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Amber Elizabeth Hladik

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AN ONLINE COMMUNITY HELPING LEFT-HANDED RIGHT  
BRAINED STUDENTS SUCCEED

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A Project  
Presented to the  
Faculty of  
California State University,  
San Bernardino

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts  
in  
Education:  
Instructional Technology

---

by  
Amber Elizabeth Hladik  
September 2007

AN ONLINE COMMUNITY HELPING LEFT-HANDED RIGHT  
BRAINED STUDENTS SUCCEED

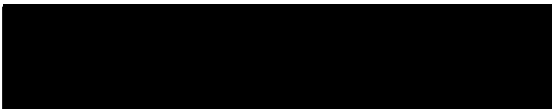
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by  
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September 2007

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## ABSTRACT

This project/paper researches the relationship of handedness to brain dominance in order to help parents and teachers understand the strengths and weaknesses of the left-handed student. In better understanding the thought process and tendencies of the left-hander, parents and teachers can facilitate the student to succeed in a predominantly right-handed left-brained world. Brain dominance plays a large role in how people learn. Each hemisphere of the brain controls different functions. Although not all left-handers are right-brain dominant about one third of the left-handed population shows a preference for the right brain. Whereas, right-handed almost always are left brain dominant. The problem is that many left-handed right-brained are in a minority. They not only feel different because of the obvious handedness disparity, many also struggle with fitting into the mold of the right-handed left-brained school system. The website created by this project is intended to enlighten students, parents, and teachers in research regarding left-handedness and right brain dominance. The website contains summaries of research, informal tests on handedness, biographies of left-handed

people, tips on how to succeed as a left-hander, links to other informative websites, and a discussion area for people to ask questions, make suggestions, and make comments.

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## CHAPTER ONE

### BACKGROUND

#### Introduction

Donna W. Brown's article "Libraries Can Be Right-Brained" (2000) states:

Schools tend to favor left-brained modes of thinking. Left-brained, academic subjects stress logical thinking, analysis, and accuracy. (p. 22)

Over the years teachers have concentrated on how to be more accommodating to all kinds of students. Teachers have been trained in how to teach students who are English Language Learners, Resource Students, students with behavior problems, and other identified groups, but little has been discussed in how to accommodate the left-handed right-brained learners in the world. It is necessary to develop an online community for students, parents, and teachers to learn about left-handed, right-brained students' strengths, weakness, and how to accommodate their needs. In this project a website has been created to discuss issues that a left-handed, right-brained person may encounter, tips for students, parents, and teachers to help left-handed students in

school, and an online community for people to discuss topics regarding the left-handed world.

There is strong evidence that the representation of language functions in the cerebral cortex is different in left-handed (LH) people than in right-handed (RH) people, and understanding of handedness may lead to valuable clues as to how the brain becomes organized in the way that it does. (Bryden, Bulman-Fleming, McManus, & Roy, 1997, p. 1)

Recent studies show that the percentage of left-handers in the U.S. and Britain are somewhere between ten to fifteen percent. It is estimated that within the Asian and Hispanic populations there are nine percent left-handers, which is slightly less due to ancient myths and handedness biases. Because of these misconceptions few studies are even seen in India and Africa (Healey, 2001). This leaves the left-handed right-brained thinkers in a minority status. If they are a minority, then why haven't teachers been educated as to how to accommodate the needs of these students? One reason could be because of the stigma behind being left-handed. Throughout history people have been told that because they are left-handed they were in cahoots

with the devil, possibly communists, and are often made to learn to perform tasks with their right hand. Many left-handed students were spanked by parents and teachers for doing the task wrong.

The world has more recently become kinder to the left-handers plight, but even in World War II there were cases of people being discriminated against. Even if teachers and parents are now aware and attentive to left-handed students, do they know how to teach left-handed students? Can they teach students to write with their left hand? Are they trained to teach to the whole brain? Which leads to the second reason why left-handed students' needs are often ignored- ignorance. Since most students are right-handed, teachers automatically think most, if not all students will be right-handed as well. Hand writing comes easily to many people, but if a left-handed person is being shown by a right-hander the situation becomes difficult. The tilt of the hand is different, the positioning of the paper is different, and even the issue of smearing the pen and pencil markings with the left hand as it continues to write is an obstacle for the left-hander. It can be confusing and frustrating for a child. Right-handed

people would not normally consider these hindrances because they have not experienced them.

The last reason why left-handers have been lost in the system is that very few studies have linked the issue of hand dominance to classroom obstacles, especially in terms of learning. There is research about brain dominance as a factor of learning differences. Some researchers strongly believe in the link of handedness to brain dominance, while others are not as convinced. There are many coincidences with regards to left-handers, such as high rates of dyslexia, schizophrenia, creativeness, but there is nothing that can, without doubt, tie handedness to brain dominance in diagnosing these conditions.

Although handedness cannot be used as a predictor of learning difficulties it should be taken into account when parents and teachers try to assess student's strengths and weaknesses. If a student is left-handed there is at least one third of a chance that they will be right-brain dominant. Knowing student's brain dominance can help the student, parent, and teacher understand the best methods for that student to learn. Handedness should

also be considered while trying to assist with learning difficulties.

By teaching to the whole brain and to multiple intelligences more students can be reached in the classroom. How can teachers test brain dominance? How will they be able to target a student who is right brained? While the science of relating handedness to brain dominance is not proven, it could be used a good indicator of what a student's hemispheric tendency may be in a quick way, without embarrassing or isolating the student. The key to teaching is in knowing the students and how they think. Not all students think the same, so it is the teacher's job to get to know their strengths and weaknesses as well as possible. Then they can instruct in appropriate manners and give all students the tools of learning that will help them become life long learners and problem solvers.

Whatever the reason may be for not using handedness as a tool to know more about students, it is an area of research that could become useful not only to teachers, but also left-handed students and their parents. The Left Handed website provides tools to support the left-hander, so their diversity will not be a burden, but a benefit.

## Statement of the Problem

The problem of this project/paper is that at least one third of left-handed students are right-brain dominant and have been forgotten by the right-handed, left-brained school system. Concepts most schools revolve around direct instruction and multiple choice assessments, while being directed by a noise intolerant teacher. This type of classroom squelches the creative, intuitive, outgoing right brain student. Some of these students will be the class clowns, disorganized, and unable to perform up to their potential in typical assignments (Lamping, 1993). "The right-handed brain is good at school because reading, 'riting, and 'rithmetic are all logical, linear disciplines. But the left-handed brain is better at playing hooky, making music, drawing pictures, and telling jokes" (deKay, 1989, p. 31-34). Left-handed right-brained students are the project doers. They will show success in more of the unconventional assignments. This project/paper addresses the needs of left-handed students in the classroom. If student, parent, and teacher are able to understand why a left-hander may do the things that he or she does, they can channel the student's talents in a productive way.



Not only do they primarily use their left hands to function in a right-hand dominant world, some studies show that their brain dominance is also in the minority, yet most educators and parents are not aware of these differences. There is research about teaching to the whole brain, but very little is actually seen in schools. This could be because there are few opportunities for teacher training. Or it could be there is no time to teach this way, because teachers are trying to cram all of the facts and skills that the students will be tested on at the end of the year state exams. A complaint of some teachers is that there is little time for creativity and personalizing instruction for students. Thus, many students are being left behind and are losing, or have already lost, motivation.

It is also difficult to assess brain dominance. Teachers do not have access to PET scans and although there are informal tests that students can take on the internet or by paper, there is, once again, little time in the daily regimen for such things. By noticing handedness, although it is not completely accurate, teachers can have a good idea of a left-handed persons' needs. By understanding the differences, students can

understand their strengths and weakness thereby learning how to succeed in a right-handed world. Until this happens, left-handed, right-brained students' needs will continue to be ignored.

#### Purpose of the Project

In a time when there is a generation of students who are struggling to be successful in school, everything should be done to help all students to do well. When students lose hope in school they tend to turn to misbehavior. It may be because they are lost or it may be because they are bored. They become behavior issues in school and at home. When they become adults many of these problem students become problem adults. The problem needs to stop in school. Teachers and parents need to work together to keep students on track. They need to get to know their children/students better and keep them engaged in school by helping them with their weaknesses and emphasize their strengths. If these behavior issues can be handled positively when they are young, then the chances of them becoming productive individuals will be much higher.

The purpose of this project is to develop a website that helps left-handed students, their parents, and teachers to help left-handers, whether they are left-or right-brain dominant, succeed. This website will be a tool to get to know their children and students better. The project consists of a paper and a website to educate about left-handed people. The research of the project is in the following three sections: 1) Brain Dominance in Relation to Handedness and its Ramifications; 2) Helping the Left-Brained Student to Succeed; and 3) Online Communities. The website includes summaries of the research from the paper, tips on how to succeed as a left-handed person, informal tests to show hand dominance and brain, biographies of left-handed people, and links to other websites that would be helpful. The solution to helping all students is first to get to know them and understand how they think. That is the goal of this website.

#### Significance of the Project

The significance of the project is to provide a tool for parents and teachers to get to know the students/children and help them to fulfill their

potential. By knowing a student better it can aid the parent and teacher in targeting areas that help the student achieve his/her best. Identifying students' handedness as a teaching tool has not been widely addressed. Very little has been discussed regarding handedness and its relation to brain dominance in schools. Teachers have been mandated to accommodate for many types of learning differences, yet there is no mention of left-handed people in these accommodations. Whole brained learning should be a part of every day lessons in the classroom to ensure that all students will receive information in a style that they are capable of understanding. If teachers can identify students' brain dominance, they can create lessons to bridge the gap between the left and right brain dominant students. By noticing which students are left-handed, the teachers can begin to understand their learning habits better.

#### Limitations

Due to time restraints, the effects of whole brained learning and the tips given in the website will not be assessed. It would be valuable to test the effects of the website on the success of left-handers. It would be

beneficial to have students, parents, and teachers participate in a study that had them put the tips into effect to see if there would be any long-term benefits of the website.

## CHAPTER TWO

### REVIEW OF THE LITERATURE

#### Introduction

This review of literature will explore the learning needs of left-handers. Although this paper refers often to the use of identification and accommodation in the classroom, it would be just as beneficial for the students and parents to understand the differences between left- and right-handers. In the first subsection of the Literature Review, relationship of handedness to brain dominance and the significance of this relationship to students is demonstrated. Each hemisphere of the brain controls different functions. Based on the dominance of the hemisphere there will be dissimilarity in the way a student learns and functions. By knowing if a student is left-handed, a teacher can have a better understanding of their thought process, why they may be struggling, how to engage them, and how to make some activities easier for them to understand.

The second subsection information is given that will help left-handed students succeed. In knowing the student's brain dominance the student, parent, and

teacher, can learn techniques that will help the student "open" up both sides of their brain. Whole brain learning could provide a new avenue for learning that the student may have never known about. It could engage the student and help the struggling student clear a path from the source of information, to their brain, and back onto the paper or verbally that may have been previously cluttered.

In the last subsection shows how an online community could be beneficial to the success of a left-hander. An online community can provide a place to ask questions, tell stories, make comments, vent, or share activities that will provide for a more meaningful learning experience. By knowing that there are others out there with the same issues or concern gives comfort and motivation to learn about and use ideas from the website.

#### Brain Dominance in Relation to Handedness and its Ramifications

The importance of studying brain dominance and its affect on students is seen in this following statement made by Lamping and Lehmkuhl(1993):

Understanding different styles can help explain human behavior, which affects success and personal

contentment and in turn directly affects our self-esteem and relationships with others. (p. 20)

Is there a relationship between handedness and brain hemisphere dominance? If there is a relation, what are the implications of this in the classroom? By understanding how students think, teachers can help all students succeed. Teachers need to be aware of differences and understand why some students struggle. By understanding why they struggle, teachers can teach in ways that will reach these students. All students think differently and learn differently, so teachers need to teach them differently. A square peg will never fit in a round hole.

The brain is separated into two hemispheres, the left and right hemispheres. Everyone uses both hemispheres of their brain, unless severe damage has hindered the use of one hemisphere. Although people use both hemispheres, most show dominance in one side over the other. The ratio for hemispheric usage is different for each person. A person can be highly dominant in one side or they can use both sides fairly evenly.

Dr. Roger W. Sperry of the California Institute of Technology was awarded the Nobel Prize in 1981 for his



work on brain hemisphere research. He found that everyone uses both sides of their brain simultaneously. Each side of the brain specializes in different functions. Almost every person depends on one side of the brain more than the other. This dependence is referred to as dominance or preference (Gazzaniga, 2002).

Brain dominance is not black and white. A person can be fully dominant left-brained thinkers or have a slight dominance of the left-brain. Although the amount of dominance of hemispheres varies for every person, the world has a strong majority of left-brained dominant thinkers.

Over the years studies have shown that more people tend to have a left hemisphere dominance of the brain. The belief is that "the genes for right-handedness predispose the brain to concentrate linguistic rules in the left hemisphere, but the genetics of lefties and their families cause the brain's two hemispheres to share linguistic association more equally" (Brownlee, 1992, p. 67). The right-handed person is usually left-brain dominant, whereas the left-handed person could have dominance in either side of the brain.

In a study by Marian Annett (2004) people were tested for hand dominance hoping to show the Right Shift theory to be true. The Right Shift Theory states that right-hand dominance and left-brain dominance are evolved traits of the human race. The right shift theory states that brain lateralization has evolved because of the use of language. Primates do not have specialized brain hemispheres, they are ambidextrous, and they do not speak. Because humans have evolved into being able to learn and do many different tasks, the brain was forced into lateralization. Each hemisphere of the brain specializes in certain brain functions. Speech is a process of the left-side of the brain. Since humans are dependent on speech as a major form of communication, the left-side of the brain is dominant in most people. And since most people are left-brain dominant and the left hemisphere of the brain controls the right side of the body, then most humans are right handed as well. This evolution is said to be in the form of a right shift gene. The people who are minus this gene are left-handed and may be right-brain dominant. It is thought that this gene may not occur in low birth-weight infants or infants where an occurrence has disturbed the fetus.

The French pathologist and anthropologist Paul Broca pioneered studies in hemispheric specialization. He found that speech functions were located in the left frontal lobe of the brain, which is now referred to as Broca's area (Wertheimer, 2002). "For example, the left hemisphere is usually superior to the right for processing phonetic, syntactic, and certain semantic aspects of language, whereas the right hemisphere is usually superior to the left for processing intonational and pragmatic aspects of language" (Hellige, 1993, p. 21).

Since the left-side of the brain houses the functions that control speech and the human race is highly dependent on speaking as the main means of communication, humans have evolved to use the left-side of their brain much more than the right. The Right Shift Theory serves to explain why there is a large majority of right-handed people in the world if handedness depends on chance (Annett, 2004).

Much research has been done on the relation of handedness to brain dominance and how brain dominance affects learning capabilities. Many coincidences have been found linking left-handedness to right-brain

dominance and certain mental and learning deficits and differences, but nothing has been proven.

In the following quote taken from, "The Southpaws Secret Semantics" by Brownlee(1992), some coincidences of left-handedness are discussed.

For righties, the left hemisphere dominates; for lefties, dominance is less certain. Whatever happens during brain development to produce left-handedness also confers an uncommon mix of mental assets and deficits. Lefties suffer disproportionately from dyslexia, for example, transposing numbers and scrambling the letters in words. On average, lefties score lower on standardized verbal tests, but they far outrank righties in mathematics (p. 66).

Research studying patients with brain damage shows that there may be differences in people of differing brain dominance. People who have suffered damage to the left side of the brain often suffer from aphasia, partial or complete loss of power to use and understand words. Right-brain dominant people suffer less serious problem from such damage. It is more likely that they would suffer greater if there is damage to the right side of the brain, which leads researchers to believe that their

language specialization is in the right side of their brain (Brownlee, 1992).

Research has shown that the left side of the brain controls the traditional organizing skills and linear thinking patterns while the right side of the brain is more intuitive and creative (Lamping, 1993). Thus, most of the people in the world, the right-brained people, think in a linear organized pattern. This leaves the right-brained thinker in the minority of people who look at situations as a whole and problem solve through intuition. They may also be considered disorganized in the eyes of the left brained.

Over thirty years ago Michael Gazzinga, Roger Sperry, Joseph Bogen, and P. J. Vogel conducted research on patients who had their "corpus callosum—the superhighway of neurons connecting the halves of the brain" (Gazzinga, 2002, p. 27) hoping to find relief from epilepsy. In this study they were able to see how the brain reacted when the two sides were unable to communicate with the each other. By stopping the communication of the hemispheres it was easier for the researchers to recognize which hemisphere is responsible for what actions.

Studies by Gazzinga, Sperry, Bogen, and Vogel on the lateralization of the brain and its functions also tested the split-brain and how the senses were affected when the hemispheres were forced to function independently. Tests on touch, smell, and sound were conducted. Each "half of the brain could control the upper muscles of both arms, but the muscles manipulating hand movement could be orchestrated only by the contra lateral hemisphere" (Gazzinga, 2002, p. 27). Thus, the left hand was controlled by the right side of the brain and the right hand was controlled by the left side of the brain. Left-handed people tend to have right-brain dominance whereas right-handed people tend to have left-brain dominance.

The experiment included showing images to the right visual field, which is controlled by the left hemisphere of the brain, and then to the left visual field, which is controlled by the right hemisphere. When an image was presented to the right visual field, the left hemisphere was able to process the information and the participant was able to construct words and ideas to explain what they saw.

This was not demonstrated when the images were shown to the left visual field. The participants were not able to discuss the image when it was shown to the left visual field. When asked to point to an object similar to the one in the image, they were able to do so with accuracy, but when asked what they saw in the image, they were not able to communicate what was being seen.

After the split-brain surgery a left-handed patient could speak out of her left hemisphere, but could only write out of her right non-speaking hemisphere. Writing appears to be an independent system. Although language is controlled by the left-brain it acts autonomously from the process of writing. Writing can be controlled by either hemisphere, depending on which hand is the dominant hand. Since writing is not considered to be an innate ability, but instead an invention of the human species, people can be left-handed, right-brain dominant or they can be right-handed, left-brain dominant with different levels of dominance. "It can stand alone and does not need to be part of our inherited spoken language system" (Gazzinga, 2002, p. 30).

The study concluded that the right hemisphere of the brain does not hold the language capabilities to describe

what it saw. Each hemisphere was seen to control different characteristics of thoughts and actions. Each has its own specialization, advantages and disadvantages. Language and speech have dominant control from the left brain. Visual-monitor tasks are controlled by the right hemisphere. If the hemispheres are not working together, the right brain cannot construct words to describe what the person is experiencing.

What does this mean for the students who are left-brain dominant? In school systems that are ruled by linear organization and verbal communication, left-handed, right-brained students are at a disadvantage. Schools judge students on how they communicate ideas and express their intelligence through essays and standardized tests. For example, students are graded on how they perform on tests, essays, and other language driven assessments. If students are left-brain dominant they may not be able to communicate their knowledge to the appropriate level that is desired by the school system. Even if the student is proficient in the subject, he may not be able to convey that knowledge in traditional assessments.



The right brain is "referred to as the unconscious mind (although it is technically incorrect), but because the right brain has no language ability, it can't verbalize its thinking process" (Lamping, 1993, p. 24). The right brain thinks in a "rapid, complex, and spatial manner, sometimes in the form of dreams" (Lamping, 1993, p. 24). The process is abstract nonverbal and holistic making it difficult to explain and define. Although the process cannot be verbalized, the right-brain's consciousness is seen through body language, in actions, or in art forms. Through art, dance, music, sculpting, etc. the right brain gets its voice. These means of communication are why the right-brain dominant person is seen to be more creative. Many do not communicate through written words as well as they do through their art forms.

All people are different and have different levels of dominance, so it is difficult to generalize characteristics of right brained or left brained people. Because a person is right-brained does not mean that they are naturally disorganized people. Nor can one say that there are no creative left brained people. Like many stereotypes, the dominance of left or right brain qualities can only be a generalization and not a rule.

In a society full of left-brained people, right-brained people have had to learn to adapt in many situations. In school, the left-brained person is rewarded by their scores in subjects that require reading and writing. The right-brained student, who may be equally intelligent, is not given a platform to excel in linguistically oriented class. A strength of the right-brained students is their creativity (Lamping, 1993), but students are not graded on their creativity nor can they take a state test to show their creative talents. "While the right brain produces a broad spectrum of intuitive and creative talents, the left brain produces those talents necessary for traditional organizing skills" (Lamping, 1993, p. 20). These traditional organizing skills which the left-brained people possess are the skills that are desired by schools. Creativity is not fostered in most classes. Creative classes are basically on the list of endangered species. Due to budget cuts, creative classes are the first to be cut, which lends the right-brain dominant person less of an outlet to succeed.

The same is true in the corporate world. People are required to have certain organizational skills which are

controlled by the left hemisphere of the brain. Not all, but many right brained people lack in organizational skills. It must be a conscious effort for many right brained people to be organized and functional as business people. Their creativity, social qualities, charisma, and thinking out of the box will carry the right brained person to the top of the business ladder, but the organizational skills will need to be sharpened or they will have to obtain a good secretary.

Strength of the right-brained person "lies in their giftedness in interpersonal relationships" (Lamping, 1993, p. 26). They tend to be very charismatic, emotional, creative, intuitive, and humorous. People are drawn to them, so they tend to make great leaders. Some famous left-handed leaders are Benjamin Franklin, Alexander the Great, Harry S. Truman, Harold Ford, George Bush, and Albert Einstein, to name just a few (deKay, 1966; 1989; & Healey, 2001). Although socially these traits are favored in schools these characteristics are usually suppressed by the need to quickly feed out information. If a charismatic right-brained person makes a humorous remark, even after raising his hand, the

teacher will most likely tell the student to be more serious because there is no time for such comments.

The sequence of thought of the right-brained person is feeling- action- analysis (Lamping, 1993). They act on their feelings before they analyze the situation, if they analyze the situation at all. They are led by emotions and feelings, which can lead to making rash and spontaneous decisions without thinking of possible outcomes. Misunderstood by the majority of the world as being flighty and too spontaneous, the right brained person may feel left out and beneath others (Lamping, 1993).

On the other hand, the left-brained person's sequence of thinking is analysis-action-feeling (Lamping, 1993). They will analyze a situation before they act. They will weigh pros and cons before making decisions. "Only when action is completed however, will they appreciate the feelings gained from it" (Lamping, 1993, p. 31). As the world has become more and more hectic, the left- brained people and their pre-planned, organized, and think before doing attitude has been a quality that drives schools and businesses alike. It may seem to be a cold and perhaps heartless way to live, but it is

functional and efficient. These are characteristics that make the world go around (Lamping, 1993).

### Helping the Left-Handed, Right-Brained Student to Succeed

The following is an excerpt from "Confessions of a Left-Handed Man" by Peter Selgin (2005).

There are lots of myths about left-handedness, myths that tell me, for instance, that I'm eccentric and artistic, that I'm more accident prone, more subject to auto-immune diseases, more likely to suffer from depression and/or to commit suicide, and likely to die sooner than my right-handed counterparts. And though most if not all of these myths have been scientifically put to bed, still, I have a hard time arguing with some of them, since I am an artist; I am accident prone (case in point: getting mauled by a black Labrador); I have suffered from at least one autoimmune disease (a bout of ulcerative colitis in my thirties); and I have been, if not suicidal, then suicidally depressed. (p. 125)

In the previous section the relationship between handedness and brain dominance was discussed.

Left-handers tend to be right-brain dominant and

right-handers tend to be left-brain dominant. Although it is realized that not all left-handed people are right-brain dominant, for the purpose of this section of the paper the term right-brained will be used in association with left-handed students.

There are three main aspects to helping a left-handed right-brained student succeed: overcoming physical, academic, and social challenges. The most obvious of the challenges are the physical challenges. Generally things are designed for the right handed person. Most scissors are right-handed. Computer keyboards and mice are usually for right-handers. The pouring lip of a sauce pan is right-hand bias. Even can openers are for right-handed people. Often left-handers are forced into being ambidextrous out of necessity (deKay, 1966; 1989; Healey, 2001).

Writing on its own can be difficult. Often schools have half desks, which are right hand bias. There are few left-handed half desks in schools. They must position themselves differently to write. Often they will hook their hand around in an uncomfortable position to write, so they will not smear the writing with their hand as they write. "You've just finished writing a long essay

answer on a test. You lift up your pen in triumph only to see a large blue ink stain on your left hand. Sound familiar? It does if you're left-handed because lefties always have to drag their hands across the piece of paper on which they are writing" (Lucia, 2002, p. 14).

There are many differences between left-handers and right-handers besides the way that they write. They bump elbows with people at the dinner table. They are forced to use the weaker hand to perform many tasks such as, can opening, pencil sharpening, and more. There are many difficulties of the left-handed person that would be simple tasks for the right-handed person. Little things that are taken for granted by the right-handed person can be problematic for a left-hander.

The right-hand biases that must be overcome range anywhere from utensils, musical instruments, sports equipment, and more (Healey, 2001). Not only are using these tools inconvenient and uncomfortable, but especially in the workplace, can be dangerous. Machinery, such as industrial meat slicers, drill presses, production lines, band saws, textile machinery, and heavy equipment can pose particular safety issues (Healey, 2001). To use these tools the left-handed person must use

the weaker hand, contort their bodies to be able to use the stronger left hand, or misuse the tool. All of these options increase the chance of injury. Dr. Coren was a pioneer researcher in looking at age trends with regards to handedness. "He explains that part of the reason for this (left-handers dying younger than right-handers) is that heavy machinery such as that used in construction is made for right-handers, so the risk of accidents is higher for lefties" (Healey, 2001, p. 18).

If a parent is right handed it is recommended that they ask for the assistance of a left-handed adult to teach the left-handed student certain hand specific tasks (Healey, 2001). Not only will a right-handed person teaching a left-hander to write be frustrating, it could confuse the child. Many parents will try to show the child how to do a task by themselves doing it left-handed. In doing this it makes it difficult for the parent because they are not accustomed to doing the task in this way, they may do it incorrectly, thereby teaching the child incorrectly. If the parent cannot find a left-handed adult to assist with teaching the child to write the parent should sit opposite the child and do the task right-handed. The mirror image of the task will help



the child see the hand movements in the correct direction. Parents of left-handed children have found the mirror image method to be the most successful way to teach a skill (Healey, 2001).

Social challenges are emotional or intellectual beliefs and prejudices that effect the left-handed person. In the past, children were forced to write with their right hand because of the association that left-handers were devil-worshippers, deformed, or less of a person with no future. The devil has even been depicted as a left-hander in the past (Healey, 2001). "In the 1600s, in both Europe and the American colonies, women accused of witchcraft were publicly stripped and examined. Moles or blemishes found on the left side of the body of an accused witch were considered absolute proof of guilt" (Healey, 2001, p. 3). Left-handers have had to overcome many myths and misconceptions and although most people do not believe these ideas to be true anymore, left-handers still have to live in a predominantly right hand bias world.

The following is another excerpt from "Confessions of a Left-Handed Man" demonstrating history of the trials of left-handed people not being accepted by society.

To get me to write with my right-hand, Nonnie would bribe me with bowls of her homemade rice pudding, the best in the world, topped with a fetching swirl of raspberry syrup and half a maraschino cherry (eventually I'd learn that the "homemade" rice pudding had its source in a can marked "Gomstock"). She'd sit me down at her doilied card table with a pencil and paper and feed me Italian phrases to transcribe, saying over and over to me, "A destra, Piero, a destra!" giving my right hand a slap when I'd reach for the pencil or my rice pudding spoon with it. Nonnie called me "Il mancino" —the left-handed one.

I can't blame my grandmother. She was only following a time-honored tradition, one as old as the prejudice against left-handedness itself, a prejudice stretching as far back as the ancient Greeks, who posted sentries at their temples to make sure those who entered did so right foot first so as not to offend the gods. Centuries later the Catholics took things a step further, burning their left-handers as witches at the stake. In Victorian times left-handed children would have their left

hands strapped behind their backs by means of a ghoulish leather straight-jacket-like device. It wasn't unusual for schoolmarms and headmasters to cane pupils for using their "other" hand. To cure their children of left-handedness, the Zulus of southern Africa would plunge a child's left hand into a hole dug into the earth and filled with boiling water, scalding it so severely the child was forced to switch hands. (Selgin, 2005, p. 126)

Though this story seems unkind and extreme, there are many people's stories that follow the same suit. Left-handedness has been seen as a detriment to people since ancient times and even today is not widely accepted in some countries. The Romans were an extremely right hand bias society using the word dexter to mean right and sinister to mean left (deKay, 1966). The modern meaning of the term dexterity as defined in the Oxford American Dictionary (1980) is "skill in handling things," (p. 236) where as the definition for sinister is "suggestive of evil" (p. 852).

In the article "Left is Right" by Lynn Santa Lucia the story of Tiffany is told. Her story shows the plight that many left-handers were faced with while growing up.

“My teachers from first to third grade tried to make me write with my right hand,” she says. “The counselors at my school considered left-handedness to be a problem, and I was supposed to talk to them about it. But I blew it off. My parents thought the whole idea was lame anyway” (Lucia, 2002, p. 14). Luckily, Tiffany’s parents were supportive of her handedness.

The story of Tiffany may make the teacher seem thoughtful in the eyes of most, but to the left handed student it can be very insensitive to his need to be like everyone else. Teachers may not realize their actions are insensitive. At the beginning of the school year they may think it is a simple and logical question to ask the class who is left-handed, so they can sit at the ends of the tables. The teacher may not want the students to bump elbows, but only thing that the students will remember is that there is something different about that student. He is not like the rest of the class. Peer acceptance is very important to all children. This attention is not something that the student will want brought to him. These stories and many others illustrate why many left-handers feel left out and unlike their peers. Many

will even try to hide their handedness in hopes of fitting in.

Although the stigma associated with being left-handed is less than in the past, many left-handed people feel ridiculed or abnormal. After writing a long essay it is obvious who the left-handed student is by the ink stains or spiral notebook indentation across his arm. Hopefully the left-hander does not forget his baseball glove at home on the day of the big game because it is highly unlikely that anyone will have any extra left-handed gloves for him to borrow.

In research done by M. K. Holder in 2004 a survey of 5,136 school children in Western Uganda and their hand preference was studied. Holder not only surveyed children on their handedness, but he also interviewed 24 teachers with hopes of finding a reason for low left-handedness in Uganda. The teachers were asked if they would encourage students to switch hands if they saw them writing with their left hand.

Fifty percent of the teachers said that they would not ask students to switch hands. One teacher said, "When you see left-handed students in your class, do you encourage them to use their right hands or do you just

let them write with the hand they prefer" (Holder, 2004, p. 203). Another teacher stated, "On my opinion and as far as I have read in books, I think that even if I try my best to change to child, I won't do much because the cause is a natural one. He/she can only be changed in the way that he/she writes but not in everything that he/she does" (Holder, 2004, p. 203).

Twenty nine percent said they would advise the students to switch hands, but they would not force them to switch. One teacher said, "In infant classes when students (are) found using their left hand in writing, they should be encouraged to stop it, but pupils should not be forced" (Holder, 2004, p. 205).

Seventeen percent of the teachers said they would strongly urge students to use their right hand to write. One of the teachers said, "If I see a child using a left hand, I tell him/her to use the right hand." The remaining four percent of teacher stated that left-handers were not seen in their classrooms.

This ill feeling towards left-handers helps to explain findings of previous studies in Africa. A study by Verhaegen and Ntumba in 1964 said that less than one percent of school aged children in Congo were left-handed

in a 1959-1962 survey. In 1987 Payne found less than one percent of 389 Nigerian Undergraduates to be left-handed (Holder, 2004).

There are three reason why the percentages of left-handers tend to be low; 1) inconsistency in handedness measures, 2) cultural pressure against left-handedness (Beukelaar & Kroonenberg, 1986) and/or 3) social and/or religious pressures against left-handed use (Payne, 1987).

With the change in the definition of left-handedness the percentage of students identified as left-handed when the study by Payne and associates survey results published in 1981. The students were surveyed in the summer of 1979 and four and a half percent 56,779 students were found to be left-handed (Payne, 1987).

Due to social implications of being left-handed studies show very low percentages of left-handed people. It is thought that the stigma behind being left-handed steers naturally left-handed people into writing with their right hand. Thus, using writing should not be the only measurement of handedness. Handedness should also take into account footedness, eye dominance, and hand preference in other activities than writing. (Holder,

2004) "(S)ocial pressures may cause the change of hand preference for certain unimanual activities like eating and writing" (Czarnolewski, 2004, p. 343).

As society has become more accepting of left-handed people the number of left-handed people has increased. They are more likely to come out and identify themselves as being left-handed. It is less likely that they will be forced to write right-handed. In the study of Annett (2004) significantly less people over fifty identified themselves as left-handed in the population of fifty and older. The theory behind this is that it was unacceptable by earlier generations to be left-handed. Due to changes in secular acceptance over the past fifty years the rate of people who identify themselves as left-handed has increased. The biggest change in identification happened in the years prior to and after World War II. In the 1920s the percentage of students who started school was only three percent. Some people who considered themselves right-handed perform other tasks with their left-hand.

"In the present analysis, older participants who preferred the left hand for primary actions other than writing were classified in the subgroup scheme on the



assumption that their writing hand was forcibly changed from left to right" (Annett, 2004, p. 342).

Although they may not be forced, there is a natural bias of most people to teach skills in a right handed fashion. In young children it is very important to let them show a dominance of sides before placing objects in the right hand. Let them pick it up on their own.

Despite this increasing acceptance of left-handers many teachers and parents do not have the experience or skills to help them succeed in a right-handed world. Most teachers are not trained to teach a left-hander to write (Healey, 2001). Teachers not only need to learn how to teach writing to a left-hander, they also need to be aware of which hand the student prefers without showing any preference towards the right hand. People tend to automatically place the writing utensil in the child's right hand. Also, children naturally imitate adults. When a child sees the parent using their right hand to write, they may be more apt to try writing with their right handed. It is important for parents and teachers to take notice of hand preference in many activities before the child begins training in how to write. All kindergarten and primary school teachers should go through training

for teaching left-handers to write. They should also be trained in awareness of the left-handers plight, so they do not influence the student in any way to use their right hand, not make them feel that being left-handed is unacceptable.

It is extremely important for a child to use its naturally dominant hand to write. Changing of hands could lead to confusion in brain dominance and lateralization of speech functions. Stuttering has been tied to children who have changing hand dominance. "Though there is still debate regarding the connection, the most convincing theories are the ones that suggest these involuntary behaviors (stuttering) are sometimes caused by attempts to force a child to switch handedness" (Healey, 2001, p. 136). When the child switches his naturally writing hand, the lateralization of the brain's speech functions is interrupted, which leads to the confusion and hesitation seen in stuttering.

One final challenge that left-handers have to contend with is in academics and differences in brain dominance. What does handedness have to do with brain lateralization and what role does that play in school? As seen in the previous section of the literature review

there are many studies that link handedness to brain dominance.

Before the Wada Test was established in the 1960s to test for brain lateralization it was difficult to link the control of language to either hemisphere. The Wada test uses sodium amytal to isolate the hemispheres, by putting the one hemisphere to "sleep" (Lynch, 1986, p. 23). Although this is not a precise science, it did assist in recognizing brain specialization in many people. By studying the hand-brain relationship such issues as dyslexia, stuttering, human variation, comparative brain research, and developmental neurobiology will be better understood.

The previously mentioned study by Annett (2004) also included that, although being left-handed does not determine these factors, research shows that left-handed students have a higher rate of learning disabilities, literacy problems, epilepsy, criminality and psychopathy, gender identity disorder, and schizophrenia.

Although left-handedness does not cause these situations there appears to be a relationship with them and brain dominance. "Increased mixed-and left-handedness are expected in children with specific disorders of

speech and literacy, when the latter are associated with absence of typical cerebral dominance (Orton, 1937. These arguments have been supported by subsequent studies (Annett, 2002, p. 349).

The left-hemisphere of the brain is what controls speech production. Most people are left hemisphere dominant and have specialization for language abilities. The rest of the world has irregular patterns of specialization. Direct tests on specialization of the brain are too invasive to do on healthy people, so there are still many questions that are unanswered regarding brain lateralization. Researchers do believe that the handedness is linked to the lateralization of the brain (Brownlee, 1992; deKay, 1989; Lucia, 2002).

Studies have shown that handedness is a strong indicator of what side of the brain people think with. Right-handed people think logically with the left side of their brain and left-handed people think more intuitively with the right side of their brain. Since most of the world is right-handed and left-brained, it can be assumed that most teachers and parents are unfamiliar with the plight of a left-handed person. In order to understand how they can help their left-handed students they must

realize how the right hemisphere of the brain thinks. "Each one of us (teachers) has a left-, a right-, or a middle brain preference, and believe it or not—this significantly influences our teaching patterns. By understanding the processes at work in the brain, we can better help our students to explore their own individual preferences" (Connell, 2002, p. 28).

Teachers tend to teach the way that they have had success with as learners. Teachers who are left-brained usually prefer teaching through lecture and discussion. They are generally time-oriented, clean, intolerant to noisy classrooms, and give problems to students that need to be solved independently (Connell, 2002, p. 29).

Right-brained teachers use more hands-on methods of teaching. They will use music, art, videos, manipulatives, group work, and visuals in the classroom. They are not only tolerant of, but they prefer a busy and noisy classroom. The classroom of a right-brained person may be seen as cluttered and chaotic to a left-brained person (Connell, 2002, p. 30).

Both types of teachers need to teach using all styles of learning. The only way they can reach each child is to differentiate their teaching styles to

encompass the learning styles of both left and right-brained thinkers. "If a learning point is delivered in a mode that does not fit the person's preferred learning style, then it is likely that the learning point will not be received consistently with the intent of the design" (Gorovitz, 1982, p. 80). If the concept is not delivered in a manner that matches the brain dominance style, the knowledge might be perceived "in a different way or not perceive(d) at all" (Gorovitz, 1982, p. 80).

The following are processing styles generally seen in right-brained students (Brown, 2000, p. 19).

- **Holistic:** Information is learned beginning with an understanding the whole idea. Then they will break the pieces apart to get a better understanding of the entire idea.
- **Random:** Priorities are not instinctive, leading to abandonment of work or postponement of work and returning to the project at a later time.
- **Concrete:** Hands-on learning is a key to understanding information.
- **Intuitive:** They hold strong intuitive ability of novelty and can tell when someone is lying

or joking. Emotions are often the driving force.

- Nonverbal: Visuals, such as Illustrations, diagrams, directions, and lists need to be used to enforce learning.
- Fantasy-Oriented: Exploration and creativity are favorable means of learning.

The story of Sam, a fourth grade student (Connell, 2002) is an example of strengths and weakness of some right-brain students. On brain dominance tests Sam has scored significantly right-brained dominant. Although this is merely one case and the same is not true for all right-brained students, it gives insight into the life of a right-brained child.

Though Sam does not have a learning disability, he has difficulty processing information that is presented verbally. When the teacher lectures, or talks in compound, complex sentences, Sam gets anxious and overwhelmed and shuts down. The teacher's words run together, and the meaning becomes garbled. Sam's drawings comfort him; they are something he knows he can do well. Right brain activities such as painting and drawing are

activities that he can do easily and with pride (Connell, p. 30).

In a world where the right-handed left brained people are the most dominant, what is a left-handed right brained thinker suppose to do? Schools are designed in a fashion to teach right handed students. They are fed information through books or lectures and are required to memorize them. This is not how a right brained thinker can reach his/her learning potential. A student who has a difficult time with this task is left lost in today's schools. Generally, left-handed right brained thinkers cannot acquire knowledge through these means. "If the work requires some form of mental processing that the person cannot access and make available, then the work will not be done or it won't be done as accurately and as efficiently as it might be if that part of the mental process was available" (Gorovitz, 1982, p. 82).

Right-brained students are more hands on learners than left-brained students. "In contrast, right-brained learners need to see the big picture. They are concrete learners and want to see and touch objects" (Brown, 2000, p. 19). Teachers need to use whole brain learning techniques to reach students of all brain dominance.



Students learn at a young age they are different when they have to use different colored scissors or they can't play baseball because there are no left handed gloves. Teachers need to be aware that the most obvious differences can be uncomfortable for a left handed student. They should make sure their classroom has tools that a left-handed person can use; left-handed scissors, automatic pencil sharpeners, left-handed rulers, left-handed desks, and loose-leaf paper are a few.

Tips for Teachers (Connell, 2002; Gorovitz, 1982; Tyrer, 2002):

- Experiential learning is advantageous. Give students plays, dramatic readings, and role-playing activities that they can personalize and will involve their emotions.
- Right brained students prefer to work in groups. Give opportunities for group work, such as reciprocal teaching, during the week. They tend to be social learners.
- They enjoy art projects. Teachers can have students create collages, poster, storyboards,

or draw a representation of the vocabulary words.

- They prefer to create projects, versus write an essay. Left-handers prefer to create projects versus writing an essay.
- Visual Clues, such as an overhead with notes, can assist while lecturing. They need to be able to see the points being made.
- Playing music will help students get in touch with their feelings. They are very intuitive.
- Use charts and props as much as possible. If they can see it or touch it, it is more likely that they will comprehend the lesson better.
- Have them get up and move. Kinesthetic learning also accesses the right-brain. In Social Studies teach a dance form of the culture that is being studied.

Although there are no concrete facts that show that a left-handed person is more creative, there are many brilliant and creative famous people who are lefties. Left-handed people visualize things more abstractly than right-handers. This could be why some of the most famous

artists ever-Michelangelo, Leonardo da Vinci, and Pablo Picasso- were left-handed. Left-handed people are also more sensitive to changes in musical tones. "Research with stroke victims indicate that songs usually bridge the hemispheres-that is, the right hemisphere learns the melody while the left brain learns the words" (Williams, 1983, p. 163). The research showed that in some patients who have lost the ability to talk can learn to speak and remember simple phrases set to music. Although music can be processed by both hemispheres, most people use their right hemisphere to process music (Williams, 1983, p. 35). Some famous left-handed songwriters and musicians were Bob Dylan, Jimi Hendrix (he taught himself to use a right-handed guitar upside down), Paul McCartney, and Ringo Star. Since 1945 one third of the presidents in the United States have been left-handed. There would be more, but Ronald Regan was made to switch to his right hand, although he was born as a left-hander. Left-handers are even considered to have an advantage in baseball since when they bat they are one step closer to first base than if they were right-handed. Other famous left handed people are Albert Einstein, Oprah Winfrey, Mark Twain, Robert DeNiro, and John McEnroe (deKay, 1966; 1989).

## Online Communities

Sociologist Stephen Brint (2001) "has identified six dimensions of community that are well supported by the sociological research literature: 1) dense and demanding social ties; 2) social attachments to and involvements with institutions; 3) ritual occasions; 4) small group size; 5) perceptions of similarity with the physical characteristics, expressive style, way of life or historical experience of others; and 6) common beliefs in an idea, a moral order, an institution, or a group" (Kling & Courtright, 2003, p. 224).

Although communities often do not have all of the six, of these characteristics they generally will have characteristics of several simultaneously. In this definition the word cooperation is not included, but in a functional and hospitable community, cooperation is necessary, especially with regards to an online community. It is very important to create an atmosphere of cooperation, warmth, and trust in an online community. Since there is, usually, none or very little face to face interaction within an online community, it is difficult for some people to trust, open up, share, and problem solve. Not only does a community need to share some of

the six traits previously stated, it must provide a comfortable environment for its members.

"The term community is widely and often uncritically used to characterize groupings of people who meet in electronic forums (e-forums)" (Kling, 2003, p. 221). Authors Kling and Courtright believe that they are more than just communities, that they are forms of social organization. Online Communities, if managed efficiently can be satisfying or its participants, but it can also be frustrating if it is not managed well. A successful e-forum will be managed based on observations and not general assumptions or the manager's desires (Kling, 2003). The site manager needs to constantly assess the needs of the participants.

Online communities can "inspire participants to seek solutions to problems through collaboration, to wish to increase their knowledge, and expose their ideas to the criticism of others in a constructive atmosphere" (van der Spa, 2004, p. 97).

It is suggested "that collaboration and cooperation are important conditions for fostering the development of a scientific mindset, curiosity, inspiration, and the search for unity being among the defining dimensions of

the scientific mind" (van der Spa, 2004, p. 97).

Discussion and self-reflection are essential to the development of online communities.

Online communities have been criticized as being cold and heartless and that they could never substitute the real communication in a face to face interaction (van der Spa, 2004). No matter what the criticism, it is undeniable the importance of the internet and the World Wide Web to human existence. They have become so much a part of the lives of people that it would be difficult to imagine what life would be like without them. The internet provides opportunities to communicate with others at different times and in different parts of the world in ways that would not be possible in any other manner. The vast world has shrunk with the existence of the internet. In a time where meaningful relationships have taken a backseat to personal agendas, time constraints, and selfishness online communities can facilitate and foster collaboration among complete strangers. "Moreover, if people repeatedly interact socially with one another, they are less likely to behave out of pure self-interest" (Churchill, 2004, p. 41). With the use of e-forums the focus has changed from person to

technology relationships to person to person relationships (Feng, 2004). The internet is no longer solely a means of research it is a tool to communicate and collaborate.

Feng (2004) states that empathy and trust are extremely important in creating successful online communities. A large piece of empathy relies on nonverbal communication in face to face interactions. How can empathy be created in an online community? Similarities in background and experiences are what cause people to empathize with each other. Common ground need and common goals to be emphasized in a community, so trust and empathy can grow.

In a study of online communities it was found that a "...total of 24% think that there is nothing to be learned in an online community, and 12% were unsure or indicated that their knowledge had increased but were not sure this could be attributed to the forum" (van der Spa, 2004, p. 103). Nearly "half of the respondents agree that the forum is a way to collaborate so as to help others solve problems" (van der Spa, 2004, p. 103). Although not everyone was happy with the online communities some were inspired through such communities. The

multi-dimensionality and versatility can be of help to all sorts of people. Online communities are created to open new doors and communication with hopes to motivate, revive, and problem solve.

“An online community is a group of people who connect with one another over time and through space using the internet as their primary medium” (Hill, 2005, p. 1). Online communities can offer education, organization, support, and more. It offers people the opportunity to communicate with others of like interest across the city, country, and even the world, creating opportunities of communication that would not be possible through any other medium.

By creating an online community that supports left-handed students, they can be more comfortable in their own skin. It is just as important for teachers to recognize their left-handers and know that they need accommodation just as an English Language Learner may need. A student needs to feel safe and comfortable with whom they are. Left-handers need to be able to see what their strengths and weakness are, so they can learn to deal with the fact that they are different, but not a lesser person.



Creating a website that serves as an online community for left-handed right brained thinkers, their families, and their educators is necessary for left-handers to have a voice and a comfortable environment to learn how to succeed with their differences. The site would include research describing how the different hemispheres of the brain work, tests to determine which side of the brain a person uses, tips for right brained thinkers, families, and educators, and an area where people can pose questions to me, the site manager, or others who visit the site.

According to the Peabody Perspective on Learning Communities created by the Cognition and Technology Group Vanderbilt (Jonassen, Howland, Moore, & Marra, 2003) Principles of an online community include:

- Curriculum and Instruction: There will be activities, ideas, and guides for teacher, parents, and students to use.
- Assessment: There will be tests on handedness and brain dominance to help students understand the strengths and weaknesses they have in learning areas.

- Professional Development and School Organization: There will be resources and links for students, educators, and parents to continue their learning opportunities.
- Community Connections: The purpose of the community is to get teachers, parents, and students working together to achieve the same goal, the students optimal learning level.
- Technology: The website will support learning, assessment, management, professional development, and community connectedness.

### Summary

Although the relationship of handedness to brain dominance and its ramifications is controversial, most of the research done for this project shows that there are, at least, many coincidences of left-handedness, right-brain dominance, and difficulties with reading and writing. These coincidences seem significant enough by many researchers to continue their studies with the hopes of finding proof that will help left-handed people succeed. Are these just coincidences? Are these coincidences significant enough to share with others? Can

students, teachers, and parents benefit by learning about these coincidences and how to help left-handers overcome obstacles? This project/paper along with many books on the subject, such as "Loving Lefties," by Jane M. Healey; "A Left-Hand Turn Around the World: Chasing the Mystery and Meaning of All Things Southpaws," by David Wolman; "Teaching for the Two Sided Mind: A Guide to Right Brain/Left Brain Education," by Linda Verlee Williams; and many articles and websites believe that there is a need for people to be aware of the differences in left-handed, right brained students. All students should be given the tools to succeed, even left-handers.

CHAPTER THREE  
PROJECT DESIGN PROCESSES

Introduction

Chapter three documents the steps used in developing the website aboutthelefthand.com. Specifically, there are descriptions of the design, development, implementation, and evaluation stages of an online community to help left-handed students to succeed.

The Dick and Carey Design Model was used to develop the website for left-handers. The Dick and Carey Model was the most closely aligned with the goals of the website. The process of the Dick and Carey Design Model is an iterative process that involves the following:

- 1) Assess needs to identify goals,
- 2) Analyze learners and contexts,
- 3) Conduct instructional analysis,
- 4) Write performance objectives,
- 5) Development of assessment instruments,
- 6) Revise Instruction,
- 7) Develop Instructional Strategy,
- 8) Develop and select instructional materials,
- 9) Design and conduct formative evaluation of instruction, and
- 10) Design and Conduct summative evaluation. (Dempsey, 2002, p. 20)

Some of these steps can be used simultaneously, out of this specific order, or in a cyclic matter if the step needs to be revisited.

## Analysis

### Assess Needs to Identify Goals

In the Dick and Carey Design Model the first step is assessing needs to identify goals. Three forms of analysis that were used in research for the website including: the internet, interviews with left-handed people, and research for the literature review through books and articles. Interviews with left-handed people and initial research through the internet helped to identify current behavior and needs regarding awareness of left-handedness. After the interviews research using books and articles for the literature review regarding current research in handedness and brain dominance was completed. Lastly, research using current websites for left-handers people was completed. The strengths and weaknesses of websites were assessed in order to structure the website for this project.

The processes of choosing and completing a project on handedness began with curiosity of handedness. Prior

to choosing handedness as a topic for this project, exploratory conversations were conducted with two people who are left-handed. There were many intriguing questions that arose during these discussions: What causes left-handedness? Why are there so few left-handed people in the world? There are stereotypes that state that all left-handers are artistic and creative. Are they really more creative and artistic than the rest of the world and if so why? Based on previous experience with left-handers, these stereotypes were true. They were all artistic and creative, but are these characteristics common to all left-handers, and if this is the case, what is the cause?

#### Initial Internet Research

Prior to research, little was known about the subject of brain dominance for this project, so the research began with handedness. The first form of research was to gain basic knowledge about the subject of handedness through the internet to gain more knowledge. At that point ideas about the focus of this project could be assessed. A general search of the internet led to a website called *Primate Handedness and Brain Lateralization Research* by M. K. Holder Ph.D. (2005).

This website is what led the project into tying handedness to brain dominance. The website illustrated and discussed how the majority of the world (70-95%) think predominantly with the left side of the brain; but that there are some people in the world, mainly left-handers, who think predominantly with the right side of the brain. Previous researchers thought that there was a direct and more definite correlation between handedness and brain dominance. It was thought that right-handers always thought with the left side of their brain and left-handers always thought with the right side of their brain. It is now known that that is not always the case with left-handers. Left-handers can be either left- or right-brained, but there is a 99% chance that all right-handers are left brain dominant. The website also introduced the idea that learning problems, such as dyslexia, are often associated with left handedness and right brain dominance.

The author of *Primate Handedness and Brain Lateralization Research*, M. K. Holder (2005), has created another website called *gauche! Left-Handers in Society*. Research regarding this website was the next step in the analysis process of this project. The website was

designed for teachers, students, parents, people in the medical field, and anyone else interested in learning about left-handers to give them "a glimpse of the world from the perspective of a non-right-hander" (Holder, 2005, ¶ 4). This website was critical in making decisions regarding challenges that left-handed people face. The website discussed biases of the right-handed world that were a challenge to left-handed people. Intrinsic biases are physically challenging biases. The world is filled with right-handed tools that are difficult for left-handed people to use. Left-handed people are forced to adapt to use these tools with their right hand or inappropriately with their left hand because they have very few options. In either case, left-handers are more prone to being injured using certain right-hand bias tools. Social and cultural biases are historical myths and misconceptions of the left-handed person. Left-handers have been associated with such things as the devil and communism simply because of their hand dominance. Many people have even been forced to switch to use their right hand. Another finding from this website stemmed from this quote, "There is a higher incidence of left-handers among children with childhood learning



disorders and among children 'gifted' in math and science. Either way, a child whose abilities are not properly appreciated will not get the sort of instructions/he needs" (Holder, 2005, Educators Section, ¶ 16). This statement made a large impact on the structure of the project. Based on research from this website a general theory was formed regarding left-handers and school. The belief was that teachers are not aware the ties between left-handedness and possible difficulties and/or differences in learning. This statement was just a belief at the time that needed to be researched more, but it did provide more focus for the project.

From the previous two websites, an outline of the project was formed. The project would be based on three main challenges of left-handed people: 1) physical, due to intrinsic biases; 2) emotional, due to social and cultural biases; and 3) possibly being right brain dominant and its implications in school. After deciding on the structure of the project, more formal research was conducted.

### Interviews

The next form of research was interviewing left-handed adults to understand what the needs were of

left-handers. The interview was based on a set of questions (Appendix B) regarding their hand preference, personality type, and sharing of any stories or anecdotes of their lives as left-handers.

The results of the interviews can be seen in Appendix C. The interviews included fourteen adults from ages 28-60. There were four men and ten women interviewed. Of the people interviewed six were extremely left-handed and six could use both hands for many tasks. Two of the people interviewed were right-handers who believe they should have been left-handed. They are both extremely left side dominant, but they write and eat with their right hand.

Although most people (8) stated that they did not have difficulties using any utensils, nine out of the twelve people discussed problem issues regarding such things as left-handed scissors and can openers. In the interviews the majority of the participants (10) explained that they did not have problems using tools because they have learned to function with both hands. The theory regarding this issue is that over the participants' lifetime they have had to learn to use both

hands because many tools cannot be used with the left hand.

The most predominant finding from the interviews led the project to understanding that people do not have an awareness of left-handed physical challenges. The world is geared for right-handers and left-handed people must adapt to use existing tools and utensils in order to function. Most places, even schools, do not provide tools, such as left-handed scissors, spiral binders for left-handers, or left-handed desks. All of the participants believed that there is little if any accommodation or awareness in schools for left-handers. A sixty-three year old participant stated that, "Being left-handed in a right-handed world has its problems. In handwriting class in elementary school, everyone was suppose to have their paper slanted a certain way on the desk- no exceptions!"

A twenty nine year old participant stated that, "I have found that with certain activities, such as art, sewing, baseball, (and) archery, I have a hard time learning these activities due to the fact that most of my teachers are right-handed. In order for me to participate in these events (I) must have left-handed equipment such

as scissors (or) bow (bow and arrow). My teachers have a hard time teaching me (these) skills because they try to do it opposite."

Danger is even posed in some cases as with this 59 year old participant. "In the military, when I was learning to shoot an M-16 rifle, I didn't realize that these weapons were made for a right-handed shooter. When shooting these right-handed rifles, the hot ejected cartridge would land into the back of my shirt, burning my back."

A fifty year old participant stated, "I always used to burn myself while learning to iron because of the way of the board and cord were set up." She also said, "School desks built for lefties didn't seem necessary to me, but made me realize how few of us there were, percentage wise."

Another finding from the interviews was that there were, in the past, and in some cases there still are people who see left-handedness as a handicap or a sin. In three of the interviews people were persecuted for their left-handedness or made to switch writing hands. One 32 year-old participant said, "I remember I was in bible study writing down notes and I heard a female's voice

yell out 'Sinner. She is the devil's child.' When I looked up she was pointing at me. She continued to say I (would) always be a sinner for being left-handed because the bible doesn't mention the word left and I should leave the class. So, I did, and I didn't return. It still gets to me knowing that I was called a sinner because I write with my left hand." Another participant, 31 years old, told of how "People will tell (her) that (she is) using the wrong hand to write."

A 35-year-old participant remembers "my mother forcing me to use my right hand to write with. I think it's because she had so many problems growing up as a left-hander. She would always place the pencil in my right hand."

In three other interviews the participants' family members had been persecuted for their left-handedness. One participant stated, "My father, who is in his 60's is ambidextrous. When he was a child he used his left hand. His mother told him that it was evil. So, she made him write with his right hand."

Another participant stated that her "father was left-handed, but stated that in the British school system in Barbados, they did not tolerate left-handedness.

Because he had not been allowed to write left-handed, he was insistent that I be allowed to write left-handed."

A fifty two year-old left-handed participant and mother of a left-hander stated that when her, "son was four, I was really sick in bed. I was at my in-laws' logging camp, 100 miles from town. My mother in-law was taking care of my two children. Her mother in law, a retired school teacher, was up visiting for summer. Without my knowledge, she really got onto my son because he was left-handed. He took her lecture to heart and writes right-handed, but does everything else left-handed." She also stated that when she was looking for a job she saw an ad that said, "left-handed need not apply."

As demonstrated in the previous interviews, there is little empathy or knowledge of left-handers' plight in the general population. Since most people in the world are right-handed and tasks are completed easily by them, right-handers do not understand how using a manual can opener or right-hander scissors could be difficult. There is a need to make people and companies who manufacture goods aware of the needs of left-handed people.

There were no significant patterns in self-proclaimed personality traits. The only trait that stood out as being significant was that nine people described themselves as "seeing problems as a whole" instead of in a "linear fashion", which only five people claimed to be. These findings might have been different if the number of participants were higher and from different backgrounds.

At this point in the analysis it was decided that a website would be created for the project in the form of an online community to help left-handed people succeed in a right-handed world. Through interviews and research there appeared to be a need to make an awareness of the left-hander's plight. Left-handed people are forced to adapt to a right-handed world, with little regard to the physical challenges it possess and the emotional strain it could cost them. This website was intended to serve as an informational and collaborative site for left-handers and for those who would like to assist in left-handers' success.

#### Instructional Analysis: Literature Review

The next step in analysis was to conduct research for the Literature Review. In order for the reader to

understand the three challenges of left-handed people, they must first understand what handedness is. The reader will need to know what causes left-handedness and what left-handers have had to face through history. The second thing that the readers will have to understand is what brain dominance is and how it can affect a person's learning abilities. Readers will need to know what the difference is between the two hemispheres, how to test brain dominance, and how handedness relates to brain dominance. When the reader has knowledge regarding left-handedness and brain dominance, then they will understand why left-handers face physical, emotional, and possibly brain dominance challenges. At that point readers will be given tips to help left-handers overcome these challenges. Research in the following areas was conducted for analysis of this project: 1) handedness, 2) brain dominance, 3) tips to help left-handers, and 4) creating online communities.

In order to understand how left-handedness affects people, this project must first discuss what causes handedness and how it affects brain dominance. The article that gave most information and set a basis of the handedness research was *Hand Preference observed in large*



*healthy samples: Classification, norms and interpretations of increased non-right-handedness by the right shift theory* by Marian Annett. Annett's article showed how right-handedness has become an evolved dominant trait as language has evolved into the primary source of communication in humans. This trait is seen in the right shift gene, which is present in most people, explaining the predominance of right-handed people. Annett also tied left-handedness and right-brain dominance to issues such as literacy problems, epilepsy, schizophrenia, criminality and psychopathy, and dyslexia. This article served as a starting point in research on handedness and its link to brain dominance. It also assisted in linking other areas of research, such as literacy problems, to handedness.

The following two articles helped to understand the affects of left-handedness in the classrooms. They also helped to show why teachers need to be aware of differences with left-handers in the classroom. Both *The Southpaw's Secret Semantics* by S. Brownlee (1992) and *Left is Right* by Lynn Santa Lucia (2002) discussed the differences in brain dominance and how left-handers have a higher likelihood of being right-brained. Brownlee

(1992) discusses the issue of problems of right-brain dominance in left-brain dominant school systems. These two articles showed how brain dominance can affect learning problems. The left-brain is the language center and it stores rules for grammar. This could be the cause of high rates of remedial students being left-handers.

Lucia (2002) focuses on dispelling myths and bringing awareness of left-handers physical challenges such as using scissors or smeared writing as the left hand drags across the papers. The intention of the article seemed to be to bring awareness of these issues to educators, so they are more thoughtful to the left-handers' plight.

The next step in analysis was to research brain dominance. *The Split Brain Revisited* by Michael Gazzaniga (2002) was one of the first articles studied that explained how the brain hemispheres differ. This article set the basis for the portion of the project regarding brain hemispheres. The researchers studied patients who had undergone split-brain surgery with hopes for relief from epilepsy. This showed how the hemispheres work independently when there is no communication between the two sides. This study is also explained through a cartoon

called *The Split Brain Experiments* (Wallén, 2007) that was found on the internet. This cartoon takes the reader through an animation of the study on split-brain research patients. It is entertaining and informative. The project used both Gazzaniga's (2002) article and Wallén's (2007) website to show how the brains differ and why it is important for educators and parents to know the difference, since it could have implications on the learning process.

The next area of research for the literature review was with regards to helping left-handed people succeed. For tips for left-handers the articles *Left Brain Right Brain* by Dianne Connell (2002), *Whole Brain Learning for Literacy* (2002) by Graham Tyrer, and *Libraries Can Be Right-brained* (2000) by Donna Brown were used. All of the articles were used to form the section of the projects about tips to help left-handers succeed. These tips can be helpful to students, teachers, and parents. It can help them to understand strengths and weaknesses of left-handers in order to provide an environment that will allow them to excel.

The article by Connell (2002) discussed how brain dominance affects teachers and students. Teachers need to

understand their brain dominance and vary their styles of teaching to reach all students. This information was used for the project to help create tips for teacher. In order to reach the right-brained student teachers need to use music, do projects, and have visuals and props as teaching tools. Right-brained learners do not learn at their best with lectures.

Tyrer (2002) illustrated the different functions of the brain showing that the right-brained learner is spontaneous, simultaneous thinkers, experience oriented, now-oriented, in tune with flow and movement (dance), sports oriented with regards to flow and rhythm, artistic (image, emotion, flow), and musical (passion, rhythm, image). For the project this article gave information and more advice on how teachers can help their right-brain dominant students. In the article there was list of the two functions of the brain that was easy to follow and understand. This list was used on the website to clearly show the functions of the two hemispheres.

In Brown (2000) processing styles of right-brained students was addressed. It also gave tips on how to teach right-brained learners. The article suggests using cooperative learning, color coding, providing hands on

items, and encouraging movement as a way to reach the right-brained students. A list of tips to help teachers reach their right-brained students was created using this article as a basis.

Another source for tips for helping left-handers was the book *Loving Lefties: How to raise your left-handed child in a right-handed world* by Jane M. Healey (2001). This book offered much to the project in terms of information about the history behind left-handedness and myths behind being left-handed. Most helpful to this project were the many ideas to help left-handed children. The book gave tips on how to make the environment left-hander friendly, how to make sure the school is left-hander friendly and positive, and it discussed possible problems and how to overcome them.

The last area of research for the analysis portion of this project was in the area of creating online communities. It was important to learn how to create a successful online community in order for this project to reach its goals. The first piece of literature that was used to research online communities was the *Peabody Perspective on Learning Communities* created by the Cognition and Technology Group Vanderbilt (Jonassen,

2003). It outlines the Principles of an online community. The principles of an online community consist of the following: Curriculum and Instruction, Assessment, Professional Development and School Organization, Community Connections, and Technology. In creating the website each principal would be seen. This literature helped to focus the format of the project. The only area that had not been previously considered was in the area of professional development. It was seen after research of the article that links to professional development opportunities would be necessary.

The second piece of literature that was used to study online communities was by Stephen Brint (Courtright, 2003). The e-forum portion of the project is based on the ideas of community by Stephen Brint. This article assisted in emphasizing the importance of creating a helpful community that revolves around the common goal of helping left-handers succeed. It stressed the importance of monitoring and moderating the e-forum to ensure thoughtful and thought-provoking discussion.

#### Instructional Analysis: Current Websites

The internet was used next to see what websites are already available for left-handed students. There were

many good sites such as, *Primate Handedness and Brain Lateralization Research* (Holder, 2005), *gauche! Left-Handers in Society* (Holder, 2005) and *Anything Left-Handed* (Anything Left-Handed, 2007), but most websites did not focus on helping students succeed in school.

The website *Primate Handedness and Brain Lateralization Research* contained research regarding handedness and brain lateralization, but the amount of information was overwhelming. It would be used more for people who are interested in research or who have a lot of time on their hands. Although Holder's (2005) website was extremely informative its structure, for the purpose of this project, was its weaknesses. The website created for this project is not intended for academia. Although it can be used as a source for university research its main purpose is to help students, parents, and teachers, who are interested in learning about and helping left-handers. It is not intended for people to spend hours reading research. The website created for this project needs to be entertaining, informative, and easy to read.

The next website that was researched was *gauche!* *Left-Handers in Society* (Holder, 2005). As with the previous website, this website by Holder (2005) was extremely informative, but not easy to read nor easy to find information. The positive point for this website was it was geared more to assist left-handed people. There were sections for educators and parents to learn about problems left-handers may be faced with and how to overcome them. There was also a section for tips on music, sports, and daily life. This website was geared more towards the purpose of the website created for this project (helping left-handers), but it was still too daunting.

The next website researched was *Anything Left-Handed* (Anything Left-handed, 2007). It is an online store, but it also has much information for left-handers. *Anything Left-Handed* was easier to read than *Primate Handedness and Brain Lateralization Research*, and *gauche!* *Left-Handers in Society*, but little information was given with relation to brain dominance. There was little information for parents and teachers to help left-handers. It was an interesting and informative site, but there was little collaboration, nor discussion seen.



The project used ideas from the three websites, but added sections that were lacking in the current websites. From Holder's websites *Primate Handedness and Brain Lateralization Research* (2005) and *gauche! Left-Handers in Society* (2005), research on handedness, brain dominance and lateralization, and the effects of right-handed biases on left-handed people were included in this project. The strengths of both of these websites were that they were very informative, but their weakness was they were daunting. Neither website was easy to read. Also, there were few graphics. Finding specific information is difficult. Ideas that were used from *Anything Left-Handed* (2007) were: linking stores that had left-handed products, origins of handedness, myths, and famous left-handers. *Anything Left-Handed* (2007) was easier to read and maneuver through than Holder's (2005) websites, but it lacked in the area of helping to overcome challenges of being left-handed. This website did have a club for left-handers, where they would receive emails of products and get a free newsletter, but there was no discussion page.

## Learners and Contexts

The next step in analysis is to analyze learners and context in order to identify the targeted audience. The targeted audience is left-handed students, their parents and teachers. Through research of literature, the internet, and interviews with people, the noticeable behavior was there is little knowledge or empathy with the plight of the left-hander. People know of the obvious difference in handwriting, but most do not have any further concern or knowledge. As seen in the interview, research for the literature review, and research of current websites the following conditions were found:

- 1) There are few left-handed products available;
- 2) Most people do not know how to teach left-handed skills, such as archery, shooting, and writing;
- 3) Although there is research linking left-handedness to learning problems it is not a widely known tool used in diagnosing students.

Not only are most people in the world right-handed and left-brained, but more predominantly seen are right-handed teachers, who do not understand the challenges of the left-handed student. At Shandin Hills Middle School in San Bernardino California there are sixty-six teachers, only seven of whom are left-handed.

Teachers need to be more aware of left-handed students' needs. They need in equipment, such as left-handed scissors, desks, and notebooks in all classrooms. Consideration must be taken of their emotional needs in being different as well. Also, the possibility of left-handers having learning difficulties needs to be taken into account when diagnosing problems with academics. Of all the in-services and accommodations created to help special needs students, the left-handed student has been forgotten. Right-brained students, most of whom are left-handed, have special needs and they deserve to be educated in a way that can reach them. Teachers must be aware of challenges in being left-handed, so they can make sure they reach these students.

Parents also need to be aware of the differences. Parents should help their children at home and collaborate with the child's teachers to insure that the child is receiving appropriate instruction, assistance, and has the correct tools to function in the class. A safe and left-hand friendly environment needs to be established in the home as well as the classroom.

This project is not intended only for left-handers who are right brain dominant. Since only about thirty percent of left-handed students are right-brain dominant, not all of the website would apply to every left-hander. It is important for people to understand that being left-handed does not necessarily mean they will be right-brain dominant. There is much conflicting research and no one answer to brain dominance and its implications, but it can give some insight in the way a person thinks. By using brain dominance testing the student, parent, and teacher can have a better understanding of the left-handed person in question. Although handedness and brain dominance are a large part of the website, the online community is not intended solely for them. The goal of the website is not to ban left-handed, left-brained students because there is a lot of useful information for all left-handers.

#### Revising Instruction and Writing Performance Objectives

After instructional analysis was conducted, revising instruction was formulated. The focus of the website was reassessed and several changes were made. Upon the completion of instructional analysis it was necessary to

create two separate, but linked portions of the project; the website and the e-forum.

There are two goals of the website: 1) to provide instruction and curriculum about handedness and brain dominance, and 2) give helpful tips for left-handers, their parents and teacher. The website provides information about left-handedness, brain dominance, and how to help left-handers overcome challenges in order to succeed in a right-handed world. Through emails from readers and through the e-forum the website's success in reaching these goals will be assessed.

The second section of the project is in the form of an e-forum. There are three goals of the e-forum: 1) sharing, 2) problem solving through collaboration, and 3) providing assistance through the website and linked forum. By providing a safe and thought-provoking atmosphere the participants in the e-forum will assist each other in problem solving and sharing. The e-forum will be of assistance to participants by linking the project's website to specific discussion questions. By monitoring the discussions, the goals of the e-forum will be assessed.

## Assessment Instruments

While setting objectives of the website, a three part questionnaire was created. These questionnaires were used in the Alpha and Beta testing to assess whether the goals have been achieved. The questionnaire developed to assess the objectives in Alpha and Beta tests consisted of: 1) a pre-test to set a norm for what each person learns, (Appendix D) 2) a test of the website that has a list of tasks to complete while on the website (Appendix E), and 3) a post-test that asks participants to rate the website and provides a space for them to ask questions, and make any comments or suggestions (Appendix F).

## Design

The design of the website was based on *Peabody Perspective on Learning Communities* created by the Cognition and Technology Group Vanderbilt (Jonassen, 2003), and the theories regarding communities by Stephen Brint (Kling, 2003). After analysis of the material it was decided to have two main components to the website. The first section is the website, [aboutthelefthand.com](http://aboutthelefthand.com). The purpose of the website is instructional. The second section of this project is an e-forum that will allow

people to collaborate and share ideas from the website with their own experiences.

The first principle of the *Peabody Perspective on Learning Communities* (Jonassen, 2003) is to provide curriculum and instruction. The goal of the website portion of the project is to provide curriculum and instruction. There are research, activities, and tips to help students, parents, and teachers.

The next principle in the *Peabody Perspective on Learning Communities* (Jonassen, 2003) is providing assessments. Assessments that are available are on handedness and brain dominance. There are online assessments and a brain dominance test. The hand dominance test and two of the brain dominance tests are online tests. One of the brain dominance tests can be printed and used in the classroom to help assess students learning strengths and weaknesses. In learning how the brain functions parents, teachers, and the student, can alter learning opportunities to fit the needs of students.

Professional development and School Organization is the next principle in the *Peabody Perspective on Learning Communities* (Jonassen, 2003). Professional Development

and School organization is seen on the resources page. There are resources and links for students, educators, and parents to continue their learning opportunities. There is a recommended reading list that provides links to buy the books on Amazon.com. There is also a section for discussing classes that are offered at some colleges that relate to whole brain learning and technique to differentiate learning to assist all students.

Community connections is the next principle in the *Peabody Perspective on Learning Communities* (Jonassen, 2003). Community connections are seen in the e-forum and through the emailing the website site manager. The purpose of the e-forum is to get teachers, parents, and students working together to achieve the same goal, the students optimal learning level. Through posts and replies the discussion group can serve as a helpful community, with the common goal of helping left-handers succeed. By emailing the site manager needs of the readers can be assessed on an ongoing basis.

Technology is the final principle in the *Peabody Perspective on Learning Communities* (Jonassen, 2003). Technology is separated into two areas: the website and the e-forum. Both the website and e-forum will support



learning, assessment, management, professional development, and community connectedness.

According to Stephen Brint (Kling, 2003), in order to ensure that abouttheflefthand.com acts as a community, social ties need to be established. Social ties develop with people who have a common belief or goal. The common goal of the website is to help left-handers succeed. In having this common bond with the members of the group, perceptions of similarity will develop. When there is a common goal and a perception of similarity empathy and social ties will form. These ties must be held together by trust and empathy within the group, which is the responsibility of the site manager/moderator. The site manager/moderator will to ensure that there is no inappropriate behavior in the forum and the posts are thoughtful and thought-provoking. Once a safe atmosphere is developed, then members will feel comfortable in sharing with each other. If all the members of the community have the same goal in mind, then ties will form. Once the ties are formed, social attachments to the website and the members of the website will form.

In order to ensure that both the e-forum and the website are meeting these goals the site manager needs to

keep in communication with the community. By posing thoughtful questions the manger can incite discussion. Readers will be able to e-mail the site manager with comments and suggestions. By joining the discussion group the participants can discuss, collaborate, share, and problem solve. The manager will have to assist in keeping all of the discussions safe and considerate in order to maintain a trustworthy and empathetic environment.

In order to ensure safety the site manager will read all posts and replies at least once daily to filter out inappropriate messages. For online communities to prosper the site manager must also act as a moderator. The moderator must promote collaboration and sharing by posting thought-provoking questions, comments, and start discussion about important and interesting subjects. Promotion of the website is of extreme importance. The more helpful information the website can generate the more the website will reach its goal of helping left-handers to succeed. People need to know about the website for [aboutthelefthand.com](http://aboutthelefthand.com) to reach its full potential.

## Development

### Instructional Strategy and Materials

The next steps in the Dick and Carey Design Model are to develop the instructional strategy, develop instructional materials, and perform summative and formative assessments. The instructional strategy or medium that is used is a website. In the development stage of website, [abouttheflefthand.com](http://abouttheflefthand.com), revisiting the goals and needs of the targeted audience were necessary to create a user-friendly, easy to read, safe, thought-provoking, and thoughtful website and e-forum.

The website has ten main sections that are accessible from each page. Figure 1 is the navigation diagram for [abouttheflefthand.com](http://abouttheflefthand.com) is based on *Peabody Perspective on Learning Communities* (Jonassen, 2003). The diagram shows the connection of the five principles, Curriculum and Instruction, Assessment, Professional Development and School Organization, Community Connections, and Technology to the website.

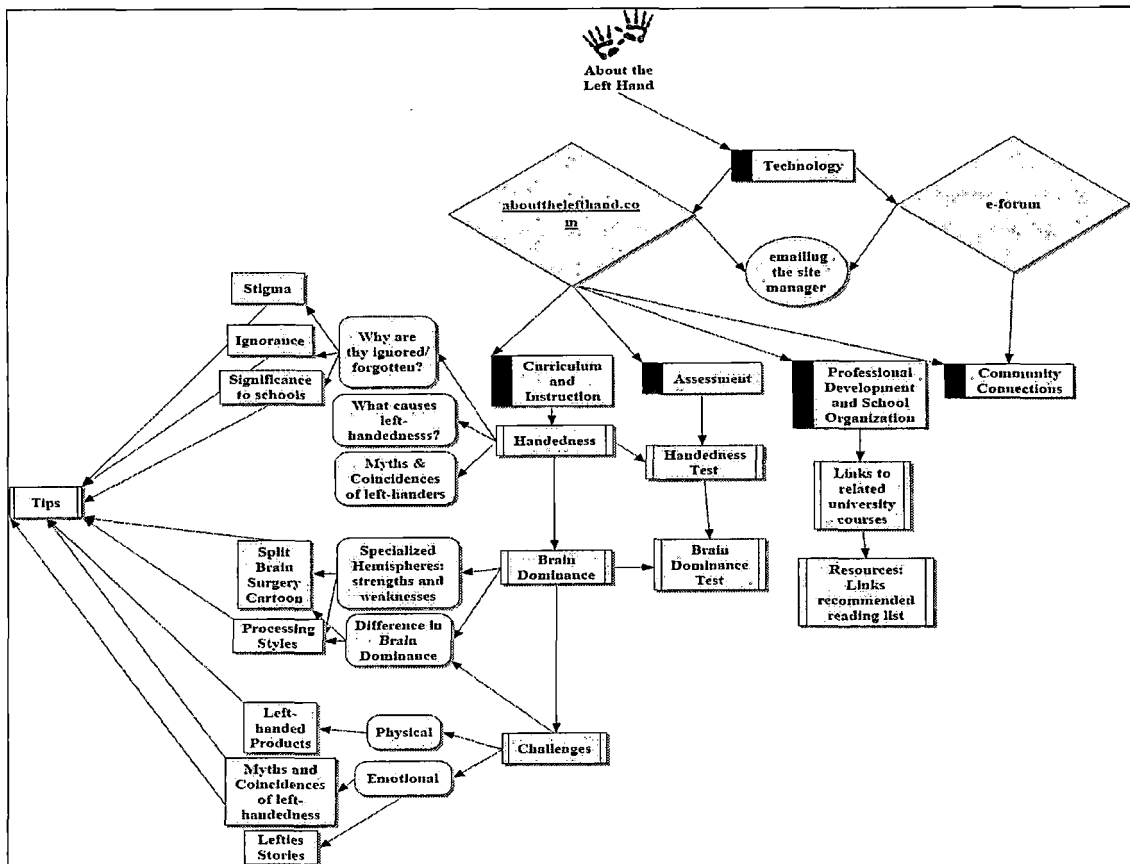


Figure 1. Navigation Diagram of aboutthelefthand.com

Under the Technology principal this project is split into two: the website and the e-forum. The focus of the website portion of the project is mainly seen in the principle of Curriculum and Instruction. Under Curriculum and Instruction are the three subtopics of handedness, brain dominance, and challenges. Each of the subtopics will lead the reader to research regarding the subjects and finally to tips to help left-handers. Assessments and Professional Development and School Organization will

assist in gaining more knowledge about the curriculum and personalize the topics by taking brain and hand dominance tests. To extend on what has been learned in the website and collaborate with others there is Community Connections through the e-forum. The e-forum will help personalize the curriculum, assist with unanswered questions, provide a forum to tell stories, and make collaborative relationships with others who also want to help left-handers.

In the website there is a section for each of the following: handedness, brain dominance, challenges, tests, tips, left-handed survey results and stories, famous lefties, myths and coincidences, stores, links and resources, and discussion section. For each of these sections there are links to more information regarding the subject. There are links to informal online tests for handedness and brain dominance to help people get a better understanding of people's possible strengths and weaknesses. On every page there is an area for people to e-mail the site manager with questions, comments, and suggestions. Feedback is critical to the sites success, so it is encouraged to give feedback. The design of the main page has the title on the top, with a graphic, and

comment box on the bottom right hand side with the site manager's e-mail address. The navigation of the site is found on the right hand side that allows readers to go to different areas on the website with ease. To create a user friendly atmosphere the navigation box is the same on each page and it is found in the same place.

The first page of aboutthelefthand.com is an introductory page (Figure 2). It welcomes readers in a fun and friendly manner and invites them to join a discussion through the e-forum. It was important to set a friendly mood to the website instantly.



Figure 2. Sample of the Homepage of aboutthelefthand.com

The homepage directs the reader to the main page (Figure 2). The main page contains two forms of navigation. The first means of navigations is by using the blue navigation box on the right hand side. This navigation menu is found on every page of the website. The second option of navigation is through an outlined narrative. Some people do not have knowledge of the subject or how the sections relate to each other, so the narrative gives them a brief overview of the website and its main points. It guides the reader through the process of identifying problems then leads them to solutions.



Figure 3. Sample of the Main Page of aboutthelifthand.com

The goal of the front page is to tell the story of the website. It begins with information about handedness, causes of handedness, and a hand dominance test. It continues into challenges of left-handers: physical, emotional, and differences in brain dominance. Under brain dominance is information regarding traits of right brained thinkers. The next section discusses possible reasons why left-handers have had a lack of support: ignorance, stigma behind being left-handed, and controversy linking handedness to brain dominance. The next section has information about myths, misconceptions and coincidences, famous lefties, left-handed stores, and links and resources. There is also a section giving the results of the interview. All of the information was created by the site manager, based on research and interviews with left-handed students, parents, and teachers of left-handers.

#### Implementation

In implementing the website the most important steps are promoting and maintenance. To promote the website online groups for left-handers were visited and messages were written promoting the website. For maintenance,



there needs to be an occasional, at least once a month, check to make sure all links are still active. The site will also rely much on the comments, questions, and suggestions from the audience through the e-mail and discussion group. The discussion group will require more maintenance than the website. The discussion group will need to be visited at least once a day to ensure that no one has posted inappropriate material. Occasionally new posts and replies will be necessary to keep discussions current and ongoing.

## Evaluation

### Formative Evaluation

In the process of creating the website there were many adjustments made to make the website easier to maneuver. After the prototype was created, it underwent a formative assessment in the form of Alpha Testing by five people to assure readability and ease of use. In the alpha testing of the website people of the general public were asked to maneuver through the site using a chart that allows them to rate the ease of finding each task (See Appendix E). Before the testing process participants were asked about their knowledge and interest in the

subject. In the alpha testing the goal was to make sure the site is easy to use and informative. The goal is to make the website user friendly, so little assistance, if any, will be required while maneuvering through the website. At the end of alpha testing the participants were asked for a rating of the website and for any questions, comments, and suggestions (See Appendix F).

Results of the Alpha testing can be found in Appendices G, H, and I. The five adults who did the alpha testing for the website had little prior knowledge of the subjects of handedness and brain dominance (Appendix G). Two of the five were self-proclaimed not technologically savvy, while the others considered themselves to be avid users of the internet. The participants were asked to find thirteen things on the website and rate the difficulty level (Appendix H). The rating scale was; 1) easy (found in less than a minutes), moderate (found in 2-3 minutes), difficult (found in over 3 minutes), or they never found it. All of the steps in the questionnaire were found under three minutes. Suggestions were given that led to the following changes: 1) more animation was added, 2) discussion was added to each page, 3) important information was put in boldface,

4) some of the font was enlarged, and 5) a new window opens when entering the specific tests. They all stated that the site was informative and user friendly.

(Appendix I) After alpha testing of the prototype it was decided to reduce words in some of the pages. The website is intended to be helpful, not daunting nor extremely time consuming. It was also decided that pictures should be added to make the site more entertaining.

#### Revise Instruction

When aboutthelefthand.com was first created discussions were in the form of a yahoo group. In the yahoo group there was a threaded discussion allowing people to talk about issues pertaining to left-handers. The problem with the yahoo group was that participants must have a yahoo account in order to participate in the discussion. It was decided to create an e-forum using phpBB: creating communities (Figure 4). Anyone can read the posts and replies by members of the group, however people must register in order to post and reply to messages.



Figure 4. Sample of the e-forum All About the Left Hand

## Summative Assessment

The final step in the Dick and Carey Design Model is to develop and conduct a summative assessment. In the Beta testing the same pre-test, test, and post-test will be given. The Beta testing was done by fourteen adults who are all active internet users in the same manner that the alpha testing was done. Similar to the Alpha testing, the Beta testing showed that most people had interest in the subject but little knowledge regarding handedness and brain dominance (Appendix J). This testing was more successful (Appendix K). Most of the information was

found at ease (under a minute). A few people rated the following tasks as moderately difficult to find (took 2-3 minutes to find): Differences in brain dominance; How does brain dominance relate to handedness?; Significance of brain dominance to schools; Stories of left-handers; and Handedness test. All of the participants stated that the website was informative and user friendly (Appendix L). There were complimentary verbal comments about the animation and the brain dominance tests-participants found them entertaining. The only negative comment that was made was that there was a lot of information to read, but they did think it was interesting. Several people said that wanted to read over the information again at home.

After the testing of the website participants continued to discuss what was learned on the website and how it affected them and the classrooms of those whom were teachers. A discussion erupted among several of the teachers about how they did not consider left-handers needs in class. Hopefully, this website will result in these teachers, along with others, being more aware of left-handers. One person stated that she believed her school site should see this website in a professional

development meeting. This is an option that is being explored at the present time for the next school year by the professional development committee at her school site.

After the summative assessment steps of the design process do not end. It is an iterative process that if managed well will never end. The manager needs to keep assessing the website. Another form of summative evaluation will be comments received from the participants in the online community. The site manager will play a role in the community asking for comments and suggestions from participants. As more information is gained from evaluations the site may need to change to fit the needs. The website is created for the participants, so the website will need to be reevaluated often to make sure it fulfills the needs.

#### Summary

In order to create an effective program, planning and evaluations are extremely important in the design process. The website will be an ongoing project that will need to be evaluated and changed as necessary in its evolution, to fit the needs. It is important to get

feedback from readers that the site will be serving, so the website manager will need to keep in communication with the audience through e-mail and through the forum.

Research for this project showed that many people who are left-handed have felt out of place at one time or another. They may have felt out of place because of the obvious physical difference or because of emotional challenges or difference in thinking. Unlike many special needs students, these students have no voice. There are no training programs in how to teach them. There are no accommodations made for them and yet they think differently from most of the people in the world.

## CHAPTER FOUR

### CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

The purpose of the project was to create a website that was informative and helpful to left-handers, their parents and teachers. Through the Alpha and Beta testing of the website, it is seen that the goal has been met. Not only was the website considered informative and helpful to the participants, the participants also considered it to be interesting and some found it entertaining. If used correctly the website will create an awareness of the needs of left-handed people. The only concern is promotion of the website. In order for the website to reach its potential the public must know about it. To remedy this problem it will be necessary to visit other left-handed groups, inviting them to visit this website on a continuous basis. The website needs to be shared with parents and teachers as well by word of mouth. The key to reaching the ultimate goal of the project will be in the maintenance and promotion of the website.



## Conclusions

The testing of the website showed that most in the public are unaware of challenges of left-handed people. Since the majority of people in the world are right-handed little thought is put into the obstacles that left-handed people face. Things that are simple to right-handed people are a challenge to left-handed people. The result of this ignorance is a lack of accommodations for the left-hander. Although left-handers have little control in what tools will be available for them to use in most situations, they should have appropriate tools at school. Classrooms should, at least, accommodate the physical needs of left-handed students by having such things as left-handed scissors and left-handed desks.

As seen in the interviews left-handers are usually able to adapt to what tools they have available to them at the time. They learn at a young age that they must learn to adapt to the right-handed world. Their adaptability is a great attribute, but it should not be a necessity. Students should be concerned with learning, not searching for tools to use with their dominant hand.

Throughout the Alpha and Beta testing, there were several statements heard by many of the participants, such as "I didn't know that," "that makes sense," or "I never thought of that." Simple tasks like changing the time on a wrist watch are taken advantage of because right-handers have no difficulty with doing the task.

Participants were also extremely interested in the brain dominance tests and the differences in brain dominance. Teacher participants knew that there were differences in the way that students thought, but comments were made that they had never seen the differences broken down into traits and processing styles. Teaching to both sides of the brain is a topic that many teachers have learned about through credentialing courses, but, as stated by one participant, "there is little opportunity for students to be creative." There was a general understanding amongst the teachers that they know they should teach to both sides of the brain, but the practicality of it is a difficult issue. Several felt constrained by the state test and were not sure how to integrate whole brain learning while still "teaching to the test." Some teachers already use some of the suggested teaching methods, but others did

not know how to integrate creative learning in their classrooms. This opens up a new area of study. Teachers need to go through extensive training processes in how to teach their specific subject while accessing both sides of the brain.

### Recommendations

Recommendations regarding the website stem from the fact that all people are different. The website is not to be used as a diagnostic tool. It is to be used as a tool to get to know students' possible strengths and weaknesses. Parents and teachers can use this website or other means of getting to know students better. The best way to help students is to know them, know their needs physically and emotionally, know how they think, and know the best ways for them to learn.

Although the website gives much information regarding the subject, it is recommended that parents who have left-handed students read some of the books from the recommended reading list and visit websites that were included in the links. There is a lot of information regarding handedness and brain dominance and it was impossible to include all of the information in the

website. The website is an overview and should be used as a springboard into more study of the subject. The purpose is to create an awareness of differences and give helpful tips to assist left-handed students. The hope is that it will spark an interest in people's minds to do more research or use some of the suggestions at home or in the classroom. The effect of the website should be ongoing, even if it is simply an awareness of differences of left-handers.

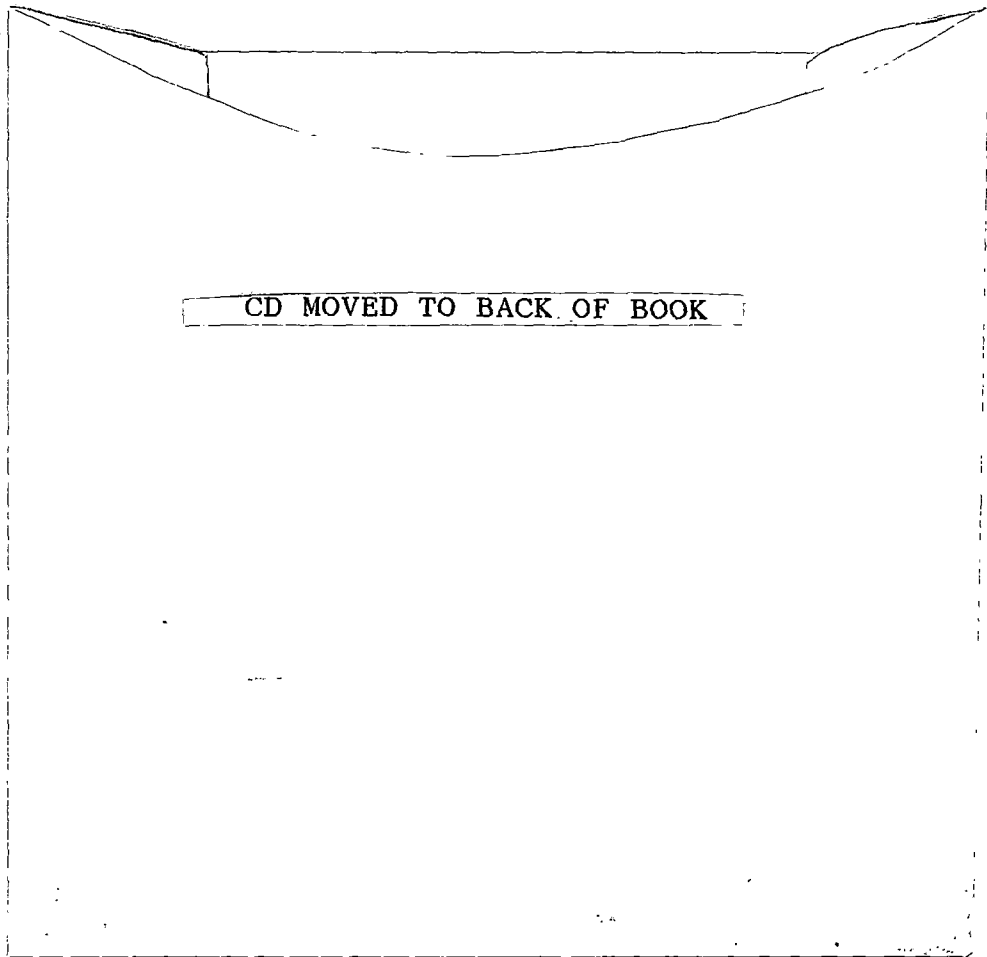
#### Summary

Handedness and Brain Dominance are controversial topics at the present time. There are websites that are in the process of being created. Even during the creation of this project new resources were created. Conclusions have not been made regarding the relationship between handedness and brain dominance, so there are studies that need to be done. The research for this project and the website itself will continue to change as new studies are completed. With the changing of the research, the website will also have to evolve.

With proper promotion of the website, this project has the potential to reach the goals as stated earlier:

to create awareness of left-handed differences and give helpful tips to assist in left-handers success. Teachers, parents, and students can use this website as a tool to help left-handed students do their best in and out of school by learning about their strengths and weaknesses. In emphasizing and utilizing their strengths and assisting them with their weaknesses, left-handers can not only survive, but thrive in the right-handed world. Much of this success lands in the hands of the adults in the lives of the left-handed children. It is the responsibility of the adults to assist and accommodate left-handers. Through awareness, thoughtfulness, and trying new teaching and learning strategies, adults can make a difference in left-handers' lives.

APPENDIX A  
CD OF PROJECT



APPENDIX B  
INTERVIEW QUESTIONS



### Interview Questions

1. Are you (please circle one) Male or Female?
2. What is your age? \_\_\_\_\_
3. What hand do you use to write? (please circle one)  
Left or Ambidextrous
4. Do you function well at daily tasks with both hands or are you extremely writing hand dominant? (please circle one)  
Extremely left handed Can function with both
5. How do you see yourself? (circle all that apply)  
Organized Approach things in a linear fashion  
See problems as a whole Goal-Oriented  
Improvisational Creative  
Disorganized Intuitive  
Methodical Now-Oriented  
Emotional Better at Language Arts/English  
Better at Math
6. Do you have a difficult time using any tools, utensils, etc.? (Please Circle one)  
yes or no
7. If the answer to #6 was yes what is it that you have difficulty using?
8. Do you have any stories or anecdotes about being left-handed? I would greatly appreciate any jokes, awkward situations, or experiences you have had as a left-handed person.  
Please Share, so I can add them to the website. No names will be used.

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APPENDIX C  
INTERVIEW RESULTS

## INTERVIEW RESULTS

1. 4 = Males      10 = Females
2. Age range = 28-63
3. 12 = Write with their left hand  
2 = Write with their right hand (believe they should be left-handed)  
0 = ambidextrous
4. 6 = extremely left-handed  
6 = can function with both hand  
2 = write and eat with the right hand, but are Left-sided
5. Self-Proclaimed Personality traits  
Organized = 6      Approach things in a linear fashion = 5  
See problems as a whole = 9      Goal-Oriented = 6  
Improvisational = 4      Creative = 5  
Disorganized = 3      Intuitive = 7  
Methodical = 6      Now-Oriented = 4  
Emotional = 6      Better at Language Arts/English = 6  
Better at Math = 8
6. Difficulties using tools, utensils, etc.  
No = 8      Yes = 6
7. Tools and utensils that caused difficulties:  
Can openers = 5      Power tools = 1  
Scissors = 3      Sewing Machine = 1  
Overhead projector = 1      Knitting = 1  
Faucets = 1      Wrenches = 1

APPENDIX D  
ALPHA AND BETA PRE-TEST QUESTIONNAIRE

## ALPHA AND BETA PRE-TEST QUESTIONNAIRE

Before using the website

1. What is your interest level in learning about left handed people? (please circle one)  
low            medium            high
2. Do you believe that there is an association between handedness and brain dominance? (please circle one)  
yes        no        don't know enough about the subject to voice an opinion
3. If people do think differently according to your hand dominance, do you think it would benefit a student, parent, and teacher to know what the differences are? (please circle one)  
yes            no            maybe
4. Do you think that a student can train themselves to be a better student by understanding their thought process?  
yes            no            maybe
5. What questions, if any, do you have about left-handers and or brain dominance? Please list any and all questions.

The goal of this website is to educate people on the differences between left and right-handed people. Although not all left-handed people are right-brain dominant there is a large majority who are. These people have tendencies to think and function differently than the right-hand, left-brained people. This difference in handedness and brain dominance has left many left-handed people without a voice in the right-handed, left-brained world. The hope of this website is to give this minority a voice and some tips as to how to be successful in the right-handed, left-brained world.

APPENDIX E

ALPHA AND BETA TESTING QUESTIONNAIRE

## Testing of the Website

Find information about	How difficult was the information to find?	Easy (less than a minute)	Moderate (2-3 minutes)	Difficult (over 3 minutes)	I never found it
Physical Challenges					
Emotional Challenges					
Differences in Brain Dominance					
How does brain dominance relate to handedness?					
Significance to brain dominance in schools					
Famous Left-Handers					
Tips for students, teachers, and parents					
Left-handed myths and misconceptions					
Stories of Left-handers					
Handedness test					
Links to other research and helpful websites					
Brain dominance test					
Stores to get Left-handed products					

APPENDIX F  
ALPHA AND BETA POST-TEST QUESTIONNAIRE



## ALPHA AND BETA POST-TEST QUESTIONNAIRE

After the test

1) How would you rate this website? (Circle all that apply)

Informative

Not Informative

Confusing to read

Easy to read

Hard to maneuver through

User Friendly

2) Do you have any comments, questions, or suggestions? Please share.

APPENDIX G

ALPHA PRE-TEST QUESTIONNAIRE RESULTS

## ALPHA PRE-TEST QUESTIONNAIRE RESULTS

Before using the website

1. What is your interest level in learning about left handed people? (please circle one)  
Low = 4      medium = 1      high
2. Do you believe that there is an association between handedness and brain dominance? (please circle one)  
yes = 4      no      I don't know enough about the subject to voice an opinion = 1
3. If people do think differently according to your hand dominance, do you think it would benefit a student, parent, and teacher to know what the differences are? (please circle one)  
Yes = 5      no      maybe
4. Do you think that a student can train themselves to be a better student by understanding their thought process?  
yes = 5      no      maybe

APPENDIX H  
ALPHA TESTING QUESTIONNAIRE RESULTS

### Testing of the Website

Find information about	How difficult was the information to find?	Easy (less than a minute)	Moderate (2-3 minutes)	Difficult (over 3 minutes)	I never found it
Physical Challenges		5			
Emotional Challenges		5			
Differences in Brain Dominance		2	3		
How does brain dominance relate to handedness?		2	3		
Significance of brain dominance to schools		0	5		
Famous Left-handers		5	5		
Tips for students, teachers, and parents		5	5		
Left-handed myths and misconceptions		5	5		
Stories of Left-handers		1	4		
Handedness test		2	3		
Links to other research and helpful websites		5	5		
Brain dominance test		3	2		
Stores to get Left-handed products		3	3		

APPENDIX I  
ALPHA POST-TEST QUESTIONNAIRE RESULTS

## ALPHA POST-TEST QUESTIONNAIRE RESULTS

After the test

1) How would you rate this website? (Circle all that apply)

Informative = 5

Not Informative

Confusing to read (a little = 1)

Easy to read = 4

Hard to maneuver through = 0

User Friendly = 4

2) Do you have any comments, questions, or suggestions? Please share  
Return button to main menu at the bottom of the page. Some sizing of  
fonts is hard to read.

APPENDIX J  
BETA PRE-TEST QUESTIONNAIRE RESULTS



## BETA PRE-TEST QUESTIONNAIRE RESULTS

Before using the website

1. What is your interest level in learning about left handed people? (please circle one)  
Low = 3      medium = 7      high = 4
2. Do you believe that there is an association between handedness and brain dominance? (please circle one)  
yes = 10      no = 2      I don't know enough about the subject to voice an opinion=2
3. If people do think differently according to your hand dominance, do you think it would benefit a student, parent, and teacher to know what the differences are? (please circle one)  
Yes = 9      no      maybe = 5
4. Do you think that a student can train themselves to be a better student by understanding their thought process?  
yes = 12      no      maybe = 2
5. What questions, if any, do you have about left-handers and or brain dominance? Please list any and all questions.  
Are left-handed people smarter than right-handers?  
How does brain dominance determine creativity?  
Are left-handers more creative?  
Related to eye dominance.  
Learning difficulties and strengths.  
Help with differentiated lessons.

APPENDIX K  
BETA TESTING QUESTIONNAIRE RESULTS

### Testing of the Website

Find information about	How difficult was the information to find?	Easy (less than a minute)	Moderate (2-3 minutes)	Difficult (over 3 minutes)	I never found it
Physical Challenges		14			
Emotional Challenges		14			
Differences I Brain Dominance		13	1		
How does brain dominance relate to handedness?		11	3		
Significance of brain dominance to schools		12	2		
Famous Left-handers		14			
Tips for students, teachers, and parents		14			
Left-handed myths and misconceptions		14			
Stories of Left-handers		12	2		
Handedness test		12	2		
Links to other research and helpful websites		14			
Brain dominance test		14			
Stores to get Left-handed products		14			

APPENDIX L  
BETA POST-TEST QUESTIONNAIRE RESULTS

## BETA POST-TEST QUESTIONNAIRE RESULTS

After the test

1) How would you rate this website? (Circle all that apply)

Informative = 14

Not Informative

Confusing to read

Easy to read = 8

Hard to maneuver through

User Friendly = 14

2) Do you have any comments, questions, or suggestions? Please share

This was interesting.

This was interesting, informative, fun, and creative.

I'm really interested in finding out more and we should spend inservice time exploring the subject.

Awesome! I want to explore further.

I found the links easy to find.

I liked the links on the right side. It was really easy to navigate.

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