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**Article Title:** Implications of Brain-based Vocabulary Instruction in the Middle School ESL Classroom  
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**Abstract**

Many English language learners cannot accurately use, nor articulate, the literal or figurative meaning for vocabulary words over time. A lack of vocabulary skills causes difficulty for English language learners in both ESL and general education classes.

The English as a Second Language (ESL) middle school teacher in this study explicitly taught vocabulary using six brain-based instructional strategies. Over the course of twenty weeks, each unit’s focus vocabulary words were matched with three of the six strategies in order to provide students with targeted strategies for remembering the meaning of the word and using it in context. Weekly, students were tested and participated in reflection activities. Finally, students took a post-test and wrote a detailed reflection.

As a result, students demonstrated significant improvement from pre-test to post-tests. Students benefited greatly by regularly reflecting on their own learning; many made significant connections between how they learn and their test scores.
Implications of Brain-based Vocabulary Instruction in the Middle School ESL Classroom

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Introduction

For the last several years I have struggled with two philosophical questions related to teaching vocabulary to middle school ESL students; first, what is the best way to select vocabulary words for instruction, and second, what are the best strategies to use to help my students retain the meanings of the words over time? Knowing that I could not tackle both questions in one research project, I chose to focus on the second question. The problem is that many English language learners (ELLs) cannot accurately use, nor articulate, the literal or figurative meaning for vocabulary words over time. For the purpose of this study ‘over time’ shall be defined as longer than one semester. Furthermore, a lack of vocabulary skills causes difficulty for English language learners in both the ESL and general education classroom.

In order to further define specific steps to address the problem, I created a visual roadmap to organize my ideas (see appendix 1). As a strategy to address problem, two immediate priorities were identified; first, provide students with brain-based direct instruction of content and literature-based vocabulary words, and second, provide explicit feedback on students’ usage and articulation of meanings for select vocabulary words. Four immediate actions emerged as a way to address the first priority: teach students how to interpret and reword dictionary definitions, provide students with meanings and uses of multiple variations of the root word for each vocabulary word, model and practice using the vocabulary words in written and oral contexts, and explicitly teach and demonstrate how to use brain-based strategies for retention of meaning and usage of select vocabulary words over time. Additionally, and of equal importance, was to provide students with explicit feedback in three ways. First, feedback was given on student usage of select vocabulary words in written and oral contexts. Second, student generated meanings of select vocabulary words, both demonstrated during weekly vocabulary practice activities were analyzed and criticism was given. Finally, using an explicit set of criteria in the form of a rubric, vocabulary tests were carefully scored and further advice was provided.

As a plan to address the problem unfolded two main foci became apparent. First, students need to be able to accurately articulate meanings of select vocabulary words over time. Also, students need to accurately use select vocabulary words in context, in both written and oral situations, and retain these skills over time. The clarifying term ‘over time’ is significant as I have found that many of my students are able to learn the meanings of vocabulary words for tests, but are not able to subsequently use them or remember the meaning of them many months later.

Review of Literature
When tackling the problem of teaching vocabulary to English language learners, Wallace (2008) states “when teaching vocabulary, one of the first dilemmas faced by teachers of ELLs is what to teach.” While he was referring specifically to general education teachers, ESL teachers often struggle with the same dilemma. Research suggesting that “students must acquire sufficient vocabulary in order to read extensively, so there is a need for continued vocabulary development” made teaching vocabulary to English language learners a topic worthy to investigate (Wallace, 2008).

A critical understanding about second language acquisition must be understood before planning any vocabulary instruction for English language learners. Cummins (1984) describes two types of language required for students learning English: BICS, or basic interpersonal communication skills, and CALP, cognitive academic language proficiency. Even though our program model services beginner through advanced students, most of our students acquire BICS within several months of attendance in our school. However, I am primarily focused on teaching my students the language they need to be successful in all of their core classes, CALP, which can take seven to ten years to fully acquire (Cummins, 2000). In addition to teaching the meaning of each new vocabulary word, Wallace (2008) confirms that teaching students explicitly how to use context clues, morphological analysis, and cognates are critical components to well-rounded vocabulary instruction.

One area in which researchers tend to agree is the direct link between reading comprehension and vocabulary (McLaughlin, August, & Snow, 2000). Stahl and Fairbanks assert “vocabulary knowledge has been identified as the most important indicator of oral language proficiency, which is particularly important for comprehension of both spoken and written language” (1986). In fact, many researchers contend that in order to comprehend what is read, students must have a sufficient quantity of acquired vocabulary (Wallace, 2008). McLaughlin, August, & Snow assert that vocabulary knowledge is a crucial factor for academic success (2000). Furthermore, Tran (2007) points to the idea that, unfortunately, “English language learners face insufficient class time for vocabulary growth and insufficient knowledge of vocabulary for reading comprehension.” My students spend approximately eighty percent of their school day in mainstream, general education classes. On average, teachers often do not spend a sufficient amount of time needed for ELLs to fully grasp the meaning of the content area vocabulary words for their classes. That responsibility then falls on the ESL teacher. Usually, this content area vocabulary is not that of daily conversation, and it represents highly abstract concepts, requiring students to ‘read between the lines’, creating a huge linguistic burden for the student (Brown, 2007).

**Participants**

The predominantly upper middle class, Bloomfield Hills School District, located in Oakland County is ethnically, culturally, linguistically and religiously diverse. Unique characteristics of West Hills Middle School include the magnet ESL Newcomer Program, the IBO Middle Years Programme, and a population of students in fourth through eighth grade who represent over 70 written and spoken languages.
This research study focuses on English language learners in grades six through eight currently receiving ESL services one or more class periods per day. Students with language proficiency levels beginner through advanced were included in the study. Only twenty five percent of the study group is male; seventy five percent of the study group is female. Students represent seven languages: German, Italian, Chinese, Thai, Portuguese, Arabic, and Telugu. In addition to learning English, seventy five percent of the study group is also learning an additional language, either French or Spanish.

Method

First, a review of the literature available regarding English language learners and vocabulary instruction was conducted. As a result of the review, it was determined that a quasi-experimental study needed to be performed. The study would look at the implications of using brain-based strategies during vocabulary instruction to English language learners. Ultimately, from the work of Marcia Tate (2003) and Robert Marzano (2001), six brain-based instructional strategies were selected: setting objectives and providing feedback, identifying similarities and differences, visualization and guided imagery, movement, mnemonic devices, and cues, questions and advance organizers. Modeling the Marzano strategy setting objectives and providing feedback, the unit objective “students will be able to give the meaning of our vocabulary words and use them correctly in sentences, now and over time, both in writing and when speaking” was posted in the classroom and reviewed daily.

Before introducing the unit vocabulary words a comprehensive pre-test was given. The pre-test consisted of four sections: word meaning, using the word in context, creating sentences with words, and writing multiple meanings of select words. To reduce anxiety, the students understand that they should try their hardest, though ultimately, the pre-test would be scored, but not graded.

The six brain-based strategies were explicitly taught. A banner listing each strategy was posted on our white board and referred to each day as we reviewed the unit vocabulary words. Each of the unit’s twenty focus vocabulary words were matched with three of the six strategies in order to provide students with targeted strategies for remembering the meaning of the word and using it in context. All words were matched with setting objectives and providing feedback and cues, questions and advance organizers. Each word was then also matched with one of the other six strategies. See appendix two for a chart displaying twenty focus words matched to strategies.

While ten new vocabulary words were introduced each week, we focused on using and remembering one to four focus words for each weekly vocabulary test. Over the eight weeks of the unit, a total of twenty focus words were introduced, learned, and assessed. Although students were exposed to a wide breadth of words throughout the course of the unit, a limited number of focus words for the unit were chosen, as the focus on acquisition of vocabulary was about depth over breadth. According to Wallace (2008), it is important that ELLs have an opportunity to review and reinforce skills in their second
language; consequently, all previously introduced and new unit focus words were reviewed daily. As students worked through practice activities using the words each week, they were provided with individual explicit feedback including suggestions on writing more clear and concise definitions and creating more meaningful context for using the words in sentences. At the end of each week, students were tested on the meaning and usage of all new and previously introduced focus words.

**Testing and reflecting**

Upon grading and providing explicit feedback, students were given back each week’s test and were asked to write a reflection (see appendix 3). The reflection asked students to answer six questions and contained a combination of Likert scale, forced choice, and short answer responses. Using a rating scale of one (lowest) to five (highest), students were asked to indicate their response to “I am happy with my score on this test” and “I studied hard for this test”. Forced to choose among the six brain-based strategies, students were asked which strategy(ies) helped them the most and to explain why. Short answer questions included: “How did I study? Be specific. What did you actually do?” and “What will I do differently next week? Be specific.”

In addition to the weekly written reflection, students kept a unit reflection graph in which they plotted their responses to the Likert scale questions from the weekly reflections. Initially, the graph was intended to show students how their ‘happiness’ score was directly related to their score for how hard they studied for the test. However, the graph became a powerful discussion tool. Students identified the upper six boxes of the graph as the area where they wanted to plot their data. This ‘upper six’ portion of the graph is where a student would score above a ninety percent and a happiness score of four or above (out of five). Students discussed with each other their feelings about plotting data both in and out of the ‘upper six’. Reflecting and graphing led to a great deal of thinking about their learning, and they were introduced to the idea of meta-cognition, or thinking about your own thinking.

Moreover, students took a post-test and wrote a detailed post unit reflection. The post-test was identical to the pre-test, consisting of four sections. Again, students were provided with explicit feedback and reflected on their test scores. Modifying the post-unit reflection only slightly, the question “What will I do differently next week? Be specific” was removed. The short answer questions “What suggestions do you have for Mrs. Toohey to help you learn vocabulary better? How can Mrs. Toohey help you remember the meaning of words over time?” and “Is there anything else you want Mrs. Toohey to know?” were added (see appendix 4).

Furthermore, the data showed that students had very similar quarter two and quarter three vocabulary test averages. Subsequently, the following hypothesis emerged “students will have better retention of the meaning of the quarter three (intervention) words over time.” To demonstrate this, students were tested with a sample of twenty quarter two vocabulary words ten weeks after quarter two ended; next, students were tested with the twenty quarter three words ten weeks after quarter three ended; finally, a comparison of the results was analyzed and conclusions were drawn based on that data.
The class was led in a group reflection by asking students to THINK-PAIR-SHARE and answer the following questions: “Why do you think we had better retention of the quarter three words?” and “Specifically, what did we do differently during quarter three that had the most impact on your ability to retain the meaning of the vocabulary words?” Students recorded their answers in their learning journals and their answers were used in conjunction with their test scores in analyzing the data.

Finally, students responded to the following questions “To what extent did the use of the six brain-based strategies improve your ability to remember the meanings of the vocabulary words?” and “To what extent did reviewing all of the vocabulary words each week improve your ability to remember the meanings of the vocabulary words?” Next, students created a pie chart prioritizing their answers. Then, they compared both the ‘priority pie’ (Sagor, 2005) from the first activity and the ‘priority pie’ from the second activity. Lastly, they wrote a short narrative explaining their learning and documenting any ‘ah ha’ moments.

**Results**

Students demonstrated significant improvement from the pre-test to the post-test. Indicating mastery of the unit vocabulary words on the post-test, students achieved an average of ninety three percent. Quarter two (pre-intervention) and quarter three (post-intervention) vocabulary test averages were relatively similar. Students stated that they benefited greatly by regularly reflecting on their own learning; many made significant connections between how they learn and their test scores. Students wrote about which strategies helped them the most and why; they participated in small group discussions of their learning which engaged them in meta-cognition.

After comparing the ten week post test scores for quarter two and quarter three, there were notable improvements across the board for all students tested. The average test score for students tested ten weeks after the second quarter was seventeen percent. After implementing the intervention, the post-ten week test score was seventy four-percent. This represents an average gain per pupil of fifty-seven percent.

**Discussion**

Students were required to graph their responses to the weekly vocabulary test reflection for questions number one and three. The graph below shows the average of student responses to question one. The averages indicate that, overall, students felt happier with their test scores as the unit progressed. Eighty three percent of students rated their happiness with their test scores at a four or higher, where five is the highest possible value. I believe that the increase in happiness results from the fact that as they moved through the unit they became increasingly more skilled at using the six brain-based strategies for remembering and using the vocabulary words. After the first few weeks of reflecting and graphing, students were increasingly more engaged in the effort of writing meaningful reflections.
Similarly, the next graph shows the average of student responses to choice three “I studied hard for this test”. The averages indicate that, overall, students studied less as the unit progresses. Eighty three percent of students rated their effort on the tests at a three or above, where five is the highest possible value. However, their effort declined steadily over the course of the unit, with an average response of just over four in week four, to slightly less than three on the post-test. The decrease in students’ effort may result from the fact that as they moved through the unit, they became increasingly more confident using the six brain-based strategies in order to study for the tests. Thus, they presumed not to have studied as hard later in the unit.
Throughout the unit students graphed their answers to questions one and three from the weekly test reflections. As a class, we discussed the qualities an ideal graph would possess. We determined that ideally, students would like their effort and happiness to intersect in the upper six squares of the graph. Our rationale was that if students’ data was plotted in the ‘upper six’ then their test score was between ninety and one hundred percent and their happiness was between and four and a five. The graph below illustrates the frequency with which each student plotted weekly data in the ‘upper six.’

As could be expected, the graph below shows a great discrepancy between students’ scores on the pre-test and post-test for the unit. All twenty vocabulary words were included on both assessments, and both were identical.
Interestingly, the following graph depicts the average vocabulary test scores of the students for quarter two (pre-intervention) and quarter three (post-intervention). I expected to see that students would have significantly higher test score averages for third quarter. However, all students showed approximately the same average for test scores from each quarter. This discovery led to questions raised for further investigation.
Perhaps the most interesting data gathered from the student reflections is illustrated in the following graph. Students were asked each week to select the strategies which helped them the most that week in studying for the test and to explain why they were helpful. Overwhelmingly, students selected *movement* as the most beneficial strategy. Remarkably, one student reflected that while she liked the strategy of *movement*, she seemed to only remember the movement, not the meaning associated with the word. This has great implications for using this strategy in the future. *Movement* should be partnered with an additional strategy so that the meaning of the word, as well as the movement with which it associated, is remembered.

The two strategies with the fewest responses are the two strategies that we used with every vocabulary word. Students may not have internalized the value of these two strategies because they see them as something they have to do when learning any new piece of information, not as a unique strategy for learning vocabulary. In other words, there is no novelty when *setting objectives and providing feedback or cues, questions, and advance organizers.*

Many students also indicated that they frequently used the strategy of *visualization and guided imagery* to remember the meaning and usage of vocabulary words. Upon reflection, students noted that making a mental image of a picture to represent the meaning of a word lasted with them longer than merely remembering the definition in isolation.

While *mnemonic devices* and *identifying similarities and differences* scored relatively low among strategies which helped students on the weekly student reflections, many students
indicated that these strategies indeed helped them. For example, one student responded, “I always like to find synonyms and antonyms for the vocabulary words, because that helps me understand better.” Another student wrote “I never used mnemonic devices before, but they really worked for me for a few of our words!” All six strategies were beneficial; it was necessary to provide multiple strategies for remembering meanings, as not all strategies work best for all words, or for all students.

One big surprise was when students were tested ten weeks after the end of the second quarter; they averaged only a seventeen percent. Immediately, I thought about how much time I have wasted over the years teaching vocabulary inadequately. Based on this score, I knew that I could expect an increase in retention of the meaning and usage of vocabulary words over time from students for whom brain-based strategies were used; mostly, because I couldn’t imagine my students doing any more poorly than seventeen percent. Thankfully, after analyzing and comparing data from the ten week post test scores for quarter two and quarter three, there were notable improvements in scores for all students. The following chart displays that while the average test score for students tested ten weeks after the second quarter was seventeen percent, the post-ten week test average for students after implementing the intervention was seventy-four percent. This represents an astonishing gain of fifty-seven percent.
Conclusion

In addition to implementing six brain-based teaching strategies, students also reviewed and were tested on all of the focus words each week throughout the unit. This idea of continuous improvement was not a part of the study design and could cloud the assumption that the brain based strategies were exclusively responsible for increasing retention of meaning and usage over time (Burgard, 2009).

It is evident that students’ retention of the meaning of vocabulary words improved as a result of altered instruction. With a combined pedagogical approach of continuous improvement and brain-based instructions, retention of vocabulary meaning dramatically increased over time in all students. It is advisable to use both methodologies concurrently to realize the maximum gains in student achievement.

References

Cummins, J. (2000). Academic language learning, transformative pedagogy and


**Appendices**

*Appendix 1*
Appendix 2

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<tr>
<th>Setting objectives &amp; providing feedback</th>
<th>Cues, questions, &amp; advance organizers</th>
<th>Identifying similarities &amp; differences</th>
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Appendix 3

My Name: ____________________________ Self-Reflection: Vocabulary Week:

1. I am happy with my score on this test.
   
   | 1 | 2 | 3 | 4 | 5 |
   | No!!! | I wish I studied | I could have done better. | There’s room for improvement. | YES! |

2. What will I do differently next week? Be specific. (short answer)

3. I studied hard for this test.
   
   | 1 | 2 | 3 | 4 | 5 |
   | Not at all | A little. | I could have done more. | With a little more effort I could have 100%. | I put in a lot of time. |


5. Which of the six strategies for learning vocabulary helped you the most and WHY?
- Setting objectives and providing feedback
- Cues, questions, and advance organizers
- Movement
- Identifying similarities and differences
- Mnemonic devices
- Visualization & guided imagery

6. What else do I need to be successful on my next vocabulary test?

Appendix 4

My Name: ____________________________ Self-Reflection: FINAL Vocabulary TEST

1. I am happy with my score on this test.

   1 2 3 4 5
   No!!! I wish I studied I could have There’s room YES!
   harder! done better. for improvement.

2. I studied hard for this test.

   1 2 3 4 5
   Not at all A little. I could have With a little more I put in a
   done more. effort I could have 100%. lot of
   time.


4. Which of the six strategies for learning vocabulary helped you the most THROUGHOUT the unit and WHY?

   - Setting objectives and providing feedback
   - Cues, questions, and advance organizers
   - Movement
   - Identifying similarities and differences
   - Mnemonic devices
   - Visualization & guided imagery
5. What suggestions do you have for Mrs. Toohey to help you learn vocabulary better? How can Mrs. Toohey help you remember the meaning of words over time?

6. Is there anything else you want Mrs. Toohey to know?