both groups performed statistically less well when tested in mismatched situations. |
| Lynch, 1981      | 136 high school students | 1. When matched with their time-of-day preference and mismatched for teacher assignment, chronic truants attended school more frequently.  
2. A significant interaction (at the .01 level) occurred among degree of truancy, learning style preference, and English teacher assignment, suggesting that time preference was a crucial factor in the reversal of truancy patterns. Had the students not accurately identified their time preferences, statistically significant interactions could not have occurred. |
| Pizzo, 1981      | 64 sixth graders | 1. When students were matched with their learning style preferences, statistically higher reading and attitude scores resulted at the .01 level.  
2. Students who were mismatched achieved significantly below the matched students. |
| Shea, 1983       | 32 ninth graders | 1. When students were matched with their learning style preferences for design, statistically higher reading scores resulted at the .01 level.  
2. Students who were mismatched for informal design achieved significantly lower than when matched. |

strong preferences achieved statistically higher; they achieved statistically less well when they were mismatched with their preferences. Because our experiments—both in laboratories and in classroom studies—have yielded consistently significant scores, it is only reasonable to conclude that since students achieve better when taught through their preferences, *their preferences must be their strength*. Those studies include Krimsky (1982), Lynch (1981), Pizzo (1981), Shea (1983) and White (1980). Both Pizzo and Krimsy were finalists in the Association for Supervision and Curriculum Development's na-
tional doctoral research competition (1981, 1982) and White was awarded the Delta Kappa Gamma International Award for the best doctoral research (1980).

5. Does teaching through learning styles increase academic achievement?

During the '60s and early '70s, evaluations of selected innovations consistently yielded essentially similar results; group achievement scores tended to reflect those of students experiencing conventional instruction. Since then, however, attribute/treatment/interaction studies, where each youngster's scores are compared with the individual's own baseline data, repeatedly evidenced the statistically increased academic achievement (Cafferty, 1980; Carbo, 1980; Douglass, 1979; Krimsky, 1982; Pizzo, 1981; Shea, 1983; Tannenbaum, 1982; Trautman, 1979; Urschchat, 1977; Weinberg, 1983; Wheeler, 1983; White, 1980) and improved attitudes toward learning (Copenhaver, 1979; Pizzo, 1981) that emerge when students are taught through their unique personal characteristics. Among the above cited research investigations are four that were cited either nationally (Carbo, 1980; Krimsky, 1982; Pizzo, 1982) or internationally (White, 1980) for their excellent quality.

Despite the above supportive documentation, many educators continue to remain unaware of the extent to which learning style characteristics contribute to individuals' ability to absorb and retain new or difficult information or skills. Certainly, there is no widespread movement to expand experimentation with an element such as perceptual strength/preference. Carbo's (1980) chapter on related literature exposes the poor designs, misinterpretation of data, and faulty conclusions of many of the studies investigating that phenomenon one or two decades ago. Indeed, the Carbo (1980), Farr (1971), Urschchat (1977), Weinberg (1983), and Wheeler (1983) data clearly documented the significant gains and retention that were consistent when students were taught through their strongest—and sometimes it was their only—perceptual strength or preference. Despite that, and despite the widespread supportive documentation of many practitioners based on classroom or school experiences (Dunn, 1981; Hodges, 1982, 1983; Jenkins, 1982; Lemmon, 1982; Wheeler, 1980), few reading experts have seriously begun to reassess teaching through modality strengths; the singular exceptions to that statement have been the pioneering leaders Barbe and Swassing (1979) and Carbo (1980).

A second area of pervasive neglect has been the classroom environment to which we demand that all students adapt successfully. Clearly, our emphasis on processing skills (global/analytic, field dependence/independence, and impulsivity/reflectivity) and brain behavior—which we can affect only minimally—has diverted our attention away from the instructional environment. For no money and little effort and time (Dunn & Dunn, 1978), any interested teacher can redesign the instructional environment into a totally responsive atmosphere for almost every student. Our preoccupation with more complicated elements has prevented us from understanding the dramatic effects on the test scores of approximately ten percent of our school population of: (a) the need for either certain types of sound or absolute/relative quiet (Pizzo, 1981); (b) bright or dim illumination (Krimsky, 1982); and (c) wooden, steel, or plastic seats and desks versus lounge type chairs or carpeting (Shea, 1983). Parents verify the differences in environments repeatedly sought by their offspring, but educators, more often than not, require conformity and tend to disregard individual inclinations when teaching. Many cannot understand that instructional effectiveness is increased when the small percentage of students that requires adjustment of the environment is provided a responsive setting.

In addition to our inattentiveness to perceptual preference/strength, sound, light, and design, we also have overlooked chronobiological energy levels. We often operate under the mistaken assumption that reading should be taught in the morning when, supposedly, most children are alert; the Lynch (1981) and Virostko (1983) investigations demonstrate the fallaciousness of that belief. Normal school hours restrict the achievement of approximately 25-30 percent of secondary youngsters; no matter when instruction is being offered, it is the wrong time of day for almost one of every three students.

6. Do good and poor readers reflect different styles?

In 1977, Kaley revealed that reading achievement is a statistically stronger and more effective predictor of learning style than IQ. In another investigation, all data were secured from 94 percent of the identified low and high reading achievers in the seventh and eighth grades of a public middle school (Murray, 1980). Analysis of the data resulted in 27 significant differences between the two groups' styles. High reading achievers were more self-motivated, responsible, and preferred learning alone—
the latter being a characteristic also verified in Wingo’s study of eighth grade, high reading achievers (1980). Low reading achievers were less motivated, needed more structure, and preferred learning with an adult.

A third comparative study of 85 elementary school children also reported that high reading achievers were self-motivated, persistent, responsible, and required little food intake and virtually no mobility while learning (Price, Dunn, & Sanders, 1981). Thus, the learning styles of high reading achievers in grades 3-8 tend to incorporate the elements of self-motivation, learning alone, persistence, and responsibility—the latter correlating with conformity (White, 1980). Requiring intake and mobility appear to characterize poor readers, as do adult-rather than self-motivation, reduced persistence, nonconformity, and an increased need to learn tactually and kinesthetically.

Furthermore, at least three important studies revealed that students whose perceptual strengths were tactual/kinesthetic—rather than auditory or visual—did not learn well through either phonics or word recognition reading approaches (Carbo, 1980; Urboschat, 1977; Wheeler, 1983). Such youngsters achieved statistically better when taught tactually. Another study of good and poor readers demonstrated that, of the good, approximately half were left and half were right “brained,” but of the poor readers, 17 of 19 were right preferred youngsters (Zenhausern, 1982).

7. Do gifted/talented students (4-12) require unique instruction?

Several studies have examined the styles of gifted/talented students at various school levels (see Table 2). Those investigations showed consistent patterns of independence, self (internal) motivation, persistence, strong perceptual modalities, and needing options rather than structure among (a) high IQ, (b) musically, and (c) artistically gifted youngsters. They also verified that, despite their across-the-board strong perceptual modalities, the gifted strongly prefer independent studies and projects to lectures and discussions. As interviewed students explained, their teachers spoke “too slowly” to keep pace with the youngsters’ thoughts. Students also complained of verbal repetition and boredom with lectures.

Cody (1983) revealed significant differences (p<.01) among average, gifted, and highly gifted fifth through twelfth graders. The higher the IQ of the students, the more motivated they were and the less structure they required. The highly gifted were evening, rather than morning, preferred, wanted sound when learning in contrast with the gifted and average youngsters who needed quiet, and were significantly more right dominant than their peers.

When combined with the data that has emerged concerning underachievers (Carruthers & Young, 1980; Cavanaugh, 1981; Dunn, 1981; Hodges, 1982, 1983; Weinberg, 1983; Wheeler, 1980, 1983), it becomes apparent that although selected learning style elements parallel the growth curve and affect individuals differently, other elements tend to reflect patterns of either giftedness or underachievement. For example, whereas the gifted are highly motivated and persistent, underachievers usually are unmotivated and are not persistent in academic matters. A majority of the gifted dislike imposed structure; a majority of underachievers require structure; a percentage of both groups want/do not want structure. The higher the students’ achievement levels, the stronger and more varied their perceptual strengths. Underachievers appear to learn most easily tactually and kinesthetically; the gifted learn equally as well tactually, kinesthetically, visually, and auditorily. Despite their ability to learn by listening, they almost uniformly dislike lectures. The reasons given often include that teachers take too long to say what has to be said, and the gifted understand the thrust of what is being verbalized before the full statements have been delivered. They also complain that teachers talk “too slowly” and that repetition is unnecessary. Such youngsters often are either morning or evening, high energy level people (Cody, 1983; Dunn & Dunn, 1978). Underachievers, particularly at the secondary level, tend to be late morning/afternoon preferents. Whereas underachievers need mobility and intake while learning, the gifted can sit for long periods of time without eating, drinking, smoking, or chewing. It is important to remember, however, that individual differences do exist among those two populations despite group trends (Carruthers & Young, 1980; Cody, 1983; Cross, 1982; Dunn, 1981; Dunn, Cavanaugh, Eberle, & Zenhausern, 1982; Price, Dunn, & Sanders, 1981; Kreitner, 1981; Lynch, 1981; Murray, 1980; Stewart, 1981; Wasson, 1980; Weinberg, 1983; Wingo, 1980).

8. Is learning style biologically or environmentally developed?

Both Restak (1979) and Thies (1979, 1983) verify that selected elements of style are imposed
Gifted/Talented Students (Grades 4-12) Require Unique Instruction

<table>
<thead>
<tr>
<th>Researchers, Date</th>
<th>Grades</th>
<th>Instruments</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewart, 1981</td>
<td>4, 5, 6</td>
<td>Learning Style Inventory*; Norwicki-Strickland Locus of Control</td>
<td>Gifted are: independent, internally controlled. Gifted prefer: independent study and discussions, but no lectures.</td>
</tr>
<tr>
<td>Dunn &amp; Price, 1980</td>
<td>4, 5, 6</td>
<td>Learning Style Inventory**</td>
<td>Gifted are: persistent, nonconforming, perceptually strong. Gifted prefer: time to complete tasks, options, few/no lectures.</td>
</tr>
<tr>
<td>Wasson, 1980</td>
<td>4, 5, 6</td>
<td>Learning Style Inventory*</td>
<td>Gifted prefer: teaching games, independent study, peer teaching, programming. Gifted dislike: recitations, lectures.</td>
</tr>
<tr>
<td>Griggs &amp; Price, 1979</td>
<td>7, 8, 9</td>
<td>Learning Style Inventory**</td>
<td>Gifted are: persistent, self-perceptually strong. Gifted prefer: learning alone, no lectures.</td>
</tr>
<tr>
<td>Kreitner, 1981</td>
<td>7-12</td>
<td>Learning Style Inventory**; Swassing-Barbe Modality Index</td>
<td>Gifted are: highly motivated, perceptually strong.</td>
</tr>
<tr>
<td>Cross, 1982</td>
<td>9-12</td>
<td>Norwicki-Strickland Locus of Control</td>
<td>Gifted are: self-motivated, internally controlled, self-directed, task committed.</td>
</tr>
<tr>
<td>Price, Dunn, Dunn, &amp; Griggs, 1981</td>
<td>4-12</td>
<td>Learning Style Inventory**</td>
<td>Gifted are: self-motivated, persistent, perceptually strong, nonconforming. Gifted prefer: options, formal design, no lectures, learning alone.</td>
</tr>
<tr>
<td>Cody, 1983</td>
<td>5-12</td>
<td>Learning Style Inventory**; Otis Lennon Mental Ability Test; Wechsler Intelligence Scale for Children-Revised; Stanford-Binet; Your Style of Learning and Thinking</td>
<td>Gifted, highly gifted, and average students differ significantly in their learning styles and hemispheric arousal systems. Gifted prefer: quiet, moderate temperatures, morning, and options. Highly gifted prefer: sound when learning, cool temperatures, evening, and more options than the gifted. These revealed the highest levels of motivation and right dominant processing/integration.</td>
</tr>
</tbody>
</table>


by genetic makeup and that others are developed as an outgrowth of experiences throughout life. It is believed that individual responses to sound, light, temperature, design, perceptual strengths, intake, circadian rhythms, and mobility are biological, and that inclinations toward certain sociological preferences and motivation, persistence, responsibility, and structure are developed because of the positive and/or negative interactions people endure (Thies, 1979, 1983).

Both experience and research appear to support those conclusions, but several mystifying sets of data confuse the hypotheses. For example, in studies of husbands and wives, most couples tend to evidence styles that are dramatically different from each other—and their offspring appear to reflect neither's style completely. In fact, children are likely to be more different from than similar to their parents when learning. Furthermore, in the
same family, offspring tend to evidence styles that are essentially different from each other.

Given the statements that learning style is biologically imposed, it is difficult to understand the differences that exist between parents and their children and among offspring in the same family. On the other hand, we've learned so much about the phenomena during the past two decades that how style emerges is just one more question that is likely to be solved in the near future.

Summary

Learning style represents each person's biologically and experientially induced characteristics that either foster or inhibit achievement. Instrumentation exists for identifying individual styles, but students can describe their strong preferences; they are, however, unaware of those elements that do not affect them.

Elements that youngsters strongly prefer are their strengths—meaning that it is easier for them to absorb and retain when their environment is complementary. In working with more than 21 elements of style, we consistently find that students evidence: (a) increased academic achievement, (b) improved attitudes toward school, and (c) reduced discipline problems (Carruthers & Young, 1980; Dunn, 1981; Hodges, 1982, 1983; Lynch, 1981) when strong preferences are responded to.

The styles of good and poor readers are drastically different; in fact, research suggests that poor readers probably would have been good readers had they been taught to read correctly (for them!) (Carbo, 1980; Urbschat, 1977; Wheeler, 1980, 1983). Furthermore, because the styles of the gifted/talented require unique instructional strategies, the styles of underachievers—which vary dramatically from those of high achievers—undoubtedly also require approaches that differ from those used in conventional classes. Indeed, widespread practitioners' reports verify that conclusion (Ball, 1982; Cavanaugh, 1981; Dunn, 1981; Hodges, 1982, 1983; Fiske, 1981; Jenkins, 1982; Lemmon, 1982).

References


Dunn, R. (1983b). You have style: How can you make the most of it? Early Years, 13 (6).

Dunn, R. (1983c). What are you willing to do to teach your students through their styles? Early Years, 13 (7).


Volume XXIII, Number 1 17


Learning Style Inventory (LSI) (Dunn, Dunn, & Price, 1979) for students in grades 3-12. Obtainable through Price Systems, Box 3067, Lawrence, KS 66044. Specimen set, $12.00.


