English Language Proficiency and Stem Strands Achievement of Senior High School Students

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Abstract — Using the descriptive-qualitative research design, this study aimed to determine the relationship between the English proficiency and achievement level of the thirty grade twelve students enrolled in STEM strands of San Pablo National High School. It also aimed to investigate the factors reducing their English proficiency. Frequency distribution and Pearson's r correlation coefficient were the statistical tools used to treat the data. Findings reveal that half of the students have English proficiency belonging to Very Satisfactory level. Also, less than half of the students have achievement level belonging to the Proficient Level. Meanwhile, low self- esteem, lack of exposure, parents' low educational attainment, and lack of motivation were identified as factors that reduce their language proficiency. Results further reveal that there is a significant relationship between the students' English language proficiency and their achievement in STEM Strands.

Keywords — achievement level, English language proficiency, lack of motivation, low self-esteem, STEM strands

I. Introduction

The importance of English language for enhancing educational attainment through improved use of rules and conventions which are used to explore and communicate meaning can never be overemphasized. Students who hardly comprehend the English language may not perform well not only in English subject but also in other subjects taught in English such as Science, Technology, and Mathematics strands.

Relative to the said claim, Fakeye and Ogunsiji (2009) believed that a person who does not know English, which includes knowing specialized vocabulary; interpreting scientific symbols and diagrams; recognizing and understanding organizational patterns common to science texts; inferring main ideas, using inductive and deductive reasoning skills; and recognizing cause-and-effect relationships may not understand the known scientific and technological discoveries that are predominantly written in English. Hence, in order to understand Science, Technology, and Mathematics, learners need to have profound mastery of language skills.

Linking the English language proficiency and STEM strands achievement, Racca and Lasaten (2016) concurred that language proficiency is a key to academic performance. A person who has poor language and communication skills, poor techniques of answering questions and the lack of in-depth treatment of topics may have low functional understanding of science for general education purposes.

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According to Maleki and Zangani (2007), students who have difficulties comprehending the lessons and concepts of subjects presented in the English language may negatively affect their academic performance. Also, Tseng et al. (2018), said that while few in numbers, most of the works in the literature focused on identifying misalignments of learning outcomes and perception of stakeholders. Even if related literature upholds that the achievement level of students may serve as basis in measuring the successful implementation of an educational program, none of the works presented the performance of the K to 12 students.

Since the 18th century, researchers have paid much attention to defining and assessing language proficiency because of its exceptional role in shaping the national economy and enhancing global organizations' competitive advantages (Lukmani, 1972)

However, Bialystok (1994) explained that in a broader context, the evaluation of proficiency is not limited only to the content of a particular curriculum taught or learned but also the ability to use language in life-like situations in a manner acceptable to native speakers of the language in a spontaneous interaction and non-rehearsed context. Hence, someone who is proficient in the English language has the ability to accurately transfer meaning in comprehension.

Meanwhile, according to the BEI report in 2012,Philippines was tagged as the world's best country in business English proficiency which attained a score of above 7.0 for two consecutive years, indicating its ability to lead business discussions and perform complex tasks.

Contrary to this report, results of the 2018 NAT for Grade 12 in Region 02 showed a very low performance of senior high school students. Information Literacy among students posted the highest mean while Critical Thinking posted the lowest mean. Likewise, results of 2018 NAT for Grade 10 indicate that problem solving skills among students posted the highest mean while critical thinking skills registered the lowest mean. Overall, the region was not able to surpass 75% level of proficiency and accuracy in all subject areas for Grades 10 and 12 as exhibited in the results of the 21st Century Skills.

For the first time, the Philippines joined in Program for International Student Assessment (PISA) 2018 with the main objective of assessing the quality of instruction in the country in provision of its quest to globalization of educational standards (DepEd, 2019). Nevertheless, it was revealed in the recent 2018 PISA result that was released in December 2019 the dismal performance of the country in terms of mathematics and scientific literacy. The Philippines ranked last among 79 joining countries in literacy in reading and second from the bottom in literacy in mathematics and science (OECD, 2019).

According to Chen (2013), several researches revealed that STEM majors were academically prepared especially in mathematics and science test scores, were successful when it comes to GPA, and persistent in earning a STEM degree.

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On the other hand, Anito et al. (2019) argued that in the Philippines, STEM graduates are insufficient; hence, the country does not have sufficient scientists. He added that the Philippines only has 189 scientists per million which is very low compared to the UNESCO recommendation which is 380 per million and that this may be attributed to the low graduates of STEM-related careers.

Teachers are always confused on the factors that affect the students' achievement in Science, Technology, Engineering, and Mathematics. This observation relative to English language proficiency and academic performance prompted the researcher to conduct this study. Particularly, this research attempts to assess the relationship of language proficiency to the achievement level of the Grade 12 students in Science, Technology, Engineering, and Mathematics, and to investigate the factors inhibiting or reducing their language skills.

The findings of the study can provide a database that can be used as a tangible reference for more meaningful educational services. It could lead to a greater recognition of the importance of stressing English proficiency among students, teachers, curriculum planners and administrators.

Statement of the Problem

This study aimed to assess the English language proficiency and the achievement of senior high school students in STEM strands. Specifically, it sought to answer the following:

1. What is the level of English proficiency of the respondents?
2. What is the achievement level of the students enrolled in STEM?
3. What are the factors reducing students' language proficiency?
4. Is there a relationship between the students' English proficiency and their achievement in STEM strands?

Scope and Delimitation

This study focused on assessing English language proficiency and achievement of senior high school students in STEM strands. It also determined the relationship between the English language proficiency and their achievement in STEM strands, and the factors reducing their language proficiency.

Moreover, the respondents of the study were the 30 Grade 12 students of a respondent National High School during the academic year 2021-2022.

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II. Methodology

Research Design

The quantitative-descriptive research approach was used to assess the English language proficiency and the achievement of senior high school students in STEM strands. Also, it was used to determine the relationship between their English language proficiency and achievement in STEM strands for the school year 2021-2022.

Meanwhile, this study employed which matches with the aim of the present study that is the in- depth investigation of the factors reducing students' language proficiency. Interview consisted of open- ended questions aiming to enable participants to relieve the experiences that they have had in their minds and describe them in detail which leads to discovery of common essence.

Research Participants

A total of 30 Grade 12 students under STEM strands of San Pablo National High School was involved in the study. The rationale behind choosing these specific students for sampling is that they already took the English for Academic and Professional Purposes during the first semester of the academic year 2021-2022. Also, the researcher believes that after some exposure on Oral Communication and Reading and Writing during Grade 11, they have developed a repertoire of experiences and can start expressing the impact of these experiences on their language proficiency.

Research Instrument

English Proficiency Test

A 60-item test encompassing a comprehensive range of questions on writing and speaking skills was administered to measure the level of proficiency of the senior high school students in English. The items were based on the Least Mastered Competencies which were identified using the Item Analysis. Afterwhich, the items were content validated by language experts and were pre-tested to grade 12 students of the respondent high school to ensure its reliability. To ensure its validity, an Item Analysis and a Table of Specification were prepared.

Achievement Level

The students' General Weighted Average during the first semester was used to determine their achievement level in STEM strands.

Interview Tool

This study made use of a researcher-made interview tool consisting of 4 questions to have an in- depth investigation of experiences and perceptions of the senior high school students in their

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language learning, which led to the discovery of the factors reducing their language proficiency. In order to ensure validity and reliability, the suggestions and strategies provided by Merriam (2004), Seidman (2006), Saldana (2011) and Creswell (2009) were taken into consideration. Therefore, before conducting the interview, a demo interview was conducted to Grade 12 students of the respondent high school to test whether what is intended to be collected can be obtained with the interview tools. The 10 volunteering participants for this study provided feedback on the clarity of the questions. On the other hand, to ensure its reliability, the researcher solicited feedback on the emerging findings from the 10 volunteering participants that she interviewed by taking the preliminary analysis back to the participants and asked whether the interpretation sounds true.

Statistical Tools

This study made use of descriptive research design. Data were analyzed using frequency count, mean, and standard deviation for the first two research questions. Specifically, the following 5 point-Likert Scale was used to analyse the students' level of English Proficiency:

Range of Scores	Level of English Language Proficiency
49-60	Excellent
37-48	Very Satisfactory
25-36	Satisfactory
13-24	Fair
0-12	Poor

To describe the achievement level of the students, the following five levels of proficiency under DepEd Order No. 31, were identified:

Grades	Description
90% and higher	Advanced
85%-89%	Proficient
80%-84%	Approaching Proficiency
75%-79%	Developing
74% and below	Beginning

The transcripts were read and different categories, patterns, and codes were identified to interpret and organize the data. A simultaneous comparison of all units of meaning obtained and negative case analysis and discrepant data analysis, involving the identification of data that are negative or discrepant from the main body of data collected, were adopted. In addition to qualitative-theme based analysis, the number of each participant's answers was counted to calculate the percentages of answers in each theme/ category.

Meanwhile, Pearson's r correlation coefficient was used to determine the relationship between the English language proficiency and achievement of the senior high school students in

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STEM strands. In the test of hypotheses, the level of significance was set at the .05 probability level.

Data Gathering Procedure

Permission was sought from the assistant school principal to float the online test and to conduct the interview to grade 12 students of the respondent high school. After which, an orientation was conducted to class adviser, subject teacher in English, and students. The researcher then floated the test using Google Forms and conducted the online interview individually, using a semi-structured interview protocol, on an appointment basis. The general strategy for the interview was to start off with demographic questions and then broad questions which were followed up on the interviewee's responses, to capture his or her meanings. Each participant approximately took 15-20 minutes.

III. Results and Discussion

Mean Scores of Students in the 60-Item English Test

One of the concerns of the study is to determine and describe the level of English language proficiency of the Senior High School students based on their scores in the Achievement Test which tested students' skills in summarizing findings and executes the report through narrative and visual / graphic forms, paraphrasing/ explaining a text using one's own words, writing a précis or abstract/ summary of texts in the various disciplines, and defending a stand on an issue by resenting reasonable arguments supported by properly cited factual evidences. The data showing the level are presented in Table 1.

Table 1
English Proficiency Level of the Students Based on 60-Item Test

Range of Scores	**Level of English Language Proficiency**	***f***	**%**
49-60	Excellent	3	10%
37-48	Very Satisfactory	15	50%
25-36	Satisfactory	12	40%
	Total	30	100%
Mean=40.37 (Very Satisfactory)		Standard Deviation= 6.66	

It can be deduced from the table that majority (15 or 50%) of the students gained a Very Satisfactory Level of their language proficiency test with scores ranging from 37-48. Meanwhile, 12 students (40%) obtained a satisfactory level while 3 students attained an excellent level. Notably, none of the students belongs to the fair or the poor level. Importantly, the mean of the students' proficiency is 40.37.

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The result indicates that the students have above average English language proficiency level. This further implies that the students have typical skills in grammar, vocabulary and reading comprehension. Thus, the students have to be exposed to more reading and writing activities to further enhance their English language proficiency level.

Mean Grades of the Students in STEM Strands

Another concern of the study is to determine the achievement level of the senior high school students in STEM strands based on their general weighted average during the first semester.

Table 2
Achievement Level in STEM Strands of the Students Based on their General Weighted Average

Grades	**Descriptions**	***F***	**%**
90- and higher	Advanced	7	23.33%
85-89	Proficient	11	36.67%
80-84	Approaching Proficient	12	40%
		30	100%
Mean=86.23 (Proficient)		Standard Deviation= 4.57	

Table 2 shows the achievement level of the senior high school students in STEM strands in terms of their general weighted average. It reveals that 12 (40%) of the students belong to approaching proficiency level, 11 (36.67%) to proficient level, while 7 (23.33%) to advanced level. No one falls under developing or beginning levels. Further, the mean of the students' GWA is 86.23.

Factors that Reduce Language Proficiency of the Senior High School Students

Low Self- Esteem

Ten or 33.33 percent of the participants stated that the fear to be judged in using the English language results in not participating in any classroom discussion. There are always negative comments regarding the fluency and accuracy in using the structures of English. Below are some quotes from the participants:

Participant 13: "*The factors that reduce my language development are self-centeredness and toxic society. Self-centeredness hinders my language improvement in the sense that I do not want to be judged by the society, thus choosing not to participate in any discussion. However, there are instances also that the society itself blocks my language proficiency, as no matter how much I strive, unfair judgment is always on my way*."

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Participant 16: "*I believe that factors reducing language development is the refusal to practice English. In addition to this, is the judgemental people around us, for instance, if we are speaking English, they will laugh even there is nothing wrong with it. Hays*"

Lack of Exposure

Eight (26.67%) participants stated that the lack of exposure or social interaction with speakers of the target language reduces their language proficiency. This may be in the form of student-teacher interaction, interaction with friends, or interaction with Multimedia (Internet, social media, television, radio, Video games). Below are some quotes from the participants:

Participant 8: "*One great factor that really affects my language development is my peers because we used to speak with our L1 and it is very rare that we speak English*."

Participant 14: "*One of the variables that hinders language development is a lack of time for communicative activities. So, socialization and engagement with others are required*."

Lack of Motivation

Six (20%) participants mentioned that lack of motivation hinders their language learning. Below are some quotes from the participants:

Participant 2: "*One of the main factors of why my language development is reducing is the lack of motivation to maintain to learn the context of language consistently*."

Participant 9: "*Some factors that reduce my language development is my native language and my motivation to learn English."*

Parents' Low Educational Attainment

Six (20%) participants stated that such factor as parents' low educational attainment negatively affects language proficiency and school performance and outcomes at large. Below is a quoted statement from one of the participants:

Participant 11: "*Having a family history of language problems, having parents with low educational attainment always result to poor language development and low achievement level*."

Admission- Related Factor

The participants expressed that English as the medium of instruction in teaching Mathematics and Science improves the quality of learning which they can use in the college admission test. Below are some quotes from the participants:

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Participant 6: "*Sometimes we talk in English at home and I also love reading books that are written in English. In this way, I can develop my communication skills which I can use later during interview in college admission, particularly in BSEd- Mathematics*."

Participant 10: "*I feel that using English in teaching Mathematics and Science is good because it can enhance my knowledge about English and in the given subjects and it is also a universal language where everyone can speak and understand*."

Participant 12: "*I feel comfortable when teachers use English as medium in teaching major subjects such as Math and Science. Aside from there are terms which cannot be translated in local language, it is an opportunity for us, learners to improve our English usage*."

Relationship of Students' English Proficiency and Achievement Level

The study determined if the students' English language proficiency and their achievement level in STEM strands have significant relationship. The Pearson's r correlation coefficient has an r value of 0.87 which means that English Language Proficiency and Achievement Level have strong positive correlation. Thus, this indicates that the students with high English language proficiency tend to perform, as well, in other core, applied, and specialized subjects.

IV. Conclusion

Based on the findings, the study concludes that half of the Senior High School students have English language proficiency belonging to the very satisfactory level. Further, the study concludes that the students' achievement level based on their general weighted average fall under the proficient level. Meanwhile, the analysis of the interview revealed major themes on the factors reducing English proficiency of the students: low self- esteem; lack of exposure; parents' low educational attainment; and lack of motivation. Likewise, the study concludes that there is a significant relationship that exists between the students' English language proficiency and their achievement level in STEM Strands. The higher the English language proficiency levels of the students are the higher their achievement level in STEM strands. The study further concludes that students' English language proficiency could be a predictor in the students' academic performance in Science, Mathematics and English since the medium of instruction used in the teaching of the said subjects is English. Thus, English language program in school should be prioritized.

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V. Recommendations

In the light of the findings and conclusions, several recommendations are offered to English teachers, students, school administrators, curriculum designers and developers, and other research enthusiasts. The English teachers of the Department of Education should update themselves not only with new approaches, methods, strategies and techniques in English but also with current research studies in order to identify and address the teaching and learning issues and concerns in their classrooms and in the school. Meanwhile, students must understand the English language as a system and of the roles of its components so as to understand its demands on academic tasks and eventually gain skills to address the role of academic language in their learning. Also, school administrators need to ensure the vision of success becomes a reality for students by providing highly explicit and systematic instruction. Curriculum designers and developers, on the other hand, may require a systematic whole- school approach for effective learning and teaching of skills such as listening, speaking, reading and writing, by taking into consideration the result of the study. Lastly, it is recommended for further studies to include more than one district in order to have a larger sample size to validate the results and findings of the present study.

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