

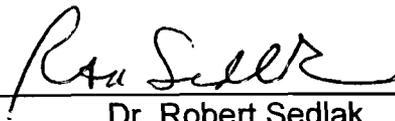
AN ANALYSIS OF RIGHT- AND LEFT-BRAIN THINKERS
AND CERTAIN STYLES OF LEARNING

By

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ABSTRACT

The purpose of this study was to analyze right- and left- brain thinkers and certain styles of learning (specifically visual, auditory, or kinesthetic) in college-level adult learners. This study includes data collected from approximately 100 adult learners with a survey, as well as a comprehensive review and analysis of literature concerning the brain, brain-based learning, and certain learning styles.

Research-based evidence from the study will be used to encourage instructors to develop and use appropriate styles of teaching to enhance their student's educational experience.

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Chapter I: Introduction

Introduction

In general, people typically favor the use of one side of their brain over the other. Some, however, are more whole-brained and equally adept at utilizing both hemispheres. Colleges tend to favor the left-brained modes of learning, focusing on logical thinking, analysis, and memorization rather than right-brained modes such as feeling, intuition, and creativity.

Ornstein (1970) argued that western cultures make use of the left hemisphere and neglect the right hemisphere through their emphasis on language and logical thinking, while eastern cultures, the right hemisphere is more exercised through their religious, languages, intuition and mysticism.

Traditional teaching techniques should be reevaluated and/or broadened and new teaching techniques created in the light of “new” information about how the brain operates. The biggest problem that faces college graduates is their inability to see the whole picture and to recognize patterns in new information introduced to them.

The left-brain/right-brain distinction provides a simple and convenient basis for questioning our education system and for helping students learn. Whether each hemisphere is responsible for a certain type of thinking and learning is not the point. The point is that people naturally think and learn in different ways.

Students come to class with a “two-sided mind.” Instructors must encourage them to use it, to develop it, utilizing both types of thinking (left and right brain) so that they have access to the greatest possible range of mental abilities. The role

of the instructor and the classroom atmosphere he/she creates is to motivate and maximize student learning (Williams, 1983).

Because of this, it is important to understand the concepts of brain lateralization and preferred styles of learning (multiple intelligences). It is also important to understand the advantages and disadvantages of each learning style as they relate to individual learners and the various teaching techniques needed to promote learning. This knowledge can assist instructors in becoming more flexible and effective in teaching in the classroom.

Statement of the Problem

The left-brain/right-brain distinction also provides a simple basis for questioning teaching methods and for helping students learn. Again, whether each hemisphere is responsible for a certain type of thinking and learning is not the point. The point is that people naturally think and learn in different ways. Williams (1983) argued, "The brain has two hemispheres but too often the education system operates as though there were only one.

In education there are many methods in which to teach the same subject. The problem arises when instructors are not able to match his or her teaching methods with the students learning styles and because of this mismatch, learners are not getting the most of his or her educational experience.

Purpose of the Study

The purpose of this study was to research the concept of brain lateralization (right- and left- brain thinkers) and certain styles of learning (specifically visual, auditory, or kinesthetic) in college-level adult learners. This study includes data collected during 2006 from approximately 100 adult learners participating in the Marian Adult Accelerated Program (MAAP) of Marian College. The database for this investigation was the result of a written questionnaire, and a comprehensive review and analysis of literature concerning the brain, brain-based learning, and certain learning styles.

The findings of the study will be used to encourage instructors to develop and use styles of teaching that will provide guidance and enhance their student's educational experience.

Questions Guiding the Study

1. Do students enrolled in the Marian Adult Accelerated Program have different preferences for hemispheric mode process (e.g. right, left or both)?
2. Do students enrolled in the Marian Adult Accelerated Program have different learning styles?

Assumptions of the Study

Adult learners are self-directed. Adult learners acquire knowledge through life experiences. Adult learners are goal-oriented. Adult learners are practical. Adult learners require relevance in coursework. Adult learners are self-motivated. These assumptions were held as true throughout this investigation.

Limitations of the Study

This study had one primary limitation. That was:

1. The study was limited to 79 students enrolled in the Marian Adult Accelerated Program. A total of 87 participants were approached to participate. However, eight did not complete the questionnaire in its entirety and were not included in the data.
2. Statistical reliability and validity of the questionnaire were not formally established. However, the items would appear to have face validity with the constructs.

Chapter II: Literature Review

Introduction

This chapter will review topics related to brain lateralization (right- and left-brain thinkers), and the concepts of multiple intelligences (specifically visual, auditory, and kinesthetic).

Brain Lateralization

When discussing its mass, scientists divide the brain into four areas called lobes. They are occipital, frontal, parietal, and temporal. The occipital lobe is in the middle back portion of the brain. It is primarily responsible for vision. The frontal lobe is the area around the forehead. It is involved with purposeful acts like judgment, creativity, problem-solving, and planning. The parietal lobe is the top back portion of the brain. Its duties include processing higher sensory and language functions. The temporal lobes are on each side, above and around the ears. These are primarily responsible for hearing, memory, meaning, and language.

As a whole, the brain consists of two cerebral hemispheres, the left and the right, that are connected by a bundle of nerve fibers known as the corpus callosum. The corpus callosum has about 250 million nerve fibers and allows each side of the brain to exchange information more freely.

In general, the left hemisphere is predominately involved with analytical, logical thinking, especially in mathematics and verbal functions. Its mode of operation is mainly linear and sequential; it moves from one point to the next in a step-by-step manner.

If the left hemisphere specializes in logical thinking, the right hemisphere is more holistic. This hemisphere is primarily responsible for visual and spatial processing, our orientation in space, body image, recognition of faces, artistic endeavor, and creativity.

Weisenberg and McBride (1935) did a study on nearly 200 patients with brain damage using both verbal and non-verbal tests. The results showed that left-brain damaged patients did poorly on tests that employed verbal ability, while right-brained damaged patients did poorly on non-verbal tests. Some right-brain damaged patients had difficulty comprehending distance relationships and mental images of maps and forms. This study supports the contention that the left hemisphere of the brain is analytical and more responsive to the messages and details of printed word, while the right hemisphere supports distance, space and visual aspects of recognition.

While each side of the brain processes things differently, some of these earlier assumptions about the left and right brain are outdated. For example, experienced or "natural" musicians process music in their left hemisphere, not right as a novice would. Among left-handers, almost half use their right hemisphere for language. Higher-level mathematicians, problem-solvers, and chess players have more right hemisphere activity when involved in these tasks,

while beginners in those activities usually are left-hemisphere active. For right-handers, the right hemisphere controls gross motor function while fine motor is usually more of a left hemisphere activity. The right recognizes negative emotions faster; the left notices positive emotions faster. Suffice it to say that the old biases about music and arts being “right-brained frills” are outdated (Ornstein and Sobel, 1987).

Brain lateralization refers to the activity of using one side (hemisphere) of the brain more than the other. However, to be more accurate, the term “relative lateralization” has been used, because a person is usually using at least some of the left and right hemisphere at the same time (whole brain mode). Because of this, it is important for instructors to have knowledge of brain hemisphericity in order to identify the advantages and disadvantages in their teaching techniques and understand when and how to develop and use certain techniques. In addition, knowledge of brain hemisphericity can assist them in becoming more flexible and effective in teaching in the classroom.

Adult Learning

The realization that we possess two different and complementary ways of processing information ... stirred considerable excitement among American educators in the 1970's and 1980's and created a desire to explore the applications of hemispheric research to the classroom. It was realized that, while we have a good deal of experience with linear, analytical approaches to education, if we teach for the full range of student's cognitive abilities, we must

complement those “left-brain” techniques with others which make use of the right hemisphere’s preference for patterns and wholes and it’s visual/special capacities (Williams, 1983).

When discussed, adult learning is frequently spoken of as if was a separate domain from adolescent learners ... almost as if a person stops learning when they reach a certain age. While we know that this not to be true, that learning is a life-long proposition, we do know the adults learn differently than children or adolescents.

Learning can be defined as any increase in knowledge ... extracting meaning from what we do, processing an understanding from the experience and deciding on what course of action to take, if any.

The purpose of the human brain is to learn and the end result of learning for humans is increased intelligence. Intelligence doesn’t mean having a bigger brain or having more brain cells. A dolphin has a bigger brain than a human and a rat brain has more cell density than a human brain. The key to getting smarter (or increasing intelligence) is growing more connections between brain cells and not losing existing connections. Today, consensus tells us that heredity provides about 30 to 60 percent of our brain’s wiring, and 40 to 70 percent is environmental impact (Jensen, 1998). Learning can change the brain because it can build new pathways and “rewire” itself with each new stimulation, experience, and behavior. Scientists are not sure how this happens, but they have some idea of what happens. As educators, it is well worth our time to

understand the “what” as it may give us some useful insights into how adult learners learn and how we should instruct.

For centuries the idea of instructor-based learning has been prevalent. In today’s terminology, pedagogy is defined as “the art or science of educating children”. The pedagogical model of instruction was originally developed in the monastic schools of Europe in the middle ages. Young boys were received into the monastery to prepare for the priesthood. These young boys were taught by monks according to a strict system of instruction and ritual that required these children to be obedient, faithful and efficient servants of the church.

After many centuries schools continue to practice a pedagogical approach that remains an instructor-centered educational system. In the pedagogic model, instructors assume responsibility for making decisions about what will be learned, how it will be learned, and when it will be learned. In other words, they dictate and direct the entire learning process. With this approach the student’s learning experience will be limited to the knowledge and desires of the instructor.

In 1926, the American Association for Adult Education began to research better ways to educate adults. Influenced by John Dewey, Eduard Lindeman (1926) wrote:

Our academic system has grown in reverse order. Subjects and teachers constitute the starting point, learners are secondary. In conventional education the learner is required to adjust himself to an established curriculum ... too much learning consists of vicarious substitution of someone else’s experience and knowledge. Psychology teaches us that

we learn what we do ... experience is the adult learner's living textbook.

In an attempt to develop an adult learning model, Malcolm Knowles built on Lindeman's works and reintroduced and popularized the term "andragogy" in 1973. Andragogy is defined as "the art and science of helping adults learn".

The andragogy model asserts that certain issues be considered in formal adult learning. These include, letting learners know why something is important to learn, showing them how to direct themselves through information and how to relate the topic to the learner's experiences. In addition, it was recognized that learning does not take place unless the learner is motivated and ready to learn. This requires the instructor to help learners overcome barriers that may inhibit learning.

While these issues may apply to adolescents as much as adults, the primary difference deals with the extent of experiences adults have over adolescents and the beliefs that adults have developed. Thus, unlike the pedagogy model, the learning experience becomes "learner-based" because the personal aspects of the model.

To succeed, adult educators must take the initiative to understand the differences in both the pedagogical and andragogical models. Knowles (1980) suggested, "andragogy is simply another model of assumptions about adult learners to be used alongside the pedagogical model of assumptions, thereby providing two alternative models for testing out the assumptions as to their 'fit'".

with particular situations”. Instructors must break the cycle of traditional learning styles, that typically focuses on left-brain learners and gain knowledge in developing and implementing styles targeted to his or her classroom audience.

Learning Styles

Learning style may be defined as the way people come to understand and remember information. James and Gardner define learning style as the “complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store and recall what they are attempting to learn” (James and Gardner, 1995).

By taking what we know about how people perceive and process information, instructors need to now focus on how to transfer information to the student and assist them in developing his or her intelligences in the most effective manner.

Ideally, the classroom would be organized around experiences that stimulate all types of thinking. The auditory, visual, and kinesthetic senses form the major learning modalities, the primary pathways by which information is taken in.

Auditory

Auditory learners learn through listening. They pick up new ideas and concepts better when they hear the information. These learners require verbal lectures and discussions, role-playing exercises, structured sessions, and reading aloud. Auditory learners can typically follow instructions very precisely after being told only once or twice what to do. In other words, written information

may have little meaning until it is heard. Since hearing and speaking are so closely related, auditory learners usually use their voice as well as their ears. They will often repeat what is said or rephrase the information into a question for discussion. This helps them process the information.

Another instructional method can include background music to facilitate and accelerate the learning. Music is one of the principle tools for inducing a relaxed mental state in which material is more easily absorbed and retained.

Visual

Visual learners learn predominately with their eyes, they learn through seeing. These learners prefer to see how to do things rather than just talk about them. They prefer to watch demonstrations and will typically get more out of video taped instruction rather than a lecture.

These learners not only require visual displays such as diagrams, PowerPoint presentations, overhead transparencies, videos, flipcharts, handouts, field trips and so on, but they also require seeing the instructors body language and facial expressions.

Kinesthetic

Kinesthetic learners learn through moving and touching. They tend to want to get their body into action and move around. They are “hands-on” learners who prefer doing rather than talking. These learners require active-learning exercises. To “quarantine” them to a classroom would probably spell failure in the student’s efforts. Because moving and action are so fundamental to

kinesthetic learners, they often fidget if they are not involved. Fidgeting helps them concentrate better.

Summary

Visual learners want to see how something is done. Auditory learners prefer to hear explanations and like to talk their way through things. Kinesthetically oriented people want to have a hands-on experience so they can “experience” how something is done.

Research also shows that people remember 90 percent of what they “do” as opposed to 30 percent of what they “see and hear” (Asselin and Mooney, 1996). Although kinesthetic learners retain best, they make up only approximately 10 percent of the population, whereas visual learners make up around 60 percent and auditory learners around 30 percent (Mind Tools, 1998).

When assessing individuals or groups, it is apparent from the literature that learning styles differ.

Chapter III: Methodology

Introduction

The objective of this investigation was to study right- and left- brain thinkers and certain styles of learning in college-level adult learners. The findings of this analysis will be used to encourage instructors on developing and utilizing appropriate styles of learning to enhance their student's educational experience. Over time and as experience is gained, alternative teaching methods can be developed to enhance learning. This section discusses the research methods used to collect data and arrive at my summary.

Subjects

Permission was granted from Marian College to allow student to participate in the gathering of data for this study.

This study includes data collected during 2006 from a sample of students (79 of a total of 447) enrolled students in the Marian Adult Accelerated Program (MAAP) undergraduate and graduate levels of Marian College. Data was collected using a written questionnaire, as well as a comprehensive review and analysis of literature concerning the brain, brain-based learning, and certain learning styles. The author met with participants to discuss the purpose of the study and to answer questions that they may have. Survey respondents were located on the Fond du Lac, West Bend, West Allis, and Watertown, Wisconsin campuses.

Instrumentation

A survey was developed by the author and administered for this study (Appendix A). General information (i.e. age, gender) was gathered in part I. Part II consisted of 14 survey statements related to learning style preferences (visual, auditory or kinesthetic). The statements are situational in context and ask the participant to respond to one of three options that best describes how they would react or behave in each situation. Responses were then totaled (at the bottom of the survey) to see what learning styles were dominant. Part III consisted of 19 survey statements related to brain hemisphericity (left or right). The statements are situational in context and ask the participant to respond to one of two options that best describes how they would react or behave in each situation.

Survey statements were developed by the author, based on extensive readings and research in the areas of brain dominance and learning styles.

Responses were then totaled (at the bottom of the survey) to see what hemisphere was dominant. The data was summarized using percentages of responses from the survey and segmentation of the data.

Reliability of the instrument was maintained by the sample size of participants. Additional confidence could be attained through re-administering the questionnaire at a later time. No formal procedure was followed to establish the validity of the questionnaire.

Chapter IV: Results

This chapter includes the results of the survey and a summary of findings.

The MAAP student population surveyed represents 63.3 percent female compared to 36.7 percent male with the majority (43.0 percent) of respondents being in the 40-49 year old age category (Table 1). This compares to an overall MAAP student population of 66.6 percent female and 33.4 male with the largest population in the 40-49 year old bracket (40.3 percent).

	Male	Female	Totals
<19 years old	0	0	0
20-29 years old	3	13	16
30-39 years old	5	9	14
40-49 years old	16	18	34
50-59 years old	5	8	13
>60 years old	0	2	2
Totals	29	50	79
Percentages	36.7	63.3	

Table 1 Age Distribution

Of those MAAP students responding to the questionnaire it is interesting to note (in Table 2) that as the population ages, the right-side domination tends to dissipate. Removing the extremes (< 19 years old and > 60 years old), the distribution is 69 percent for the 20-29 year old age group, to 64 percent (30-39 years old), to 56 percent (40-49 years old), to 39 percent (50-59 years old). While the female respondents remained stable, ranging from 50 percent (50-59 years old) to 67 percent (30-39 years old), the male population accounted for the downward trend. The male distribution is 100 percent (20-29 years old), to 60 percent (30-39 years old), to 56 percent (40-49 years old), to 20 percent (50-59 years old).

	Male		Female		Totals	
	Right	Left	Right	Left	Right	Left
<19 years old	0	0	0	0	0	0
20-29 years old	3	0	8	5	11	5
30-39 years old	3	2	6	3	9	5
40-49 years old	9	7	10	8	19	15
50-59 years old	1	4	4	4	5	8
>60 years old	0	0	2	0	2	0
Totals	16	13	30	20	46	33

Table 2 Dominate Brain Hemisphere Distribution

Findings to the questionnaire showed that 16.5 percent of respondents were linked in some way to the auditory learning style, while 69.6 percent were linked to the visual learning style and 26.6 percent were linked to the kinesthetic learning style.

As discussed earlier, approximately 10 percent of the overall population was identified as kinesthetic learners, whereas visual learners make up around 60 percent and auditory learners around 30 percent. While the Marian Adult Accelerated population fairly represents these numbers, they do not reflect the order (Table 3). The Marian group has the highest ratings in the visual category, while the auditory and kinesthetic groups are flip-flopped and several students maintained a dual-dominant learning style.

	Male		Female		Totals	
	Right	Left	Right	Left	Right	Left
Auditory	2	0	2	2	4	2
Auditory-Visual	0	3	1	1	1	4
Auditory-Kinesthetic	0	0	2	0	2	0
Visual	8	6	16	15	24	21
Visual-Kinesthetic	0	2	1	2	1	4
Kinesthetic	6	2	8	0	14	2

Table 3 Learning Styles by Brain Hemisphere Distribution

Chapter V: Discussion

While some students have one dominant learning style, and use the other learning styles only as supplements, other students use different styles in different circumstances. There seems to be no right mix. People learn in different ways and no two people learn in exactly the same way.

Research supports the concept that most teachers teach the way they learn (Stitt-Gohdes, 2001). Since most teachers have been brought up, as students, through traditional learning environments that were instructor-centered, typically lecture driven, it is understandable that their preferred style of teaching is something they feel comfortable with.

However, because most students have different learning styles (as evidenced by the questionnaire responses), teachers must recognize these differences and be able to adapt their approach and instructional style. This may mean designing courses to incorporate each of the primary learning styles (auditory, visual, and kinesthetic) rather than focusing on just one. For example, in one leadership class, students share experiences about working in teams (auditory), a video is viewed showing other organizations team structures (visual) and a team building exercise is performed (kinesthetic).

The theories of brain-based learning and multi-intelligences support the idea that teachers must expand their teaching techniques to accommodate the student's learning styles. Some strategies and techniques, suggested by Caine and Caine (1990), are:

- Coordinate student learning experiences to draw upon and reflect the simultaneous processing of all brain functions.
- Introduce novelty, discovery, and challenge into the learning environment.
- Engage students in active learning processes, such as problem-solving and critical thinking to help them develop personally relevant learning patterns.
- Create a supportive emotional climate.
- Provide learning experiences that engage the functions of both the left and right brain hemispheres.
- Extend the learning environment beyond that in a learner's immediate focus.
- Incorporate awareness and reflection as part of the learning process.
- Draw upon the personal world of the learner to expand memory functions.
- Enhance spatial memory through experiential learning activities.
- Create in learners a state of relaxed alertness.
- Use a multifaceted approach to teaching that allows uniqueness.

Information about learning styles and multiple intelligences are also helpful for instructors to develop teaching strategies that are aimed at compensating for student weaknesses and capitalizing on their strengths.

This being said, students must also become engaged, stimulated by information that is being presented, in order for learning to take place ... it must be relevant to them, it must be personal. Instructors must also focus on the content of the subject matter and utilized the best deliver method for the content.

For example, if students are to learn a certain computer application it would probably be more effect to provide a hands-on simulation rather than a lecture.

The research presented in this investigation is intended to be used as a foundation of discussion in an upcoming faculty convention or in-service workshop, to encourage instructors to develop and use styles of teaching that will provide guidance and enhance their student's educational experience. While it is also recognized that instructors must also balance the student's learning needs with the content's best method of deliver ... in either case, we are falling short.

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Appendix A - Questionnaire

Read the word(s) in the left column and pick the one description that best expresses how you handle each situation.

Gender: Male Female Age: <19 20-29 30-39 40-49 50-59 >60

When I		✓		✓		✓
Spell	I try to see the word		I sound out the word or use the phonetic approach		I write the word down to find out if it feels right	
Concentrate	I become distracted by sounds or noises		I become distracted by untidiness or movement		I become distracted by activity around me	
Read	I prefer action stories and am not keen on reading		I enjoy dialog and conversation and can "hear" the characters		I like descriptive scenes and pause to imagine action	
Do something new at work	I prefer to jump right in and try it		I like to see demonstrations, diagrams, slides or posters		I prefer verbal instructions or talking about it with someone else	
Put something together	I look at the instructions and pictures		I ignore the directions and figure it out as I go along		I like to talk with someone or find myself talking out loud	
Need help with a computer application	I call the help desk, ask someone else or growl at the computer		I seek out pictures or diagrams		I keep trying to do it or try it on another computer	
Teach someone	I do it for them, letting them see how it's done or ask them to try it		I prefer to tell them		I prefer to show them	
Relax	I prefer to watch television, a play or movie		I prefer to listen to music, the radio or read		I prefer to play games or work with my hands	
Take a test	I read the questions aloud		I picture the information studied, in my head		I write notes in the margins	
Am in a classroom	I prefer information to be written on a whiteboard or overhead		I prefer to use models, actual practice or activities in the class		I do better by listening to lectures or tapes	
Study	I learn more if I take lecture notes and make study sheets		I remember best by rewriting my lecture notes		I listen to lecture tapes rather than read the textbook	
Receive direction	I follow oral directions better than written ones		I understand and follow directions on maps		I prefer general direction and the freedom to reach it by my own means	
Network	I prefer meeting people and talking while participating in an activity		I prefer direct face-to-face personal contact		I prefer the telephone	
Meet someone	I remember where I met someone		I remember what we talked about		I remember what we did together	

Read the statements in the left column and pick the one description that best expresses how you handle each situation.



I usually run late for class or other appointments	Yes	No
When taking a test I prefer questions to be	Objective	Subjective
When making decisions I	Usually go with my gut (what feels right)	Carefully weigh every option
When relating an event to a friend I	Get straight to the point and fill in the details later	Hit all the details before telling the conclusion
I have a place for everything and everything has a place	Yes	No
When faced with a major change in my life I	Get excited	Am terrified
When I'm working I	Concentrate on one task at a time	Juggle several things at once
I can tell approximately how much time has passed without a watch	Yes	No
The easiest for me is	Geometry	Algebra
It is easier for me to remember	People's names	People's faces
When learning how to operate a new piece of equipment I	Jump in and wing it	Read the instruction manual before beginning
When someone is speaking I respond to	What is being said (the words)	How it sounds (emotion, tone, and so on)
When I speak I use	Many gestures	Few gestures
My work area, desk, office and/or laundry area are	Neat and organized	Cluttered
When asked my opinion I	Immediately say what is on my mind	Think, then speak
I do my best thinking while	Sitting at my desk	Walking or driving
When reading a magazine I	Go to wherever looks more interesting	Start at page one and read in sequential order
When I am shopping and see something I want to buy I	Save up until I have the \$\$\$	Charge it !!
When hanging a picture on a wall, I would	Measure first, then hang it	Hang it and move it if necessary

_____ / 19 Left

_____ / 19 Right