Enhancing Science Vocabulary through Active Learning Approach: Impact to Students' Performance

Frederick Obniala

Philippine Christian University, 1648 Taft Avenue, Malate, Manila, 1004, Metro Manila, Philippines
Contact e-mail: *ericobniala@gmail.com*

Abstract —This study investigate and assess the enhancing Science vocabulary through active learning and its impact to students' performance in Science at Marie Vithaya School, Nakhonratchasima, Thailand. The experimental method was used in documenting and assessing the Science vocabulary performance of the Grade six students. It was also experimental because it sought the discovery of the science vocabulary performance of the experimental group exposed to given intervention compared to the science vocabulary performance of the control group, which not given an intervening variable. The results of the study found out that the experimental group registered a higher mean difference of 2.85 compared to control group with mean difference of 0.79. Comparing the pretest and posttest of the both group, the experimental group have as significant change in scores after the intervention. The relationship between vocabulary performance and the demographic profile revealed no significant difference.
Keywords— Active Learning, Science Vocabulary, Students' Performance, Vocabulary Strategies.

I. INTRODUCTION

Science teaching strategies can develop context – based content knowledge along with language development and should promote active learning (Bonwell & Eson, 1991). Despite a regular use of English language both inside and outside the classroom setting, the students still encounter problems in the learning and they generally see unknown words as the first problem to overcome. This may because vocabulary has been recognized as crucial to language use in which insufficient vocabulary knowledge of the learner's led to difficulties in second language learning (Agsari& Mustapha, 2011). Additionally, mastering vocabulary is one of the most challenging tasks that any learners faces while acquiring another language (Nyikos& Fan, 2007). According to Dóczi (2001), vocabulary – learning strategies are significant because the acquisition of vocabulary is never – ending process and can solve insurmountable difficulties for language learners. Improving students' vocabulary is an area of urgent need if we are to develop the advanced literacy level required for success in school and beyond. Vocabulary is also in an area where teachers are ask for guidance on instructional approaches, strategies, and materials (Berne &Blachowicz, 2008). That digital tools and media are available in most schools that teachers could harness now to improve vocabulary learning tools that capture the interest of students and that provide scaffolds and context in which learn with and about words more profitably.

Statements of the Problems and Hypothesis

This study investigated and assessed the Enhancing Science Vocabulary through Active learning approach and its impacts to students' performance in Science Six at Marie Vithaya School, Nakhonratchasima Thailand. Specifically, it sought to answer the following questions.

1. What is the respondents' profile in terms of the following: (a) age; (b) gender; (c) students' academic achievement grades?
2. What is the performance of the control and experimental group in the pretest and posttest?
3. Is there a significant difference between the vocabulary performance level of the control and the experimental group in the pretest and posttest?
4. Is there any different level of proficiency between the control and the experimental group?
5. What is the vocabulary skill performance of the experimental group on terms of: (a) age; (b) gender; (c) students' academic achievement grades?

6. Is there a significant relationship between the vocabulary skills performance of the respondents in the experimental group and the respondents' profile in terms of: (a) age; (b) gender; (c) students' academic achievement grades?

This study has the following assumptions:

1. There is no significant difference between the science vocabulary performance level of the control level and the experimental group in the pretest.
2. There is no significant difference in the science vocabulary skills performance level of the control and experimental group in the pretest.
3. There is no significant difference in the science vocabulary skills performance level of the control group in the pretest and posttest.
4. There is no significant difference in the science vocabulary skills performance level of the experimental group in the pretest and posttest.
5. There is no significant relationship in the science vocabulary skills performance level of the respondents in the experimental group and the respondents profile in terms of age, gender and intelligence quotient.

Significance of the study
The purpose of this study explore an alternative and innovative technique, active learning strategy, for teaching vocabulary to increase the vocabulary skills of the Grade six students at Marie Vithaya School, develop their skills in order to apply the vocabulary in the context manner. Another objective of this study is to determine whether the students' attitude toward this innovative and alternative technique positively affected their learning process, specifically increase the vocabulary skills. For teacher includes activities that will develop vocabulary instruction in order to raise students' motivation, and interest to improve their vocabulary retention, and knowledge as important contribution in developing their skills in science. The study was conducted with one hundred and seventy students divided into groups: twenty – fours students in the experimental groups smaller that the control group with one hundred and forty – six students. The distribution of the students didn't depend on the researcher. It is a matter of academic registration process of each student.

II.   REVIEW OF LITERATURE
In the sphere of second language learning, vocabulary is an indispensable part of the flour language skill. Without vocabulary, the skill of language learning including reading, writing, speaking and listening may be not successfully achieved *(Zhi-liang, 2010)*. Mastery of vocabulary is very important for second language (L2) learners as vocabulary can support them when they communicate in the target language. They may, however, express their meaning with gestures and mere sounds. English vocabulary skill is considered a necessary skill that students studying at any level need to be equipped with, since so many textbooks and journals assigned to be read are written in English. According to *Baba (2009),* L2 learners are aware that their limited vocabulary will hinder a good quality of writing. They perceive the importance of vocabulary knowledge to their writing performance. When language learners are assigned to write composition, vocabulary is necessary tool for them to complete the task.

Vocabulary learning is one of the major challenges that foreign language learners face during the process of learning language" (Ghazal 2010. P.84). Further, it is a more complex process than simply memorizing the meaning of words because it encompasses seeing, hearing and using words in meaningful contexts *(Bintz, 2011; Daniels and Zemelman, 2004)*. In the context of English teaching in Thailand, some Thai EFL students are taught to repeat the English words spoken and memorize the words' spelling and meanings in a teaching method which seems to be passive *(Khuvasanond, Sildus, Hurford and Lipka, 2012)*. This may account for the inadequacy of vocabulary knowledge among some Thai primary, secondary students, which is then passed on through their tertiary – level education. However, there are other students who can tackle the vocabulary problems on their own. They seem to have sufficient vocabulary knowledge and are considered better English language.

Vocabulary Teaching Techniques in EFL Classrooms
Traditional techniques can be defined as the way that has been repeatedly used for a long time by teachers to present vocabulary without any significant change (Cambridge Dictionary, 2003), *some of these are the bilingual dictionary, word groupings and memorization of vocabularies.* It has been noticed that most of EFL teachers give less importance to vocabulary instruction, which aimed at supporting students along the language learning process. Learners can have access to different courses such as grammar, pronunciation, conversation and others; however, most of such courses are usually aimed at teaching vocabulary. Typically, students learn vocabulary when they are given word lists to learn them by heart. In summary, teachers might have the tendency to ignore the use of other techniques to deal with vocabulary instruction EFL classroom Oxford and

Crookail (1990) state that 'those techniques may be classified into four groups: *decontextualizing, semi – contextualizing, and adaptable.*" Each of them is summarized below:

Decontextualizing Techniques. In this case the word is removed completely for any communicative context to disable students remember and provide some notion about how a word is used as a part of language. Those decontextualizing techniques include word lists, flashcards and the use of bilingual dictionaries.

Semi – contextualizing techniques. These techniques in providing the context and linking words with others or word – sounds. In other cases, the context is more extra – linguistic such as visual imagery, physical response and physical sensation. Semi – contextualizing techniques include word or concept association, semantic mapping, words grouping, visual and aural imagery, physical response and sensation and keyword.

Fully contextualizing techniques. They refer to the use of new words totally fixed to the four skills of a language. Some of those techniques are related to reading and listening practice, speaking and writing practice.

Adaptable Technique. This technique is often used to reinforce any other technique previously mentioned. Those are some of the techniques that have been used to teach and learn vocabulary in both EFL/ESL classrooms until now. But among those techniques, the most commonly used in classrooms is the use of flashcards, a decontextualizing technique and memorization of vocabulary with the purpose of increasing vocabulary knowledge for the vocabulary skill *(Oxford and Crookall,1990; Shejbelová, 2006; Bocková, 2007)*.

Pictures and Vocabulary Teaching
The use of visual aids has traditionally helped teachers in foreign language classrooms. It is known a normal classroom is not a natural environment for learning a foreign or second language. So, teachers are required to use their creativity to build suitable and similar environment to resemble the real world of the language. Actually, pictures or flashcards become one of these useful aids *(Lheanacho, 1997)*. The use of pictures not only recreates the real world of the language, but it also provides fun to the class. Surprisingly, the use of these visual aids affects other aspects of the foreign language teaching positively as well. For example the fact of employing flashcards can help language educators to teach structure function, and at the same time activate all four-language skills. Thus, using visual aids reinforces the

language teaching and provides a different environment *(Bocková, 2007)*

Benefits of Visual Aids
There are some advantages of using aids in language teaching. First of all, they are a mean of motivation because they draw learners' attention easily. Second, they give a sense of context to the language. Also, the use of visual aids is suitable for any English level and age; however, it must be mentioned that it works better with beginners. Moreover, visual aids can be used in different ways in the classroom. For example, they can be stored easily. Also they are often free to get in any magazine or in the Internet, and they can be personalized. Finally, because of the nature of visual aids, students are always curious and pay more attention to what teachers are going to do with the pictures, for example, the ones that are displayed in a class. In summary, the use of this traditional technique has been a useful aid in language teaching *(Hutchens and Hutchens, 2010)*.

Choosing the Appropriate Vocabulary to Teach
Teachers have to select the vocabulary to teaching according to the level, the number of words and the students' need. According to Nation (2006) and Schmitt (2008) "learners need to know approximately 98 percent of the words in written or spoken discourse in order to understand the message well", and "students must learn a large number of words to become proficient in English, so teachers must help them learn as much vocabulary as possible." In this regard, teachers have to identify which vocabulary to teach and the quantity of words that students need to retain in every level of English they are supposed to teach. Interestingly, researchers agree with the fact that explicit vocabulary must be taught with basic and intermediate levels. Why? Because students in those levels do not have too much contact with the language (Nation, 2006). Schmitt (2008) states that " with true beginners it is probably necessary to explicitly teach all words until students have enough vocabulary to start making of use of unknown words they meet in context." So, teachers might select the words which frequent use is quite low but necessary.

Active learning, is a participatory form of educating students where teachers creates condition so that students can take charge of their own learning, moves the learners beyond the role of passive listeners and note –taker. Prince (2004) considers any instructional method that engages students in the learning process as active learning. Active learning includes a variety of teaching methods such as small group discussion, cooperative learning, role-playing, hands – on project, and teacher

driven questioning. Active learning calls for a combination of teaching approaches to stimulate learning in students with different learning styles, advocates learning techniques which include the visual, auditory and kinesthetic aspects of learning.

Simmons and DiStasi (2008), describe a learning activity that requires students to use variety of learning techniques to promote retention of large amount of information, and encourage greater social interaction through peer discussion.

Active learning as a Teaching Strategies
Teaching strategies that promote active learning have five common elements. These includes (1) student involvement beyond mere listening; (2) more emphasis on the development of skills and less on transmittal of information; (3) student involvement in higher thinking skills; (4) student involvement in activities such as reading, discussing and writing; and (5) an emphasis on student exploration of values and attitudes (*Bonwell and Eison, 1991).*

A recent study ethnographic study done in Japan where students were engaged in cooperative learning experience supports the benefits of active learning strategies in boosting content learning. The results of the study led to the author conclude that students who engaged in frequent cooperative learning experiences during classroom instruction increased their knowledge and attitudes about science (*House, 2008*). Engagement is inseparable from empowerment. When students had to reflect on learning processes and while learning the deeper meaning of science concepts.

A study by *Yazedijian and Kolkhurst (2007),* discussed how anonymity is nurtured in typical lectures classes, as students are not encouraged to interact and get to know each other as well as the instructor. These authors attempted to use small group activities to promote rapport during their lecture classes, examining how students felt about the effectiveness of small group activities to promote active learning in large lecture class. They concluded that all instructors ought to implement similar activities in their classrooms.

III. METHOD

Research Design
The experimental method will be used in documenting and assessing the science vocabulary performance of the Marie Vithaya School Grade Six students. It is experimental because it will seek to discover the science vocabulary performance of the uncontrolled group exposed to a given intervention compared to the science vocabulary performance of the uncontrolled group, which

will not be given an intervening variable. Moreover, this experimental method will be used to assess whether there is a significant difference between the performances of the students after the implementation of the strategy.

Further, more this study is quantitative. The quantitative part of the study includes the scores of the experimental and control groups in the pretest and post specifically; the scores of the experimental group will correlate with their profile.

Sampling and Sampling Techniques
This study will focus on the Grade six students only with the total population of 170. Universal sampling method will be used to get the total number of the responded. The researcher is currently teaching the students in Grade six. With this set – up, the researchers' direct contact towards the respondents will make the study a successful one. Data gathering can be easily done and direct observations towards the respondents can be achieved too

Respondents of the Study
This study focus on Grade six students only with a total population of 170. Universal Sampling method was used to get the number of respondents. These students have only one section.

Instrumentation
This study will use a researcher pretest – posttest science vocabulary assessment. This pretest – posttest science vocabulary assessment has four parts: Part 1 will elicit the profile of the respondents; Part 2 will be multiple – choice test; Part 3 will be a matching type's test where pictures will be given and the students need to spell the words.

Part 1 of the science vocabulary test will be a multiple – choice test where the respondents will be asked to encircle the word that corresponds to the meaning. There will be 20 test items in this part. In each number there will be four choices. The respondents will be asked to encircle the word, which they think has the correct answer.

Part 2 of the science vocabulary test will be matching type test. There will be 10 items. The researcher will read the sentences ad after that, the researcher will the word that the respondents are going to spell in written form.

Part 3 of the science vocabulary test will be another matching type test. The researcher will dictate a word the respondents will be asked to spell the word in written form. There will be 20 items in this part.

Data Gathering Procedure
Before the researcher will conduct the study, the researcher will seek permission and approval from the School Director both to conduct a study in the school under his administration and to use the school as the

locale of the study. Upon approval of the request by the School Director, the researcher further will further ask for approval and permission from the Thai class adviser to conduct a study using her students as the research respondents.

Since this is an experimental study, it calls for an experimental group and a control group. To determine who will go to each group, the previous achievement grades of the students was gathered from the Academic Year 2015 – 2016.

After determining and categorizing the previous achievement of each student, the student's achievement grades of the respondents will be matched. The researcher in the experimental group and in the control group will equally distribute the number of respondents who have high achievement grades, mid achievement grades, and low achievement grades.

These two groups will be subjected to pre-test and post-test procedure. The scores from the pre-test and post-test will be collected and will be recorded by the researcher. The data gathering was dome during the month of June to August 2015.

Statistical Analysis of Data
Gathered data will be classified, tallied, and tabulated and will be subjected to quantitative analysis. The statistical tools to be used in the study will be descriptive statistics, such as mean, frequency count, and percentage. This study will also use inferential statistics, such as Pearson Product Moment Correlation Coefficient and t-test for related samples and unrelated samples. The tabulated data will be presented together with the description in the discussion.

For the first problem of the study, mean, frequency count, and percentage will be used to determine the number and percentage of respondents' profile in terms of gender and achievement grades.

Meanwhile, the second problem of the study will be answered through the use of mean to determine the science vocabulary performance of the controlled group.

The scores of the controlled group in the post-test will be collected and will be subjected to mean. Also, the scores of the uncontrolled group will be collected and will be subjected to mean. Mean will be used to determine whether the science vocabulary performance of the controlled group is higher than the vocabulary performance of the uncontrolled group.

Furthermore, the third problem of the study will be answered using t-test. This statistical tool will be used to determine whether or not there is significant difference between the spelling performances of the controlled group and the uncontrolled group in the pretest and posttest.

The fourth problem will be answered using t-test. Moreover, this statistical tool will be used to assess if there is significant difference in the vocabulary performance of each group in the pretest and posttest.

The fifth problem will be answered using mean to determine the spelling performance of the respondents in the controlled group according to their age, gender, and achievement grades.

Finally, the last problem of the study will be answered through the use of correlation. To determine whether or not there is significant relationship between the vocabulary performance of the controlled group and their profile in terms of age, gender, and academic grades, the researcher will use Pearson Product Moment Correlation Coefficient.

In finding the Pearson Product Moment Correlation Coefficient and t-test, the statistician of this study will make use of SPSS 19.0 version.

IV. RESULTS AND DISCUSSION
Sub – problem no.1 what is the respondents' profile in terms of age, gender and students' academic achievement grades

Results revealed that 75% of the respondents for both the control and experimental group were aged 11 while 25% were aged 12. Table 1 shows the distribution of respondents according to age.

Table.1: Distribution of respondents in the uncontrolled and controlled group according to age

Age	Control Group		Experimental Group	
	Frequency	Percentage	Frequency	Percentage
11	24	75	18	75
12	8	25	6	25
Total	32	100	24	100

Along age, one can infer that the respondents of the control and experimental group are similar. Meanwhile, results have revealed that more than half of the respondents of the uncontrolled and controlled groups

were female. Table 2 shows the distribution of the respondents in the control and experimental group according to gender.

Table.2: Distribution of respondents in the uncontrolled and controlled group according to gender

Gender	Controlled Group		Experimental Group	
	Frequency	Percentage	Frequency	Percentage
Male	13	41	10	42
Female	19	59	14	58
Total	32	100	24	100

The control group has 1% more female respondents than the female respondents of the experimental group while the latter has 1% more male respondents than the male respondents of the uncontrolled group. This difference can be considered negligible. In that, along gender, one can infer again that the uncontrolled and controlled group are similar. On the other hand, result of the previous achievement revealed that both the control and experimental group are comparable. The table below shows the distribution of respondents according to achievement.

Table.3: Distribution of respondents in the uncontrolled and controlled group according to previous achievement

Previous Achievement	Control Group		Experimental Group	
	Frequency	Percentage	Frequency	Percentage
91-95	3	9	2	8
86-90	2	6	1	4
81-85	4	13	3	13
76-80	6	19	5	21
71-75	7	22	5	21
66-70	1	3		
61-65	5	16	5	21
56-60	2	6	2	8
51-55	2	6	1	4
Total	32	100	24	100

Noticeably, more than 50% of the respondents in both groups have previous achievement grade between 65-80. Similarly, more than 20% for both groups have achievement grade between 81-95 while 12% of the respondents in the both groups have previous achievement grade between 55-60. It can therefore be inferred that the both groups are normally distributed. As a whole, the demographic profile of the respondents in the control and experimental group revealed that these groups are comparable with each other.

Sub- problem No.2 What is the performance level of the control and experimental group in the pretest and posttest?

Results revealed that both the control and uncontrolled group have registered an increase in the respective means after the intervention. The control group registered a mean difference of 0.79 while the controlled group registered a mean difference of 2.85. Although it is remarkable that the mean difference of the experimental group is 2.06 higher than the mean difference of the control group. Along this line, given the all the intervening variables were controlled, it can be inferred that the intervention given to the controlled group is more effective than that of what was given to the control group. Although further, analysis was done to find out whether or not these difference in the means are significant or not in the later part of the discussion of this study.

Sub – problem No. 3 Is there a significant difference between the vocabulary performance level of the control and the experimental group in the pretest and posttest

Pretest compared

The pretest revealed that both the control and experimental group is comparable with each other. The mean difference of the pretest scores between the control and experimental group was found to be 0.0564, which can be considered negligible. The comparability of the group was confirmed when the t-test for two independent samples was done. It was found that the absolute value of

the calculated t at p < 0.05 is smaller than the critical value, which is 0.0383 < 2.015. Statistically, this would mean that the means of the two groups are not significantly different, hence they are comparable. This further confirmed the comparability of the control and experimental group.

Sub- problem No. 4 Is there any different level of proficiency between the control and the experimental group?

T-test was done to compare the significant difference in the scores for both the uncontrolled and controlled group in the pretest and the posttest. In the uncontrolled group, the t-test to compare the means of the pretest and posttest revealed that at p < 0.05, the absolute value of the calculated t exceeds the critical value, which is 8.5339 > 1.98. Statistically, this shows a significant difference. Similarly, for the controlled group the t-test to compare the pretest and posttest scores revealed that at p < 0.05, the absolute value of the calculated t exceeds the critical value, which is 3.5518 > 2.069. Again, statistically, thus shows a significant difference.

Generally, with these t-test results, the uncontrolled and controlled group has registered a significant change in scores after the intervention.

Posttest compared
Meanwhile, the posttest score of the uncontrolled and controlled group were compared to prove that the intervention given to the controlled group was more effective. In the previous discussion, it was presented that the mean difference was found to be 2.0, which is a considerable difference. The t-test result to compare the posttest result of the uncontrolled and controlled group revealed that that at p < 0.05, the calculated t exceeds the critical value, which is 4.2693 > 1.976. Statistically, the means of the two groups were found to be significantly different. This implies that the intervention to improve the vocabulary performance introduced to the controlled group is effective.

Sub – problem No.5 What is the vocabulary skills performance of the experimental group in terms of age, gender and students' academic achievement grades?

In the pretest, it was shown that the mean for scores of aged 11 is 22.89. That is 0.39 higher than those of aged 12, which registered a mean of 22.50. Meanwhile, the posttest resulted a mean difference of 0.44 higher for those aged 12 as compared to aged 11. This confirms the

finding of studies that revealed that more mature students a capable of learning more than those of the less mature ones.

Remarkably, in this study, the males out-performed the females. In the pretest, the males registered a mean difference of 1.73 higher than the females. Similarly, the posttest registered a mean difference of 0.69 higher than the females. This then refute a number of studies conducted on the past revealing that females perform better in vocabulary and language-related lessons than the males.

Generally, students with higher previous achievement were expected to have higher scores for both the pretest and the posttest. Although for this study, it was found that generally the trend was similar except for those respondents who belong to the middle achievement group (71-80) who registered a remarkably higher mean. The data is not enough to draw a conclusion along this difference. Hence, another study maybe done to find out the reason and conclusiveness of this findings.

Sub – problem 6 Is there a significant relationship between the vocabulary skills and performance of the respondents in the experimental group and the respondents' profile in terms of age, gender and students' academic achievement grades.

Two tests were performed to find out the relationship that exists between the vocabulary performance and demographic profile of the respondents. These include the Spearman rho and Pearson moment correlation.

Age and vocabulary performance
Using the Spearman rho correlation, it was found that the value of R is 0.19184 and the two-tailed value of P is 0.4457. By normal standards, the association between the two variables cannot be considered statistically significant.

Similarly, the Pearson moment correlation resulted a calculated value of R, which is 0.0811. Although technically it is a positive correlation, the relationship between these two variables is very weak. The nearer the value to zero, the weaker is the relationship.

Gender and vocabulary performance
Using the Spearman rho correlation, it was found that the value of R is -0.29155 and the two-tailed value of P is 0.31184. By normal standards, the association between the two variables cannot be considered statistically significant.

Similarly, the Pearson moment correlation resulted a calculated value of R, which is -0.2921. Although

technically it is a negative correlation, the relationship between these two variables is very weak. The nearer the value to zero, the weaker is the relationship.

V. CONCLUSION

This thesis presents a work that has been done to enhance student's performance in science vocabulary through active learning approach. It is claimed that science is all around us, influenced by human uncertainties, judgments, values, and interests. It's important that we emphasize the human side of science. Science is creative and science is tentative, which means that scientists recognize that we understand things based on current research. Just think how our understanding of the world has changed as a result of the invention of telescopes or microscopes. Also applications of different approach in active learning such as inquiry – based instruction have clear significant potential advantages for science education, by modeling scientific inquiry during concept learning.

As a conclusion a designed instructional units, sound active – engagement lessons, a good teaching are as important as whether lessons are cast as inquiry or direct, *Cobren (2008)*. It can also help to enhance the students' aspects when it comes to the student performance toward learning science.

Their enthusiasm can be evidently shows. *Bonwell and Eison (1991)*, summarize the literature on active learning ad conclude that it leads to better students attitudes and improvements in students' thinking and writing. They also cited evidence from *McKeachie, et.al (1987)*, that discussion, one form of active learning, surpasses traditional lectures for retention of material, motivating students for further study and developing thinking skills.

The researcher believes, that the findings in this thesis can have a good impact on the school. Attention needs to be given to supporting science learning to produce the required higher points especially in taken the national test of every Prathom six students. What is need now is to have a clear plan, to coordinate activities, and to develop teaching approach accompanied with follow- ups for student and teachers.

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