

The effect of brain-based instruction to improve on students' academic achievement in social studies instruction

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Abstract -The purpose of study is to compare social studies instruction based on the brain-based instruction (BBI) and traditional teacher-centered method, and to search the effects of BBI on elementary school sixth grade in social studies instruction students' academic achievement and motivation

In the study which is designed as an experimental research; traditional teaching, and brain-based instruction have been selected as independent variables, and academic achievement have been selected as dependent variables. The research design consists of pre-test, post-test, one experimental group and one control group

The sample of the study consisted sixth grade students which were selected randomly from two separate classes of Türdü 100th year Primary School in Muğla. One of these classes has been randomly assigned as "experimental group" and the other one as "control group" of the study.

Instruction in the control group was carried out in accordance with traditional teacher-centered method and in the experimental group instruction was done in accordance with brain-based learning and teaching principles.

Data from dependent variables was collected by "Academic Achievement Test of Social Studies and the Interview method of qualitative research. To analys the data, the technique of covariance analysis (ANCOVA), t-test were used.

Key Words: Brain-based learning and instruction, social studies, academic achievement,

Introduction- As the popular press has discovered, people have a keen appetite for research information about how the brain works and how thought processes develop (*Newsweek*, 1996, 1997; *Time*, 1997a, b). Neuroscience has disclosed important information about the brain and how it learns. It has uncovered "unprecedented revolution of knowledge about the human brain, including how it processes, interprets and stores information" (Sousa, 1998). The new brain-based learning theory "require[s] that we now shift our focus to the learning process" (Sousa, 1998). The nature of cognition, the functioning of the human brain, and the construction of knowledge are tied to one another. Brain-Based Learning

(BBL) is an education which brings the learning system of brain forward. BBL is an instruction which takes into consideration how brain takes, processes, interprets information; makes connection, stores (like making connection, coding, constructing matrix), and remembers the messages (Greenleaf, 2003, 14). Brain-Based Learning is student centered learning that utilizes the whole brain and recognizes that not all students learn in the same way. It is also an active process where students are actively engaged in constructing their own knowledge in a variety of learning situations and contexts (Caine & Caine, 1994, 1997; Caine & Caine and Crowell, 1999). Brain based researches are interested in how feelings affect learning and the topics that are related with feeling, perception, attention and memory (Goleman, 1997; LeDoux, 1996; Pert, 1997; Sprenger, 1999; Diamond, & Hopson, 1998; Greenfield, 1996). BBL emphasizes the applying of information with which is related to real themes. Different emotions involve different neuronal networks. Goleman's (1997, 1998) five dimensions of Emotional Intelligence include Self-Awareness, Self-Regulation, Motivation, Empathy, and Social Skills. Brain-based research has demonstrated ways that teachers can help create the best emotional climate for students to learn.

Experiences, thoughts and memories are always embedded in emotions and corresponding physiological and psychological states (LeDoux 1996). The students try to find and give the meaning to the answers themselves. This is the perfection of BBL. In this respect, teachers have to think about the findings of brain-based learning. They should encourage the students to problem solving experiences and let them deep into the meaning.

A brain-based education uses research in neuroscience on how the brain works to gain an understanding of how students learn and develop in a classroom (Madrazo, 2005).

Brain-based or brain-compatible instruction requires instructors to understand how the brain works and thus, design instruction with that information in mind (Stevens & Goldberg, 2001). Teachers have been encouraged to combine knowledge about their profession with findings from brain research to create learner-centered environments – whether online or in physical classrooms. Applying brain research to instructional design can result in the practice of brain-

compatible instruction instead of brain-antagonistic instruction (Stevens & Goldberg, 2001).

The best learning comes true with making use of the variety of experience which is intensively stimulated, music, role-playing, drama, art, colors, graphics, figures and metaphors (Sylwester, 1995; 2000; Jensen, 2000; Dhority and Jensen, 1998; Sousa, 2000, Duman, 2004). According to research on brain-based learning, environments, diet, amount of sleep, music, color, oxygen, movement, exercise, serotonin, and water intake all affect the way our brain responds and learns.

The important thing for teachers is to decide what, where and how much should be done in order to get the students to learn effectively. By getting students' style inventory, the teachers are able to address their two brain lobes.

Education should deal with both the necessity of human brain and the design of how it learns. 'To reach the design and artistry, to recognize the level of meaning, to use the indicators of meaning are three basic elements of BBL (Caine and Caine, 1994; 1997; Caine, Caine and Crowell, 1999).

In order to realize the **active processing** in learning-teaching activities it is needed to let the students involve in this process. Moreover in this process, by modeling cognitively, talking aloud we should get them to immerse into the problems deeply. The objective is to create the current situations of a concept that are being taught.

What is Brain Based Learning?

Brain-based learning focus on how the brain learns. Brain based learning includes accepting the rules of brain processing and organizing the teaching according to these rules in the mind for meaningful learning (Caine and Caine, 1994; 1997; Caine, Geoffrey, Renate Nummela Caine and Sam Crowell, 1999). It is a concept which tells how fusion of the common sense, human experiences and brain researches produce useful tools and principles for classroom environment. It does not give us a map to follow. But it provides us to think the structure of our brain at the stage of making decision. We can make better decisions and reach much more students thanks to the knowledge of our brain. In short, brain based learning is to learn with the brain in our mind (Jensen, 2000).

Brain based learning depends on how the brain learns and works. At the same time, it depends on the theory of being able to be learned by anybody. The brain learns the new patterns while creating its own patterns. As lots of trainers, brain based trainers adopt constructive and active learning models. According to them, teachers should teach for the meaning and understanding. They claim that in order to do this, teachers should create learning environments which are low at threat and high at encouragement and students must actively participate in and immerse comprehensive experiences. Teachers must know the short and long term memories, how our past learning's affect the new learning's and the differences of processive, explanatory and episodic memories (Bruer, 1999).

The Aim of Brain Based Instruction?

Advocates of brain-based learning have concluded that teaching techniques based on the neuroscience of how the brain learns are effective in producing long-term learning. The aim of the brain based instruction is to pass from memorizing through meaningful learning. It requires these three interactive elements; 1. Relaxed alertness. 2. Immersion. 3. Active processing (Caine and Caine, 1994; 1997).

Relaxed alertness and being ready for easy comprehension.

Two important characteristics of being ready for comprehension: 1. General relaxity 2. Innate motivation. (Caine and Caine, 1994; 1997; Caine, Geoffrey, Renate Nummela Caine and Sam Crowell, 1999). We need an environment which gives possibility for taking safe risks to increase the learning at the highest level. Sense of safety that accepts a risk at suitable level is a part of being relaxed (Dwyer, 2002). You should start the lesson with open or pair discussion taking several minutes. **Immersion:** It is the students' focusing on the context. When the wholeness and connecting to each other are inevitable, the students have to use local memory systems to discover the context. As Kristina Hooper says, immersion into the "forceful experiences" forms immersion, alertness, interrogatively, meaningfulness and consistency for the brain. **Active Processing:** A brain learning *active processing* is an active brain. In active processing, teachers should work with the students purposefully because the students need to connect and innate the knowledge both meaningfully as a character and conceptually harmonious.

Why Brain Based Learning?

We already learn with our brain. What is the new thing? Caine's answer to the questions that may be asked by the people who have just heard about brain based learning is this: of course, every learning is brain based but if we say only learning, people may not understand what we have said. People have a brain which is wonderful and has infinite opportunities. So, while we are implying the brain based learning, we are interested in understanding how the brain works best and how we can increase the learning at the highest level and tell these to people (Pool, 1997).

How the Brain Learns?

The brain cells including learning are neurons and glia. Learning occurs when two neuron communicate with each other. Neuro-scientists emphasize that learning occurs when a neuron sends a message to another (Hannaford, 1995, Jensen, 2000; Sprenger, 1999; 2002; Sousa, 2000; Learning Engages the entire physiology. Food, water, and nutrition are critical components of thinking (Sylwester, 2003). We are "holistic" learners - the body and mind interact the peptides in the blood are chains of amino acids that become the primary source of information transfer. The Brain is a parallel processor. Left and right hemispheres work together. Many functions occur

simultaneously. Edelman (1994) found when more neurons in the brain were firing at the same time; learning, meaning, and retention were greater for the learner.

The principles of Neuro-Physiological Based on Teaching: As a result of researches on the brain, following 12 basic principles are determined as the essential structure stones of brain based learning (Caine and Caine, 1994 ; 1997; Caine, Caine and Crowell, 1999).

1. Brain is a parallel operator. 2. Learning is a physiological event and the brain is an organ which is working according to physiologic rules. 3. Brain tries to give meanings to the data's that have arrived there. At the same time, the brain has a perfect curiosity and hunger for novelty, discovery and challenge. 4. Giving meaning becomes by the way of patterning. Imagining, problem solving and critical thinking are some kinds of patterning. 5. Senses have an important place in patterning. The learning of the person is affected by the senses as expectation, tendency, prejudice and social interaction. 6. Brain perceives the parts and the whole at the same time. While teaching a subject, the whole and the parts of the topic that interacting with each other should be given at the same time. 7. Learning includes the information which is taken from both focused directly and additional stimulations. (As smiling of a person near us) 8. The learning consists of **intentional** and inadvertent processes. 9. There are two kinds of memory. They are spatial memory system and learning by memorizing heaps system. People have a natural spatial mind that can memorize without experiences and rehearsal. 10. Facts and abilities are learned well when they are stored in spatial mind. 11. Learning increases with the activities that force the brain. 12. Each brain is unique. Teaching should be programmed in a way that the students express their visual, auditory and emotional choices.

Application of Brain-Based Learning and Instruction in Classroom Environment.

A methodology that is enriched is needed to be used to create successful, creative, constructive, critical and probability based learning atmosphere and process for all students who have each levels of learning. An enriched methodology should be based on the findings of brain studies like cognitive and neuropsychological. Each stimulant is subjected to an evaluation in brain cells. More information is needed on how teaching and learning is constructed.

Teaching strategies that enhance brain-based learning include manipulative, active learning, field trips, guest speakers, and real-life projects that allow students to use many learning styles and multiple intelligences.

According to Gray E. Myran and Laura Erlauer (2003) these brain based strategies should be used in different levels and content areas in class: using movement, using music, using personal stories, using humor, using metaphors, using colors, using the first 15-20 minutes of the course as an effective teaching time, using brainstorming that is related with knowing, wanting to know, learn and using the learned things, using project presentation...etc.

In order to carry out the Brain-based learning and teaching in classroom environment better, firstly, to increase getting

students ready for learning and instruction, arrange the environment, get the students' attention, memory and recalling processes, Prigge (2002, 237–241) suggests the Brain-based teaching strategies such as: teaching students about Their Brains, Smart Thinking, Sleep, drinking and eating, learning preferences, establishments a positive atmosphere, using music, laughter, and positive visual reminders, creating an interactive environment, integrating novel strategies, providing movement, being aware of internal and external attention, engaging emotions appropriately, creating sensory associations, making learning personally relevant, using creative repetition, remembering the importance of first and last, teaching specific recall techniques.

Six ways to have the students ready:

1. Inform the students about their brains. 2. Form individual objectives. 3. Tell the students that enough sleep is needed for their brains, so they can sleep wisely. Adequate sleep and rest is necessary for efficient learning. Decreasing attention can be seen at noon that this hour are 12 hours after person's midpoint of sleeping (Dwyer, 2002). 4. Teach students the relationship between behavior & success and food & nourishing so that they eat well, if one student is hungry or not nourished enough, it is hard to learn with concentration, in this respect, the tolerance against disappointment and stress decrease. Breakfast that has high level of nutritious and proteinaceous provides awakens during morning and a balanced diet that includes complex carbohydrates provides awakens during day. Because of the food consumed affects the brain function, good nourishing is essential for learning (Dwyer, 2002). 5. Notify the students that water takes an important role in all body system and effective running of brain, in lesson time water should be had in stock instead of caffeine. As caffeine takes a role like a pill that brings urine and consumes the water mass that is needed to process the learning of brain (Dwyer, 2002). 6. Inform the students about learning styles.

To manage learning and teaching environment; 1. Create a positive atmosphere, 2. Use music, 3. Use positive visual reminders, 4. Create an interactionist environment.

To keep the students Attention on; 1. Integrate strong and reformist emotional connections with learning, 2. Use humor, 3. Allow movement, 4. Be aware of internal and external attention.

6 ways to strengthen recalling memory:

1. Notice the importance of Emotions, 2. Create effective association, 3. Relate learning with the students' personal life, 4. Use creative repetition, 5. Remember the importance of the first and the last, 6. Teach special retention techniques

During the process of learning and teaching images and words that call threat disturbs the running order of the brain. If the knowledge that brain takes is perceived in a threatening way as physically and psychologically, rational/logical thinking process is closed, and in the situation of war or escape, hypothalamus and pituitary glands team up in order to secrete adrenaline. This initial automatic reaction is good for escaping from danger but lessen the learning (Dwyer, 2002).

Statement of the problem

Does Brain-based learning have any positive effect on increasing academic achievement of student and student motivation in teaching social studies?

Purpose of the study

The general aim of this research is directed to determine what the effects of Brain-based learning on increasing student’s academic achievement in teaching social studies are. On this general objective direction, answers are searched to these questions below as sub objectives:

1. Is there a significant change between the academic achievement of experiment group that is instructed in Brain-based learning and the academic achievement of the students that are in control group according to the final test?

METHOD

Universe and Sampling

It is kind of research and experiment study. In this research, brain based instruction and traditional teaching methods are compared on the academic achievement and motivation of primary school class according to Social Studies Instruction. Here, doing the Social Studies Lesson of brain based learning is tested.

Two experiment and a control groups were determined in this study. The experiment groups were exposed to the teaching which is based on brain based. However; the control group was taught according to traditional teaching method. Before the experimental process, a pre-test was done and at the end of study, a final test was done. Some meetings with the students were arranged. The research was designed from real experiment models to pre-test, final-test control models.

Working Group

The research was made in Tüdü 100th year Primary School class during the second term of 2004-2005 learning and teaching period. The sampling heap of the research was determined according to sampling method. There are total 113 students who are from 7-A, 7-B, 7-C. They form the control and experiment groups. The population of each classroom is approximately 40 students. The sections were selected impartially. The experiment groups are 7-B and 7-C and the controlling group is 7-A.

When we investigate the points of pre-tests in table 1, it can be shown that the arithmetic average of experiment groups 7-B and 7-C are approximate to the controlling group 7-A.

As there are three groups, ANOVA analysis was made with the aim of pairing the groups.

Table 1 some descriptive data’s about total pre-test points of the groups

	N	Mean	Std. Deviation
1.00	39	10.6923	3.22942
2.00	38	11.6316	4.41999
3.00	36	11.6111	3.92267
Total	113	11.3009	3.87272

Table. 2. The ANNOVA Analyses conclusions relating to total points of academic achievement tests of experiment and controlling groups.

Source of variance	average	sd	average	F	Sig.
Between groups	22.065	2	11.032	.732	.483
Within Groups	1657.705	110	15.070		
Total	1679.770	112			

Table 2 shows that there are not important differences between the points of academic achievement pre-tests of experiment and control groups. (F=732, p>01) In other word, before starting the experimental process, it is determined that there are not important differences between the students from the point of content. Experiment group class B (N=39, X=10.69), experiment group class C (N=38, X=11.61), control group class A (N=36, X=11.61), as you see they are approximate to each other.

Academic Achievement Test

It is found whether there is a meaningful difference between 27 percent of groups with independent groups’ t-tests for the academic achievement test. The items that don’t have differences are not accepted as a reagent and they were got out of the test. Test analysis was made after the item analysis. Because the arithmetic average (X=16.17) and the middle (14.500) are a bit far to each other, the median of the test is evaluated according to dispersion of the test. It is found that the reliability alpha coefficient of the test is 85, the average difficulty is 48, standard distortion of the test is ss= 7. 02. It can be said that the academic achievement test has reliability at a suitable level for this research.

Data Collection

Data that is answer to the question of the research was collected by doing pre-test, final test and by interviewing the students.

The Processes in Experiment Group

To take part in now and future’s education world, the need of having students comprehend the importance of cognitive awareness lies. From the first lesson, students were asked

whether they realize their own characteristics and features or not. And **'you are what you are and it is your uniqueness the most beautiful one'**. It was stressed that each student and person learns things in different way. First, while learning something, the necessity of making use of all senses was explained. By the way, it was emphasized that whatever your age it is, there is a direct relationship between the life areas of learned and presented manner & order of a learning content (Edgar Dale, 1969; Heinich and et al., 1993). The students were deeply plunged in an active process by writing on the board, about the role of senses in learning, the scientific research discoveries of which are depended on life cone. Learning activities about this subject that we are going to study and about other topics are wanted students to arrange in order and construct them based on their own life experiences. While doing these arranging and constructing, they were wanted to analyze first their actions, feelings, sensation, expectation and needs, for this reason 'mutual teaching, role-playing, creative drama methods' were used.

1. The basic aim in the experimental classrooms where teaching activities are being made (during learning-teaching process) of this research is to involve students in **an active processing** by creating atmosphere that may be a sample atmosphere or the current situation of generalizations, process, principle, concept that has been taught.

2. Thanks to this atmosphere both in individual and in cooperative groups, making use of students' each other's thinking and learning styles is provided. Besides, situational environments are formed to observe and realize other students' learning, thinking and problem solving strategies. In addition to this, they develop their own learning strategies and adopt new strategies by stimulating feeling of success.

3. In this process students are oriented to **deeply plunged** activities and to information in content.

4. While doing learning activities, students are allowed to sit wherever and whomever they want. Also they have right to wander in class (**the principle of using movement**).

5. In order to create a **harmonious learning environment** and in order to get the students to feel themselves secure, being far-threat, the activities started with songs that students like.

6. Posters, pictures are hung to **guarantee the success**, to give meaning to the content of the lesson, **to animate the learning's in students' thoughts**. Presentations and slide shows were made. New thoughts and horizons were provided to broaden on charts.

7. **Personal stories, humor and metaphors** were used.

In this respect, content and presentation which are defined with the teaching principles and methods in experimental study were carried out through the principles below:

1. The computer-assisted audio-visual presentations about **how their brain works and learns** were made 2. **The approach of producing information instead of memorizing was adopted.** 3. **Adopting the methods of scientific research, problem solving,** developing the students' problem-solving skills with immersion to the concepts that are

the fundamental structure of information through basic principles were followed. 4. It was stressed that **feelings had a critical role on Brain-based learning and teaching, and the lesson atmosphere was planned according to this.** 5. 'The Human Body' CD which tells about the structure of brain and how it learns, designed by BBC, was showed to the students in class and the subject was discussed. The content has to be meaningful for students. It was concretized and made meaningful by integrating with students' daily life relations. In other words, the learning's that were taught in the process of teaching-learning in class were related with outside-world. Students were tried to see the reflection and projection of the learning's related their social life.

Moreover brain-based teaching activities was used to tie in facts and skills with real experiences to embed learning in a meaningful way in experimental classroom to create vibrant learning environments and to incorporate learning with storytelling that is an effective way to ground the meaning in structure and provide for emotion (Hayes, 2005). Telling stories is one of the most influential techniques because you give the information, ground the meaning in structure, provide for emotion, and make the content meaningful. Our brain loves storytelling (Shank, 1990). Other activities such as Speculations, experiments, question and answer sessions, hold debates, games, simulations, music, songs, and role playing was used to embed information into the student's long-term memory. Activities were used to tie in information with the students' previous experience or make it relevant in their life in order to enhance the brain's transfer of knowledge into long-term spatial memory.

Findings

In this chapter, social studies instruction with brain based instruction method and social studies instruction with traditional method are compared. The students' academic achievement points are compared, too. You can see the information resulted from the application of pre-tests and final tests and the averages (x) and the standard distortions (sd) of these tests points and the results of ANOVA.

Table 4. The arithmetic average of academic achievement tests of experiment and control groups, values of standard distortion.

	N	Mean	Sd	Mean	Sd
		Pre-test		Post- test	
Experiment group B	39	10,6923	3,22942	23,2564	6,01191
Experiment group C	38	11,6316	4,41999	22,6053	5,28404
Control group A	36	11,6111	3,92267	17,0278	4,69946
Total	113	11,3009	3,87272	21,0531	6,00869

When we investigate the points of pre-test in table 4, it can be seen that arithmetic average of experiment class B is X=10.69, class C is X=11.63 and the control class A is X=11.61. An ANOVA analysis has been made to determine if

the difference between the groups is meaningful or not and to pair the groups. It is not observed that there is a meaningful becoming different between the groups according to the facts. The points of final tests are compared in the way of the objectives of the research.

Question 1: Are there any meaningful differences between the experiment groups B, C classes and the control group A class?

Table 5. The ANOVA results of academic achievement points according to experiment and control groups.

Source of variance	Sum of squares	sd	mean squares	F	Sig.	Meaningful difference
Between groups	951.073	2	475.536	18.579	.000	Experiment B & control A experiment C & control A
Within Groups	2815.564	110	25.596			
Total	3766.637	112				

The results of ANOVA analysis show that there is a meaningful difference between the class B, C and the class A. As you know class B and C are exposed to brain-based instruction method and the class A is exposed to traditional teaching method. ($F(2-110)=18.57, p=000$) In other word, the academic achievement of the students in the groups have changed meaningfully with the independent method factor. Scheffe test has been made to find where the students' academic achievement differences are. According to Scheffe test results, it is found that the arithmetic average of academic achievement points of experiment groups, class B, ($X=21.33$) and C, ($X=21.86$), is much more than the control group, class A, ($X=15.38$).

Table 6. The t-test analysis results of final test academic achievement points according to sex.

Sex	N	X	S	Sd	T	P
Male	59	18.7627	5.70341	111	1.654	.101
Female	54	20.5556	5.81042			

There is not a meaningful difference between the final test achievement points according to sex ($t(111) = 1.65, p = .101$). You can see arithmetic average of academic achievement points of males and females but it can be implied from the table that there is not a relation between sex and the results.

Discussing and Comment

During the last two decades authors in this area are Leslie Hart ,1983; Marian Diamond, 1998; Howard Gardner, 1983; 1993; Springer and Deutsche, 1992; Sousa, 1998; 2000; Sprenger, 1999; 2002, Renate and Geoffrey Caine, 1999; 1994; Caine, Caine and Crowell, 1999; Pert, 1997; Jensen, 1998, 2000; Sylwester, 2003; etc. and neuroscientists have be

doing research that has implications for improved teaching practices. Neuroscience is based on information obtained through autopsies, experiments, and different types of scans -- MRIs, EEGs, PET and CAT scans, as well as the most recent brain research lab studies in neuroscience. Thus, technologies in medicine have paved the way for many new learning innovations, and determine how brain learning actually occurs.

Brain-based or brain-compatible learning theory focuses on concepts that create an opportunity to maximize attainment and retention of information. In brain-based learning environments, materials and instruction must be learner-centered and delivered in a manner that is fun, meaningful, and personally enriching (Lucas, 2004). Learning is strongly influenced by emotion. Strong emotion connected with an experience causes chemicals in the brain to send a message to the rest of the brain such as, "This information is more important.

The basic belief of brain based instruction is cognition that may be related with sense and may effect learning both positively and negatively. Positive sense is quite good for performance. Good mood develops the ability of complex and flexible thinking. Amusement is a genetic reward for learning. Anxiety prevents academic performance. Emotion is critical in learning successfully. Emotion is the first catalyzer in the process of learning. Experiences are shaped in the brain. "Emotions drive attention which drives learning, memory, and just about everything else" (Sylwester, 1995). A positive emotional state is essential for the student's ability to acquire new knowledge, and helps focus the attention of the individual (Caine, 2000; Sousa, 2000; Caine et al., 2005; Caulfield et al., 2000; D'Arcangelo, 2000; Jensen, 2000; Pool, 1997; Slavkin, 2004; Lucas, 2004; Wagmeister & Shifrin, 2000; Wolfe, 2001). So we know according to this information that our learning experiences change and reorganize according to the brain physiology and structure. These changing are structural and the behaviors can be observed.

The never-ending search for better teaching practices in this area has led educators to the work of key authors such as Caine, Caine, McClintic, and Klimek (2005), Erlauer (2003), Jensen (,2000 , 2005), Slavkin (2004), Wagmeister and Shifrin (2000), and Wolfe (2001). Most of these authors would agree with those teachers who contend they already incorporate some aspects of brain-based learning into their classrooms. Recent innovations in science have allowed an unprecedented look into the way the brain Works.

The years between 1990 –2000 are named as "brain's ten years". It was the first time that scientists could study on how the brain processes while it is working. In past, studies used to be done either on a dead person or during an operation. But advanced technologic displaying systems as MRI and PET have encouraged scientists to draw maps of the brain in lots of areas.

It has been proved at the experimental study on brain based instruction which was carried out by Caulfield, Kidd, and Kocher (2000) between the years of 1994–1999 with CARE that was in Valley Park Primary School in Kansas, that brain based learning effects the students' academic achievement,

attitudes and motivation positively. It has been emphasized in the studies which were carried out according to its own principles that brain based learning increases both students' and teachers' motivation. Moreover; a teacher of primary 1.class expresses her feelings by saying "I grow impatient to go to school every day."

Wagmeister and Shifrin, (2000) used brain based instruction program to which they believed to create an environment that provides the students to widen their knowledge, make connections, find new patterns and take risks, at a school in which the students have differences in learning language, in California in Encino. At the end of the application, it is determined that teachers and students were in a positive attitude towards learning. Westmark school managers created a rich learning environment by starting out with the belief that brain based instruction provides the students' brains better blood circulation. So this both increased the academic achievement of the students and provided them to improve positive attitude towards learning. One of the experimental studies based on brain based learning was done at Drew Primary School in New Jersey. It is found that important results are obtained with BBL program (Neve, 1985).

An important increase was seen at the academic achievement of the students, when an Iowa test was done at the end of the project in which the principles of BBL were practiced. Moreover, the close pursuit in the process of learning-teaching showed that there was a great advance in learning. It is determined that composition writing of the students that learn in the classes where brain based learning method is used, has developed increasingly.

As it is emphasized above, BBL not only increases the academic achievement of the students but also provide the students and the teachers to motivate well with the addition of team mood, collected effort and interest.

Conclusion

We learn best when we are challenged and believe. Learning physically alters the brain. Brain-based or brain-compatible learning theory focuses on concepts that create an opportunity to maximize, the transfer of knowledge, attainment and retention of information. "Enriched and challenging environments produce more neural connections while boring and sterile ones these connections to wither and die." (Diamond & Hobson, 1998). Students' emotional states influence their level of academic achievement. Caine, in an interview with Pool, stresses the importance of establishing a culture and environment where students feel safe and are not fearful (Pool, 1997).

It is concluded that when we compare the experiment group (class B and C) students' academic achievement point which was studied with BBL with the control group (class A) students' academic achievement points, there is a significant difference ($F(2-110)=18.57, p=.000$).

During experimental activities, Tüdü 100th Year Primary School, 7th class experimental group students expressed that

they were so glad during brain-based learning and teaching activities.

Besides this, the students stated that they were able to analyze themselves better thanks to having got information about their brain. Moreover, they explained that they realized their brains were a unique potential. The students of experimental group stressed that they were so impressed of the computer-assisted audio-visual documentary film CD's that they watched and they thought that they had clear and meaningful information about how their brain learns on their minds.

According to the data's that we collected, the students expressed that BBL and education activities gave them positive feelings and ideas. They stated that 'we wish all of our lessons were like this'.

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