# Ways of Learning: What the Trainer and the Student Need to Know about Learning Styles

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Introduction

What is the best method for training? What media are most effective in accomplishing the trainer's goals? The learner's goals? How does a manager spend a training budget effectively?

Knowing the subject matter of the training will not answer these questions. Choosing a training path that will be effective requires an understanding of the learning style of the student. Understanding learning styles benefits the learner, who can choose training paths that are most likely to succeed; the trainer, who can vary presentations to reach a diverse set of learners; and the training administrator, who can choose courses that include all learners in their audience.

This paper will review several proposed systems for categorizing learning styles and suggest specific training techniques that will broaden the accessibility of training courses to all learners. It will touch on ways to identify your own learning style, or your own teaching style, and provide information on how to adapt to styles that are different from yours.

What is Learning Style?

People seem to be born with clear preferences for certain ways of interacting with their environment, and for ways of processing information internally. Environment can play a role in strengthening these preferences or building up the effectiveness of the less preferred method. The combination of these preferences can be thought of as the individual's learning style.

Learning involves taking information from the environment and processing it internally so that it can become part of the individual's repertoire. In a very broad sense, the goal of learning is for the individual to "own" a concept or tool, being able to use it effectively to increase her ability to pursue and reach her goals.

Research is showing that matching teaching methods with the student's preferred learning style increases the chances for that goal to be achieved.

How Is Learning Style Determined?

There are a growing number of different systems for categorizing learning styles. This paper will review training implications of the following schemas:

> Right brain - Left Brain
> Whole Brain
> ASTD
> Myers-Briggs
> Gardner's Multiple Intelligences

Just by studying the different characterizations, a person can often identify his own style. Some of the systems have tests or checklists for assigning a style to an individual. But the point is not so much to put a label on the style of an individual as to understand that different styles exist. Knowing this will help a learner ask questions that encourage a trainer to present the material in the style the student prefers, while maintaining her confidence when the material isn't grasped right away. It will help a trainer find alternate ways of helping students absorb or welcome new concepts, without feeling ineffective or frustrated when some students seem not to "get it".

Right Brain - Left Brain

Many people are familiar with the dichotomous model of brain activity that came out of some research on the actual physical location of many mental processes. The extrapolation to a metaphorical model of two distinct ways of thinking is very useful in an educational context.

In this model, the "right" brain is the center for nonverbal, nonrational, conceptual, visual, nonsequential processing. The "left" brain

handles the logical, procedural, objective processing. Some examples are:

Left-Brain
speech
reading
writing
verbal memory consolidation
abstract categorizing
musical ability
fine manual sequences
seeing >1 thing at a time
detail in drawings

Right Brain
understanding of metaphor
facial recognition
attending to left body
visual space
spatial perception
ability to find way
visual closure
musical sense
form memory consolidation
proper form in drawings

Parallel Ways of Knowing

| Left | Right |
| --- | --- |
| successive | simultaneous |
| intellect | intuition |
| convergent | divergent |
| digital | analogic |
| secondary | primary |
| abstract | concrete |
| directed | free |
| propositional | imaginative |
| analytic | relational |
| linear | nonlinear |
| rational | intuitive |
| sequential | multiple |
| analytic | holistic |
| objective | subjective |

Strongly left-brain dominant individuals tend to major in the sciences. Right-brain dominant people prefer the humanities and social sciences.

Most traditional classroom teaching methods are entirely left-brain based.

The down-side of this unilateral approach to education becomes apparent when the focus changes to the creative process. Innovation and breakthrough thinking seem to originate in the right brain. No less an authority than Einstein, in reflecting on his own thought processes, identified the essential elements as visual and muscular. He described productive thought as consisting of combinatory play with these signs and images. Only in a secondary stage, when a particular association was sufficiently established, did he seek "laboriously" for the conventional words and logical construction to communicate his thought to others.

Products of traditional American schooling become adept at left-brain thinking. Those who can't adjust, the strongly right-brain dominant, often leave the educational system and thus self-select out of professional occupations. Increasing the right-brain, creative powers of the population in a given profession should improve the power of that profession to make the kind of creative leaps in problem-solving that keep the profession moving with the times.

Training courses can help increase the right-brain powers of a profession, both by enhancing the right-brain skills of left-brain dominant individuals, and by making the necessary learning accessible to strong right-brain thinkers. To do this, the training must use methods preferred by right-brain thinkers. What are some of these methods?

1) Bridging -- relate the activity to something the learner has already had experience with. In programming, this can mean making sure the examples deal with topics familiar to the learners. At a more basic level, it would mean developing a metaphor for what a program is or for the programming process. For example, compare a computer program to a cooking recipe.
2) Focusing -- introduce a topic, discuss what it is about, what will be done, what the results will be. In a SAS training course, start with having the students look over all the course material and study a few of the sample programs and printouts. Reviewing the whole book gives the learner an idea of where the course is going, helping him screen out distracting stimuli during the class.
3) Using visual aids -- For most courses this goes without saying. But to appeal to all learners, the visual and auditory presentations should be redundant. Each student will absorb

the material from the media that suits her. Going further with the attempt to reach right-brain dominant individuals, use visuals that show information in a holistic rather than sequential manner. A map of relationships among concepts rather than a list would be an example.

4) Vocabulary building -- Right brain perception of new words works best through example and context rather than through definition. Use several different examples rather than a definition and one example. To introduce *observations* and *variables*, describe some familiar information such as a telephone book in SAS dataset terms.

5) Tactual experience -- opportunities for touching items and using materials related to the concept being taught. This means more than hands-on the keyboard. Cardboard cutouts symbolizing the observation can be used to show how data moves from the program data vector to the output dataset. Building blocks can symbolize PROCs and DATA steps. Students themselves can act as observations in two datasets to show how a MERGE works.

6) Real life application -- show how the concept being taught will be used. The best way to prepare students to receive a new concept is to pose them a problem that requires the new concept for solution BEFORE introducing the new concept. For example, if a class has some understanding of the DATA step, ask them to summarize a dataset. After they have a mental model of what the summary process is about, and have tried to write it using DATA step logic, they will have a clear grasp of the utility of PROC SUMMARY.

7) Imaging and visualization -- guiding students in visualizing a condition, situation or person that is part of the coming lesson. Spend some time getting students to create a mental picture of what is going on in a program or what needs to happen to get a particular result from a program. Give them practice in sketching out a map of the known information.

8) Origination -- inspiring and motivating students to originate new uses, ideas, methods or conditions related to the central topic. Go ahead and ask them what PROCs ought to exist. How would they use PROC TRANSPOSE? Involving students' thinking in the class changes them from passive to active learners.

9) Soliciting feedback -- questioning, responding or reinforcing any of the processes mentioned with individual feedback. This is another that goes without saying, but it can't be stressed enough that individual attention buoys up a student's interest in class material.

10) Reviewing -- another obvious technique, but an important one. Reviewing should be done both by repeating what has been said, and by saying it in a new way.

11) Transference -- do exercises to allow students to transfer their new knowledge to a variety of situations. Then allow time to understand what they've just done. For the right brain, the experience comes first with its sensations and reactions. On its heels come evaluation and understanding. After the exercise is completed students need time to process and digest what has been learned.

12) Minimize distractions -- see that background stimuli are kept to a minimum. The right brain is easily distracted and has difficulty screening out irrelevant sights and sounds.

The right-brain does not process time well. It does not respond to short deadlines. For the training course, this means that it will take extra time to allow for right-brain processing. With right brain involvement, even left brain thinkers will have a deeper understanding of the material. Without it, a powerful force for innovation will be omitted from the profession.

Whole Brain -- Ned Herrmann

This theory unites the right/left brain concept with another theory called the triune brain. In this system, there are 4 quadrants: Right and left cerebral and right and left limbic. The right - left distinction remains the same as in right/left theory. The cerebral portion of each is characterized by abstract and conceptual thinking; the limbic involves visceral and emotional modes. Both accountants and bookkeepers have left-brain preferences, but accountants are more cerebral while bookkeepers have limbic tendencies.

This model divides the learning process into structured (left) and unstructured (right). The structured mode involves logical and quantitative activities (the cerebral piece of left brain processing), in organized and sequential procedures (the limbic piece of left brain activity). The unstructured mode involves visual

and conceptual processing (cerebral) and the emotional, interpersonal component (limbic).

Every learning point in a workshop should be checked against the model to make sure the material is delivered in ways appropriate to each of the four mental modalities. In addition to lecture, the students should have the opportunity to absorb the content through experience or unstructured means.

Quoting from an article by Ned Herrmann: "While learning about how to cover the entire brain dominance spectrum in making key points in a course, more and more often I delivered each point not in just one way, but in three or four ways...I might use facts and data first, then show a graphic model, develop a case study, interpret it using a metaphor or a film, and follow up with an experiential simulation, with a written statement at the end.

"Wasn't all that repetition tedious and time-consuming? Not at all. Participants loved it, not only because of the variety, but also because each type of delivery expanded their grasp of the subject. You can learn about a car in a limited way from a written description, more fully from a snapshot, more fully still by touching it and getting inside, and even more so by driving it, by looking under the hood, or going to an automobile factory.

"Thus, the multidominant teaching ensured that students mastered the material as it was designed to be understood. And as for time-consuming, if a person's educational goals are meaningful in the first place, how can a course where people really learn cost any more in time and money than a course where people don't learn."

ASTD Recommendations

The American Society for Training and Development issued some practical guidelines in their August 1988 issue of INFO-LINE. Mary Lippitt identified two ways of gathering information (active and passive) and two ways of processing information (deductive and inductive). She recommended that trainers use a variety of training techniques to address these learning preferences. Figure 1 shows which training methods match each learning style.

The deductive/inductive dimension correlates with the left/right brain dimension discussed previously.

Most instructor-based SAS training courses consist of lecture/presentation with some exercises possibly falling under the case study heading. There is little opportunity for those learners with an inductive processing preference to use their best learning mode. How could group discussion or role playing be added to a SAS training course?

One exercise that might be helpful is the one mentioned previously, where learners are asked to come up with ideas for PROCs that ought to exist. For true creativity, this can be a very "blue sky" brainstorming session. Keeping the discussion anchored in an actual situation, allowing the group to discuss the advantages and disadvantages of PROC FREQ vs PROC SUMMARY as a technique for counting observations, can encourage participants to bring additional resources to bear on the learning, involving them and interesting them in the topic at hand. This takes more time than the instructor simply telling the class that PROC FREQ is more efficient, but which will be retained longer? And which will encourage the learners to use their own resources to make decisions later on rather than relying on a set of rules?

Role playing could be used to introduce a new PROC. Assign one student to BE a PROC such as PRINT. Have another student hand him a dataset and ask him to PRINT it. The dialogue between the two as they try to come up with the desired report leads directly to the statements that accompany PROC PRINT such as VAR, ID, BY, etc. This requires the instructor to be responsive and flexible and is more taxing than traditional approaches, but the students will have a much deeper understanding of not only PROC PRINT but the whole concept of customizing PROCs with additional statements.

An additional tool for assessing the effectiveness of training styles appears in the same issue of INFO-LINE and is shown in Figure 2. This one is based on how participatory or didactic each approach is. The thesis of the authors, Mary Lippitt and David W. Miller, is that adults will

learn new material to the extent they are involved in the training.

Score a typical SAS training course using this scale, then note the interpretation of the score. "Scores of 40 or higher [those where the trainer presents material in lecture format] are appropriate for briefings and for orientation events. Training targeted at adult learners is generally more effective when the scores are below 25 [student directed and participatory]."

A trainer might be inclined to argue that the material is straightforward and lends itself well to the teacher talks/students listen format. But research is showing learners need to become involved in the training process to internalize new information. Louise R. Slater of the Wilson Learning Corporation is quoted as saying "Focus on asking the right questions, not on having the right answers."

In traditional classroom situations, problems are not set for students unless an answer has been found. For convenience of the teacher, the answer that has been found becomes the "right" answer. The student's goal is to become facile finding that solution again. This does not necessarily develop the student's ability to approach problems that have not yet been solved or that have many solutions, or even that cannot be solved. Yet which is more common in the real world?

MBTI Types

Many people are familiar with the Myers-Briggs Type Inventory, a set of four dimensions for classifying a person's preferences for interacting with the world. Although it is widely used in organizations today for many reasons, including improving communication and teamwork among diverse individuals, it was developed in a learning context and is particularly useful in improving effectiveness of training.

It would be impossible to cover the MBTI completely here. It is mentioned to show the utility of typing and to point out how a given training method can work very well for some people and be counterproductive for others.

Very briefly, the four dimensions are:

Extrovert-Introvert: outward vs inward focus.

Sensing-Intuitive: focus on detailed facts vs. big picture ideas.

Thinking-Feeling: preferred basis for making decisions.

Judging-Perceiving: preference for closure vs. leaving things open.

The actual MBTI instrument can be given only by a licensed professional, but you can get an approximation of your type by taking the Keirsey Temperament Sorter. This is available in book form in Please Understand Me by David Keirsey and Marilyn Bates, or on the internet at

http://sunsite.unc.edu/personality/keirsey.html

Figure 3 shows a summary of research on MBTI types and learning preferences compiled by Gordon Lawrence in People Types and Tiger Stripes. This table points up the obvious problems with the one-size-fits-all approach to training course design. Although a diverse approach can accommodate many styles, there are some fundamental conflicts between the preferences of the different dimensions.

For example, notice that while extraverts thrive on discussion and working with a group, introverts need time for internal processing. If a trainer wants to involve extraverts by having group participation, she will force the introvert to devote all available resources to coping with this unpreferred mode and he will have no energy to devote to digesting the material. Similarly, while those with a Judging preference want the material presented in a steady, orderly way, those with a Perceiving preference want to be flexible and follow impulses. Would a course that tries to incorporate both types of organization appeal to both types, or alienate everyone?

Fortunately, almost no one is strictly Judging or strictly Perceiving. Thinkers feel and Feelers think. People have the capacity to work in an unpreferred way. If both learner and trainer understand their preferences they can tolerate the anxiety associated with working in a non-preferred way, knowing that their preferences will be accommodated at other points.

## Multiple Intelligences

Howard Gardner's thesis, that there are several kinds of intelligence, is making profound changes in elementary schools across America. Teachers at that level have been quick to embrace an approach that supports what they have known for years: some very gifted people don't get high grades on traditional tests. Many abilities that teachers perceive and appreciate go unrecognized by pencil and paper exams, and undeveloped in a one-dimensional classroom.

The effect of this new theory has been to broaden the range of activities taught and types of products required, allowing learners to show mastery in ways other than multiple choice tests. The emphasis in education has shifted from how much students know to how well they can think. And assessment of thinking process has changed to encompass more than just deductive reasoning.

Gardner's theory of multiple intelligences encourages not just acceptance of but appreciation for diversity: of background, culture, approach, skill, contribution. He proposed seven categories of intelligence originally, and has recently added an eighth.

## Eight Ways of Knowing and Targeted Teaching Tools

1. Verbal/Linguistic: Intelligence of words and language, written and spoken. Teaching tools include reading, lecture, debate, humor.

2. Logical/Mathematical: Often called "scientific thinking". Deals with inductive and deductive reasoning, numbers and abstract patterns. Teaching tools include symbols, outlines, graphs, patterns.

3. Visual/Spatial: Relies on the sense of sight and ability to visualize an image. Includes the ability to create internal mental images or pictures. Teaching tools include imagery, color, designs, pictures, maps.

4. Body/Kinesthetic: Intelligence of physical movement and the wisdom of the body. Teaching tools include role playing, gestures, movement.

5. Musical/Rhythmic: Based on the recognition of tonal patterns and a sensitivity to rhythm and beats. Teaching tools include patterns, vocal sounds, sound effects. Merely using music as a mnemonic device, like putting the names of the presidents to a recognizable tune, does not constitute use of musical intelligence.

6 Interpersonal: Ability to deal effectively with other people, establishing relationships and communicating. Teaching tools include cooperative learning, communication, role playing.

7. Intrapersonal: Relates to inner states of being, self-reflection, and metacognition (thinking about thinking). Teaching tools include silence, thinking strategies, high order reasoning, introspection.

8. Naturalist: An ability to identify and make use of elements in the natural environment. Teaching tools include natural systems, integration, relationships among pieces.

Intelligence differs from style in that style describes how a person approaches activities and intelligence describes a capacity geared to specific content. Intelligence patterns affect style because what a person can do easily can become a preferred activity.

## Conclusion

Although many different structures exist attempting to categorize the ways individuals learn and grow, there is one central point made by all theorists: diversity among learners, while inconvenient for administration of learning environments and a challenge for teachers, is inevitable and essential. If our goal is to find more effective solutions to the problems of today and tomorrow, our education and training programs must work for individuals with different learning styles, and they must involve and enhance different intelligences of those individuals. Understanding that these differences exist and are valuable is the first step toward making the necessary improvements.

This paper is not intended as a review of all, or even the most important, frameworks for understanding learning styles. Rather it

introduces the idea of broadening the training experience to an audience of trainers and learners with the hope of starting some additional research and discussion.  Interested individuals are encouraged to contact the author.

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Figure 1.  Addressing Participant Learning Preferences.  Reprinted with permission from ASTD Info-Line, Basic Training for Trainers, August 1988.

| | Gathering Information | | Processing Information | |
|---|---|---|---|---|
| | Active | Passive | Deductive | Inductive |
| Lecture/Presentation | | X | X | |
| Group discussion | X | | X | |
| Readings | | X | X | |
| Simulation and Role Play | X | | | X |
| Programmed instruction | X | | | X |
| Games | X | | | X |
| Panels | | X | X | |
| Demonstration | | X | | X |
| Case Study | X | | X | |

**Figure 2.  Assessing the Effectiveness of Training Styles**

From "Basic Training for Trainers", ASTD INFO-LINE, August 1988, Issue 808.

## TRAINING STYLES  SCALE

| PARTICIPATORY | | | DIDACTIC | | |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **SCORE** |

| | | |
|---|---|---|
| The trainer elicits examples from others. | The trainer provides examples. | _____ |
| The goals and objectives are flexible. | The goals and objectives are established. | _____ |
| Learners influence timing and pace of the program. | The trainer controls program timing or pace of learning. | _____ |
| Design options are built into the program. | There is a single design. | _____ |
| The program relies on practice. | The program relies on conceptual understanding | _____ |
| Learners are assumed to be experienced and/or knowledgeable. | Learners are assumed inexperienced and/or uninformed | _____ |
| The program addresses the skill level of training. | The program addresses the awareness or knowledge level. | _____ |
| The trainers asks questions. | The trainer makes statements. | _____ |
| The trainer seeks alternatives, creativity, and originality. | The trainer seeks consistency. | _____ |
| Participants are seen as the primary resource. | The trainer is seen as the primary resource. | _____ |
| The trainer relies on active training methods. | The trainer relies on passive methods such as lecture. | _____ |
| The trainer uses ongoing or mid-course evaluation. | The trainer uses end-of-course evaluation. | _____ |

## SCORING

Scores of 40 or higher are appropriate for briefings and for orientation events.
Training targeted at adult learners is generally more effective when the scores are below 25.

**Figure 3.  Learning Preferences for MBTI categories.**

# Summary of Research on Type and Learning Style

## Table 1.  Learning Preferences Associated with MBTI Dimensions

**Extraverson**
* talking, discussion
* psychomotor activity
* working with a group

**Introversion**
* reading, verbal reasoning
* time for internal processing
* working individually

**Sensing**
* tasks that call for carefulness, thoroughness, and soundness of understanding
* going step-by-step
* tasks that call for observing specifics
* tasks that call for memory (recall) of facts
* practical interests (independent of intelligence)

**Intuitive**
* tasks that call for quickness of insight and in seeing relationships
* finding own way in new material
* tasks that call for grasping general concepts
* tasks that call for imagination
* intellectual interests

**Thinking**
* teacher's logical organization
* objective material to study
* depth and accuracy of content

**Feeling**
* personal rapport with teacher
* learning through personal relationships
* personal connection to content

**Judging**
* work in steady, orderly way
* formalized instruction
* prescribed tasks
* drive toward closure, completion

**Perceiving**
* work in flexible way, follow impulses
* informal problem solving
* discovery tasks
* managing emerging problems

## Table 2. Learning Preferences Associated with MBTI Quadrants

**IS__ Types**
* demonstrations
* labs
* computer assisted instruction
* films, audio-visual aids

**IN__ Types**
* serious reading
* tutorials
* independent study
* systematically organized courses

**ES__ Types**
* television
* reports to class on topics selected by students
* scheduling own time
* having a schedule and sticking to it
* orderly work on goals set in advance

**EN__ Types**
* reading
* self-instruction
* courses where student works on own initiative'
* working on group projects
* meeting a lot of people
* opportunities to be creative and original