
Brain-Compatible Activities for EFL Vocabulary Learning and Retention

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Abstract: *The purpose of this study was to investigate the effects of brain-compatible activities (BCA) on the vocabulary learning and retention of the 31 third-year undergraduate students taking English for Tourism after taking the course using the BCA. Data, gathered from pre-test, immediate post-test, 2 delayed post-tests, and semi-structured interview, were quantitatively and qualitatively analyzed. The results of the study indicated that the students significantly learned the target words while taking the tourism course using the BCA. Moreover, the vocabulary they learned were retained at least 6 weeks after the instruction.*

If the learner is confident, learning increases.

If the learner believes in the teacher, learning increases.

If the learner thinks the subject is important, learning increases.

If the learner believes it will be fun and valuable, learning goes up!

Jensen (2000:115)

1. Introduction

Tourism is one of the major sources of income in Thailand and it is unavoidable to train students to be good tour guides and become ambassadors of the country. To accomplish such goal, students need to learn the important vocabulary that could help them achieve their potential. To enhance such learning, it is necessary for the teachers to find an effective way to teach and train the students. In this study, Brain-based Learning principles were seriously taken into consideration to help the students learn the words needed in their field in a natural way. These principles can be considered as the students' gateway in achieving the desired outcome in becoming effective tour guides.

The brain itself has been the subject of centuries of study. Neuroscientists, psychologists, and educators all played a part in the growing number of research done in this field. These research studies provided a wealth of resources (Willis, 2008) on brain activity and how it learns (Jensen, 2000, 2005; Caine and Caine, 1994; Sprenger, 1999, Sousa, 2001). The brain-compatible classroom activities are one of the results of the studies made about the brain and its ability to learn. These activities have been carefully planned and are considered very helpful for the language learning development of the students.

2. State of the Art

Brain-based Learning is about the brain's structures and functions. Every human being has a brain and thus is capable of learning (Hart, 1999). However, if the learning situation hampers the person's opportunity to learn, it would be difficult for any learner to register the things that are supposed to be important for them. It is certainly appropriate for every learner to be able to express themselves in the favorable way they can without fearing of being criticized, judged or mocked upon. It is also critical for teachers to energize the learners' brain to keep them moving and growing more knowledge. Brain-based Learning is focused on the reality that everybody learns and that the brain has an immense power to process that learning. Thus it helps provide the opportunity for students to enhance their learning capability by energizing the brain through activities in the classroom to make it expand its storage capacity to uphold knowledge and help the learner reach a maximum potential about the subject matter. Integrating brain-based principles in English for Tourism lessons is fascinating since this course requires hands-on experiences which can activate the brain and thus engage it with the task at hand.

Caine and Caine (1994:69) attest that "learning is positively affected by relaxation and challenge and inhibited by perceived threat and fatigue. Stress is considered harmful in learning." A pleasant atmosphere should be experienced

in the classroom where the students learn so that they will be free from inhibitions and be able to express themselves well. Sprenger (1999) notes that there is a great need for students to participate in a realistic environment where they can try new things. Merely showing something to the students is not enough for effective learning to occur. It is important for them to do hands-on learning as they connect the existing information to the current knowledge they gain and be able to retain them for future use (Wolfe, 2001; Caine and Caine, 1994).

As students learn in a sensible and meaningful way, the information learned is retained in their memory bank (Sousa, 2001; Sprenger, 1999). That means, when teaching the students, the teacher should associate the words with something concrete like real life situations or real objects to provide meaning in remembering since the human brain is both visual and textual and can remember better when the words are aided with objects (Paivio and Csapo, 1973). As a facilitator of the students' learning in the classroom, the teacher's challenge is in choosing the right activities and materials to develop retention among the students. Such activities should help the students keep the information and knowledge they have learned in class from their short-term to their long term memory, thus, enabling them to draw such knowledge from their brain whenever the situation calls for it.

Memory, either short-term or long-term, is essentially about the brain. The students' ability to store information and recall it later can certainly affect their performance in learning. Jensen (2005) states that the "only way we know that students have learned something is if they demonstrate recall of it" (p.125). Matured and independent students can connect past experiences with the present, which eventually lead to better understanding of the task at hand (Caine and Caine, 1994; Sprenger, 2005). Still, in vocabulary learning, many students tend to remember the words that they use very often, eventually forgetting those words that are used infrequently. However, if they understand the importance of the new words given for them to learn and the words' impact to their future career, they would be able to refocus and

internalize the new knowledge they are gaining while taking English for Tourism.

Though many people believe that brain development is only for children, several studies have been found proving that it is a lifetime growing matter. Concurring with Caine and Caine's (1997:2) brain learning principles that "learning is developmental" these researchers (Tompkins, 2007; Lin, 2010; Chang, 2004; Bayindir, 2003) have proven that the brain continues to work wonderfully even when the person is already beyond the so-called critical period. No matter how old a person is, learning continues to occur. With that, this research is focused on the area of vocabulary learning, since words are essential in developing fluency in language development. This poses as a challenge to the researcher as to the extent of the learning that the students would gain especially on the retention of words and on recalling them after a period of time.

2.1 Literature Review

The 12 Principles of Brain-Based Learning (BBL)

In this study, the twelve brain-based principles were considered as the framework in which the lessons and the activities were created. A lesson plan was created for every class session based on the brain-learning principles by Caine and Caine (1997) as follows:

- The brain is a parallel processor.
- Learning engages the entire physiology.
- The search for meaning is innate.
- The search for meaning occurs through "patterning".
- Emotions are critical to patterning and drive our attention, meaning and memory.
- The brain simultaneously perceives and creates parts and wholes.
- Learning involves both focused attention and peripheral perception.
- Learning involves both conscious and unconscious processes.
- We have at least two types of memory: spatial and rote.

- We understand and remember best when facts are embedded in natural, spatial memory.
- Learning is enhanced by challenge and inhibited by threat.
- Each brain is unique.

Caine and Caine (1994) suggested three important phases of the learning and teaching process that are very valuable in developing lessons for the learners. These are: orchestrated immersion, relaxed alertness, and active processing. Each phase is not a separate entity from the others. Each has a distinct role in the teaching and learning process by which students comprehend the lessons in a non-threatening way.

Each lesson plan in this study was created by connecting the BBL principles with the three important phases of learning and teaching. In the phase of orchestrated immersion, the students were asked questions and shown pictures in order to set their mood on the things that they were about to discuss for the day. Moreover, it gave them an overview of what was going to happen during the particular session. The last part of this phase is the introduction of the words that they needed to learn for a certain session. It connected to the BBL principle stating that *emotions are critical to patterning and drive our attention, meaning and memory*. Since the teacher gave the students the idea on what to study and what it does to their life, this connects to BBL principle stating that *the search for meaning is innate*. In the phase, relaxed alertness, the students got involved with activities that led them to understanding the lessons and made them use the words they learned in the first phase. Since the students were involved, the researcher believed that it would be easier for the words to sink into their memory as they use them while playing games. This connects to BBL principle that says *learning engages the entire physiology*. The third phase, active processing, involved production. The students needed to plan for a presentation like role-playing. They had to use most if not all the words they learned in class for the day. This is in conjunction with the BBL principle that states, *we understand and remember best when facts are embedded in*

natural, spatial memory and learning is enhanced by challenge and inhibited by threat.

Brain and Learning

By paying more attention on the brain and its faculties, vocabulary learning will probably no longer become a difficult task for every second language learner. The students' awareness of learning consciously will be enhanced knowing that they are learning for a valuable reason. Yet, one should know the brain first and how it functions in order to use it for optimal learning.

The human brain is basically responsible for all the things we learn in life. However, there are certain things that are focused on how the brain works with environmental influences in order to become more efficient in learning. Educators would find it easy and fun to teach when the students' brains are engaged – that is when all their senses are involved. When students are focused on the things that they are concerned with, they will be able to link the new information to their previous experiences, thus creating more meaning to what they are learning at present. They are believed to respond positively in classroom activities which they could make sense of and where their five senses are working actively. Classrooms that promote brain-compatible teaching and learning allow students to experience challenges. Challenging activities make the students think and be active in class. As they participate in the activities, they would have a feeling that they belong since emotional well-being allows the intellectual capacity of the students to function well (Marchese, 2002). The absence of threat and a state of relaxed alertness (Caine and Caine, 1994) is one of the characteristics of brain compatible learning. The students interact well when they know they are respected and will not be laughed at even when they commit a mistake, thus giving them the courage to participate in class. In this approach, feedback should be provided immediately in order for the students to know where they are at in terms of learning.

Brain learning leans more on the way the students learn. It centers on the things that the teacher, as a facilitator, needs to do in order to enhance the knowledge of the students in a certain way. It facilitates the capability or ability of the brain in storing data and information and

recalling them when necessary. When students fail to remember the things they have learned in class, it means that their learning is only skin-depth or that it could have been interfered with. Knowing the storage in our memory and how to facilitate the transfer of learning to attain retention serves as a valuable tool in helping the students make use of the brain faculties to learn and remember what they learned.

Vocabulary Learning and Its Importance

It is very important to learn vocabulary when learning a foreign language since vocabulary plays a major role in language comprehension and production (Read, 2000). It is “central to language and of critical importance to the typical language learner” (Zimmerman, 1997:5). Educators are often faced with the challenge of how to teach vocabulary to learners comprehensively making them able to recall the words they learned when the situation calls for it (Sokmen, 1997).

Nation (2001) believes that a large amount of vocabulary can be acquired with the help of vocabulary learning strategies. The skills learned along the way prove useful for students of different language levels. Fluent target language users usually internalize the use of the language by committing as many words as they can to their memory. The more words they commit to their long-term memory, the more confident they become and the easier it is to learn new words. For students to be proficient and competent EFL (English as a Foreign Language) learners and language users, they need a large, rich vocabulary and the special ability and skills to use those words adequately (Pikulski and Templeton, 2004). However, learning vocabulary in EFL contexts is quite challenging because students rarely have opportunities to use them. As a result, it is easy to forget the words. Many students employ different strategies to improve their vocabulary learning and memorizing (Schmitt, 1997; Nation, 2001). Each strategy is considered helpful in some way.

3. Methodology

3.1 Research Method, Instruments, Participants, and Data Collection Procedures

This study used a pre-experimental research design. There were three instruments used in this study. First were the vocabulary tests. They contained 30 words (see appendix A) that the students needed to use in tourism in the local area of the Northeast province of Thailand. A group of students were given four tests which were a pre-test and an immediate post-test to measure the vocabulary gained through BCA in English for Tourism course. And the other two delayed post-tests two weeks and three weeks after the immediate posttest to measure the students' retention of the words learned in class. Second were lesson plans for four class sessions or twelve hours of instruction, which were designed, based on 12 principles of BBL (discussed earlier). Last was the semi-structured interview, which was conducted with one-third of the total number of students after the whole experiment was completed.

There were 31 participants of this study. They were the third year undergraduate students who were taking English for Tourism as one of the required foundation courses. The researcher decided to conduct this study with only one group of students to track their changes very carefully; from the day they started taking the course using BCA until they finished.

Data for this study was gathered for a ten-week period during which the researcher taught the class using the BCA in the classroom for three sessions. The fourth session was done on-site where the participants acted as tour guides and another group of students from the same university were invited to be the tourists.

4. Findings and Discussions

Data from different instruments will be used and presented together to clearly and comprehensively illustrate the findings.

4.1. The Effects of BCA on vocabulary learning

The effect of BCA on vocabulary was measured by comparing the scores from the pretest and immediate posttest. The findings were shown in Table 1 below.

Table 1: Results of the students' pretest and immediate posttest

Participants	Pre-test Mean	SD	Post-test Mean	SD	Sig.
31 students	3.61	1.58	14.29	3.37	.013

Significance level is at .05

As seen in Table 1, the students' scores in the pre- and post-tests were compared using the statistical tool. It was found that the mean scores of the posttest (14.29) was significantly higher than that of the pretest (3.61) which means that the students learned many target words at the end of the sessions using BCA. Based on the results of the pre- and post-tests, it can be claimed that BCA was effective in the students' vocabulary learning. It appears that the activities helped them understand the words and their usage.

Before BCA started, the students barely knew most of the words included in the pre-test since very few or none of them were able to answer them correctly. Please see Table 2.

Table 2 Scores of each word used in BCA sessions

Vocabulary List	Scores in Pre-test	Scores in Immediate Post-test
extinct	11	26
archeological	13	26
commemorate	4	27
isolated	1	10
summit	4	10
gallery	9	25
original	11	18
magnificent	7	29
craft	0	12
alley	1	5

annually	12	28
sanctuary	10	18
restore	2	11
attraction	14	25
replica	2	12
century	14	19
monument	11	24
pediment	7	24
lintel	5	17
sandstone	17	26
carved	5	19
arrangement	4	19
competition	12	22
excavate	10	20
stairway	12	18
laterite	10	17
explore	4	13
itinerary	7	17
procession	11	19
region	2	8

It can be seen in Table 2 that the students scored very low during the pre-test. While their scores were higher during the immediate post-test, it can also be seen that some of the target words have very low scores like region (2,8) and alley (1,5). Such results could be attributed to the students' interest or lack thereof in knowing the words and using them in order to remember them longer. It could also be the result of a friendlier environment as a result of using BCA in class. Here are some of the results during the students' interview:

"I did not like to study before, but it is very fun to study in this class..." (S16)

"We enjoy to study in this course and I learn many words." (S22)

"Before, I shy very much and don't know how to speak English. But my friend is friendly and teacher is friendly so I try. I learn how to present with tourists and with friend in Phanom Rung." (S31)

4.2. The Effects of BCA on Vocabulary Retention

After two weeks, the first retention test was administered to measure if the students would still be able to remember the words that they learned. Consecutively, three weeks after, the second retention test followed. The scores of the students were calculated and analyzed. The scores of both retention tests were compared with the immediate posttest. The summary of the results is shown in Table 3.

Table 3: The retention test scores

N	Posttest Mean	SD	Delayed Post-test 1 Mean	SD	Delayed Post-test 2 Mean	SD	Sig.
31 students	14.29	3.37	13.35	3.67	13.13	3.83	.000

Significance level is at .05

As seen in Table 3, there was very little difference between the mean of the immediate post-test (14.29), first delayed post-test (13.35), and second delayed post-test (13.13) respectively. Statistically, it shows that there was a significant difference between the means of the abovementioned tests. These findings also suggested that the students remembered most of the words that they learned in class for at least five weeks after the classes ended as evident in the result of their interview:

“I like the activities in class... I like the field trip more because we go to the place and use what we learn in class and we become tour guide for one day. We remember the vocabulary and use them for the tourists. It was fun and exciting to go there and see Phanom Rung and describe Phanom Rung to the students who are tourists.” (S21)

“I like... game in class...about lesson... everybody funny and relax. On field trip day, we use the words that we learned and it was exciting.” (S16)

These interview results show the students' positive feelings about remembering the words and using them in the actual situation. Some of the students did not have the same feeling as the rest of the class. They feel that there were just too many words for them to remember. Their nuances are shown below:

"I forget some of the words but my friend help me to remember and use them when we have our field trip. We are tour guides in the field trip and I have to talk about Phanom Rung to tourists." (S3)

"So many words to remember in every lesson. I get confuse sometimes and I cannot remember."(S22)

"I am difficult to remember the words because they are many."(20)

These could be reason why a slight decline was noticed even though most of the words learned in class were retained in the students' memory. It could also be due to the time and the use of these words. It could mean that some of the words/knowledge they gained about the words learned in class did not sink deeply into their long term memory, hence the unavailability of such knowledge when they were trying to use it. However, it was surprising to see that 90% of gained vocabulary could be retained effectively. There was only 10% loss of retention. This could confirm the effectiveness of the BCA in teaching vocabulary.

4.3. Discussion

The BCA done in class helped provide the better atmosphere among the students, which led to gaining vocabulary knowledge and retention. Beginning with the class sessions where each one would get a glimpse of the things they would be studying for the day which confirms the brain learning principle stating that "the brain simultaneously perceives and creates parts and wholes" (Caine and Caine, 1994). As the learners anticipate the entirety of what they would be learning for the day, they were also creating expectations in their heads. Meeting such expectations or even exceeding them was a challenge to the

teacher since they might get bored if done otherwise, and which would hamper learning.

Repetition played a vital role in students' retention of the words taught in class. The more the students used the words in various activities, the more they stayed in their memories. Sprenger (2005:105) states that "long-term memories are networks of neurons that have been strengthened through repetition". As neurons would continually communicate with each other in various ways, retention would follow.

Emotion also affected the students' learning in different ways. The kind of emotion that flows to our brain would either inspire or suppress attention, which would lead to effectively comprehend the lesson or completely turn away from it (Sprenger, 2005; Jensen, 2005). In this study, BCA sessions led to positive emotions among the students, towards their teacher and the course they were taking. These good emotions resulted from the friendly atmosphere they were in and the awareness of what they were learning as they connected it with what they wanted in their life. According to Sprenger (2005:22), "emotions and emotional states are patterns of response that lead to behavior". Since emotion affects our brain and entire body, providing good experiences could greatly help the students in remembering what they have learned.

The feedback given by the teacher to the students when they committed mistakes or when they were doing right was very helpful in their understanding of the course. Sprenger (2005:83) explains that "feedback as reinforcement offers encouragement and the opportunity to fortify what the students understand". Feedback helped build-up the students' comprehension and corrected their wrong assumptions before keeping such knowledge to their long-term memory (Sprenger, 2005). It invigorated those who grasped the concept of the things they were learning while inspired those who needed reassurance and more support. It also served as a guide to the teacher in knowing which area of the course was understood and which one needed to be further reiterated.

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Nemati (2009) made a research regarding the impact of teaching through memory strategies with 310 Indian pre-university females. In this study, the researcher taught the students the meaning of new vocabulary by using acronyms and imagery. The participants were divided into experimental and control groups. They were given a pre-test, a post-test and a delayed post-test to check their long-term retention. The results showed that the experimental group scored higher and that they were forgetting less as compared to the control group. The researcher believed that the memory strategies used for vocabulary retention was effective both in restoring and retrieving.

5. Pedagogical Implications and Suggestions for Future Research

The findings of this study suggest that brain learning is effective not only with the children but with the university students as well. The BCA done in the classroom could be helpful for the teachers who are open to challenges and are motivated to create different strategies with the aim of helping the students achieve their full potential in learning a language. The teacher's role in this approach is more of a facilitator. Students in BCA classrooms are encouraged and guided to be more cooperative and be more interactive.

Since Brain-based Learning is generic for all kinds of education, they could be integrated into many subject areas of instruction. Therefore, teachers of math, science, and so on, should try to use these principles to design their lessons. Research on the topics will be of great useful for effective classroom instruction.

The following topics can be suggested for further research: brain-compatible activities for other language skill development such as writing composition or speaking. Different areas of research can be focused on, like learning a foreign language, English for specific purposes, or retaining information in long-term storage using the first language of the learners as the language of teaching.

References

Bayindir, H., (2003). *An investigation of students' attitudes towards brain-based applications in English Composition Skills II course: A case study*. A Master's Thesis. Middle East Technical University.

Caine, R. N., & Caine, G., (1997). *Mind/Brain learning principles*. New Horizons for Learning. WA: USA.

Caine, R. N., & Caine, G., (1994). *Making connections: Teaching and the human brain*. Menlo Park, CA: Innovative Learning Publications.

Chang, S., (2004). *A Brain-compatible vocabulary teaching strategy applied to underachieving students*. A Master's Thesis: Ming Chuan University.

Hart, L., (1999). *Human Brain and Human Learning*. WA: Books for Educators.

Jensen, E., (2000). *Brain-Based Learning*. Del Mar, Calif.: Turning Point Publishers.

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Jensen, E., (2005). *Teaching with the Brain in Mind*. Alexandria, Va.:
ASCD.

Lin, M., (2010). *The effects of whole language approach and brain-based
learning instruction on students' GEPT test performance*. A Master's
Thesis. National Yunlin University of Science and Technology. Taiwan,
Republic of China.

Marchese, T. J., (2002). *The new conversations about learning: Insights
from neuroscience and anthropology, cognitive science and workplace
studies*. New Horizons for Learning. WA: USA. Retrieved from
http://www.newhorizons.org/lifelong/higher_ed/marchese.htm

Nation, P., (2001). *Learning vocabulary in another language*. Cambridge
University Press.

Nemati, A., (2009). "Memory vocabulary learning strategies and long-term
retention." *International Journal of Vocational and Technical Education*
vol.1, no. 2, pp. 014-024.

Paivio, A., & Csapo, K., (1973). "Picture superiority in free recall:
Imagery or dual coding?", *Cognitive Psychology*, vol. 5, pp. 176-206.

Pikulski, J. and Templeton, S., (2004). *Teaching and developing
vocabulary; key to long-term reading success*. Houghton Mifflin
Company.

Read, J., (2000). *Assessing Vocabulary*. Cambridge University Press

Schmitt, N., (1997). "Vocabulary learning strategies", in Schmitt & M.
McCarthy (eds). *Vocabulary: Description, Acquisition and Pedagogy*.
Cambridge University Press, pp. 199-227.

Sokmen, A. J., (1997). "Current trends in teaching second language
vocabulary", in Schmitt & M. McCarthy (eds). *Vocabulary: Description,
Acquisition and Pedagogy*. Cambridge University Press.

Sprenger, M., (2005). *How to teach so students remember*. Alexandria,
VA: Association for Supervision and Curriculum Development (ASCD).

Sprenger, M., (1999). *Learning and Memory: the brain in action*. Alexandria, VA: Association for Supervision and Curriculum Development (ASCD).

Sousa, D., (2001). *How the brain learns: A classroom teacher's guide*. Thousand Oaks, CA: Corwin.

Tompkins, A. W., (2007). *Brain-Based Learning Theory: An Online Course Design Model*. Doctoral Dissertation. Liberty University. VA: USA.

Willis, J., (2008). *Teaching the Brain to Read. Strategies for Improving Fluency, Vocabulary, and Comprehension*. Alexandria, VA: ASCD.

Wolfe, P., (2001). *Brain matters: Translating research into classroom practice*. Alexandria, VA: Association for Supervision and Curriculum Development.

Zimmerman, C., (1997). "Do reading and interactive vocabulary instruction make a difference? An empirical study", *TESOL Quarterly*, vol. 31, no. 1, pp. 121-40.