Self-efficacy, Study Habits and Teaching Strategies and Its Influence on Student Science Performance: A Cross-Sectional Study

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Abstract

The focus of this study was to determine the influence of self-efficacy, study habits, and teaching strategies to student performance in Science of the junior high school students. The study utilized the descriptive research design examining the relationship of self-efficacy, study habits, and teaching strategies to science performance across grade levels. The results revealed that the overall science performance of the 323 sample respondents from Grades 7 to 10 is satisfactory. Varied teaching strategies in teaching science were experienced about half of the lessons by the students. There was significant differences in student's performance in science and teaching strategies experienced among grade levels while no significant difference was found in the students' study habits and self-efficacy. The overall rating on the study habits of the students was moderately good, and among the three variables, only self-efficacy could significantly influence the academic performance in science of the Junior High School students. It is recommended that an in-depth study to qualitatively determine the relationship of variables studied in this research be done.

Keywords: Cross-sectional, science education, science performance, self-efficacy, study habits

Introduction

Science is frequently perceived to be of great importance because of its links to technology and industry which, from a national perspective, may be areas of high priority for development. The main goal of science education is to have a scientifically literate community (Altun-Yalçn, Açşli & Turgut, 2011; Chin, 2005; Ozdem, Cavas, Cavas, Cakiroglu, & Ertepinar, 2010). Moreover, Science is included as a core subject in the school curricula in elementary and secondary levels because of the need to achieve a degree of "scientific literacy" to enable students to participate effectively as

citizens in modern societies. Scientific literacy refers to the understanding of science that allows a person to actively participate in socio-scientific topics and to make informed and sound decisions on these issues, as well as the appreciation of processes, values, and ethics related to science (Dawson & Venville, 2009). Studies indicate, however, that many of the Filipino learners are not attaining functional literacy without which they find it too difficult to meet the challenges posed by the rapidly changing world (DepEd, 2002). This level of scientific literacy could be difficult to achieve when the performance of Filipino students in Science is poor. In 2003 results of Trends in International Mathematics and Science Study (TIMSS), the Philippines ranked second and third from the bottom (Gonzales et al., 2004). This highlights the need to understand the factors that affect performance in science and address it.

There are several factors that have been identified to account for the low performance in science of the Filipino students which include the lack of science culture and deficiencies regarding the school curriculum, the teaching-learning process, instructional materials and teacher training (Batomalaque, 2003; Japos & Hinay, 2010). In a different study, pupils' performance in science subjects was found to be significantly related to many factors and one of which is on students' self-confidence in learning science (Alivernini, Palmerio, Vinci, & Di Leo, 2010). In addition, students' positive attitudes toward science study and class environments were found to be highly influential to science performance (Imam, Mastura, Jamil, & Ismail, 2014b). Further, in China, positive attitudes towards science study were found to be solely influential to performance in science (Linghong, 2001). This highlights the importance of self-beliefs, positive attitude, and self-efficacy towards performance in science (Pisa, 2012; Rosen, 2008).

Meanwhile, study habits were also noted to affect performance of students. In the study in Nigeria, study habits' subscales of teacher consultation was the most influential while time allocation was the least influential to students' academic performance. This is supported by the Skills-deficit Model where it is believed that students with ineffective study habits have higher levels of test anxiety and poor performance in test (Numan & Hasan, 2017). Moreover, it has been argued that effective study habits are highly essential in order to avoid academic failure and ensure success in academic performance (Gettinger & Seibert, 2002). These highlights the effect of ineffective study habits towards academic performance of students.

In addition, teaching strategies employed by teachers also affect students' performance in science. As shown in multiple studies, teachers have profound effect on student learning and performance (Nye, Konstantopoulos, & Hedges, 2004; Rivkin, Hanushek, & Kain, 2005). Multiple studies have also shown that the type and quality of teaching strategies employed by teachers have differing effects towards students' performance in science.

One of these is a study which found significant difference on science performance between students exposed to inquiry-based learning and traditional teaching (Abdi, 2014). In addition, teaching strategies that is responsive to the multiple intelligences significantly affects the academic performance of students in science (Alí Abdi, Laei, & Ahmadyan, 2013).

The recent National Achievement Test of the fourth year students of school year 2014-2015 results show the low performance of students in Science in the Division of Cagayan de Oro City with a mean percentage score of (MPS) 41.33 along with Mathematics 41.26 far below the 75% mastery level. Moreover, in the comparative results for the past years of the National Achievement Tests (2012-2013, 37.50; 2013-2014, 40.49; 2014-2015, 41.33) Science has been the lowest in Mean Percentage Score (MPS) among other subjects and among the schools in the City, with Lapasan National High School as one of the low-performing schools in the National Achievement Test for the past three years. Moreover, students' science performance has been the focus of this study primarily because substantial data show the low performance of students in Science in the National Achievement Tests in the Philippines for the past ten years (Maligalig & Albert, 2008). In addition, NAT has been used to determine performance of both students and schools (Belizario, Totañes, de Leon, & Matias, 2014) and compare achievement gaps of public and private schools students in the Philippines (Bernardo, Ganotice, & King, 2015). Thus, this study aims to determine the influence of self-efficacy, study habits, and teaching strategies on science performance of the public secondary students of Lapasan National High School.

Conceptual Framework

Self-efficacy is defined as people's beliefs about their capabilities to produce selected levels of performance that exhibit influence over events that affect their lives (Bandura, 1977). It is having an intrinsic interest and having insightful immersion in activities that signify as to how the child perceives himself/herself and how he/she perceives something. Self-efficacy is shaped by four different factors: mastery experience, vicarious experience, verbal persuasion, and emotional arousal (Bandura, 1977). Mastery experiences comprise the most powerful source because these experiences provide authentic and personal evidence that a person can accomplish the desired task. Vicarious experiences are also influential because they involve the individual's observation of another person's performance and gaining confidence from that experience. Verbal persuasion, on the other hand, is provided by other individuals, which can influence a person's confidence either positively or negatively. Finally, emotional arousal, stress, anxiety, or general feelings about a given task can also influence one's belief in one's own effectiveness.

In education, self-efficacy means that the learners will be more likely to try, persevere, and be successful to a task (Cherry, 2018). However, if they

fail, there are two possible reasons- this may either be they lack the skills to succeed or because they have the skills but lack the sense of efficacy to use these skills. These beliefs on their capabilities are determinants of how people think, behave, and feel (Bandura, 1977). Moreover, self-efficacy takes a facilitator role in the process of cognitive engagement. By increasing the academic self-efficacy beliefs, the use of cognitive process and strategies also increase (Dunn, 2005). Several researches also indicated that science self-efficacy has a positive correlation to academic performance (Liu, Cho, & Schallert, 2006; Pisa, 2012; Rosen, 2008; Shen & Tam, 2008; Wang, Wu, & Huang, 2007). In other words, students will learn better if they believe that they are good at it in a productive way.

Another variable considered to affect academic performance in this study is study habit. Study habit is the pattern of behavior taken by students for their study which serves as the vehicle for learning (Crede & Kuncel, 2008). Study habit is also characterized by appropriate studying routines such as frequency of studying sessions, review of lessons and many others occurring in an environment that is conducive to learning depending on the degree to which the student engages in a regular basis of studying (Mendezabal, 2013). Moreover, a prescribed pattern of steady behavior can result into learning that then leads to the achievement of a learner's goal (Owusu-Acheaw & Larson, 2014).

The theory on connectionism indicates that learning is the result of associations forming between stimuli and responses that can be strengthened or weakened by the nature and frequency of the stimulus-response pairings which further supports the premise that study habits affect student performance (Donahoe, 1999; Plunkett & Sinha, 1992; Thorndike, 1920). Furthermore, connections become strengthened with practice and weakened when the practice is discontinued (Thorndike, 1927). Thus, a student who has regular and frequent study periods and follows certain patterns and methods prove to have a better performance as it is repeated forming "habits." This idea is supported by a recent study that revealed a high correlation between study habits and students' academic performance by examining the usefulness of imbibing study habit to students as a means of enhancing their academic performance suggesting that their academic performance can only be improved upon when students take in or cultivate proper study habits (Osa-Edoh & Alutu, 2012).

The last factor considered in this study is the teaching strategies employed by faculty members. There are two theories (constructivism and behaviorism) that have a large influence to the development and creation of teaching strategies used widely in education today. A teaching strategy is one of the important mechanisms that contribute to better academic performance of the students. Thus, teachers need to develop a repertoire of teaching strategies based on the differences in students' needs

and learning styles (Grant, 2008; Gray, 2009).

The behaviorist learning theory asserts that all students can learn the same information if provided with an appropriate environment. This places emphasis on the effects of external environment such as rewards and punishments in determining future behavior of students (Morrison, Ross, & Kemp, 2004). In addition, the theory gives attention on objectively observing behaviors which would consequently discount mental activities. As stipulated in the operant conditioning, behavior of students is a result of the students' response to external stimuli. In school setting, teachers use varied forms of positive and negative reinforcements embedded in their teaching strategy to improve interaction and learning (Weegar & Pacis, 2012). Teachers who practice this theory present their lesson objectives in a linear manner. This presentation provides hints or cues to guide students to a desired behavior, and then uses consequences to reinforce desired behavior. In addition, the linear way of presentation of lesson begins with lower-level cognitive skills then building up to higher-levels of cognitive skills. In terms of its impact on curriculum development, behaviorists view learning as a process that results from the connections made from stimuli-response relationship, and the desire to learn is assumed to be enforced by these relationships (Brandon & All, 2010).

In the constructivist learning theory, the teacher would engage the students in real-world, practical workshops in which they would demonstrate their knowledge through creativity and collaboration (Dewey, 1938). Furthermore, most constructivist theorists agree on two main principles: learners take an active role in the construction of their own knowledge; and social interactions are a significant part in the construction of knowledge (Woolfolk, 2016). Students are provided with opportunities to think for themselves and articulate their thoughts thus education becomes grounded in real experience. Moreover, learning must be a process of discovery where learners build their knowledge with the active dialogue between them and their teachers building on the former's existing knowledge (Bruner, 1961; Weibell, 2014). Using the constructivism theory, the teacher's role as a transmitter of knowledge shifts to a facilitator, and there is an open-ended evaluation of learning outcomes (Bransford, 2003; Bransford et al., 2005). Moreover, constructivist learning theorists use problem-solving and hands-on activities that require active participation that yields positive results for teachers and students (Rolle, 2012). Teachers who use constructivist theory concentrate on showing students relevance and meaningfulness in what they are learning.

The work on the social context of learning also supports the philosophy of constructivism (Vygotsky, 1978). Learning happens through social interaction since knowledge is socially embedded. In the meantime, every function in the child's cultural development appears twice: first, on the social level; and later, on the

individual level; between people (inter-psychological) and then inside the child (intra-psychological) (Vygotsky, 1962). The socio-cultural theory states that adults and peers as well as cultural beliefs and attitude influence or have an impact on how learning takes place in a child (Cherry, 2018). Therefore, teachers have a great role as to how learning takes place and the "culture" they create through the teaching strategies used.

Piaget (1955) also supported the philosophy of constructivism through his in-depth work on the concept of discovery driven from his views on the psychological development of children. The developmental theories developed by Piaget gives another viewpoint of the goal of constructivist theory, and that is to provide an ideal learning environment in which learners are given an opportunity to construct knowledge that is meaningful for them. Therefore, Piaget believed that to understand is to discover, or reconstruct by rediscovery, and such conditions must be encouraged in the future if individuals who are capable of production and creativity and not simply repetition, are to be formed.

Academic performance in science was used in this present study to refer to the average grade of students in the two grading quarters (first and second quarters). This practice of using average grades to report academic performance has been used in several literature reviewed. In a study on Australian students, self-efficacy was found to be correlated to the Grade Point Average (GPA) (McKenzie & Schweitzer, 2001) that supports the use of average grades to correlational studies on self-efficacy. In addition, GPA was also used as part of measure of academic performance in a study on academic stress and academic performance (Akgun & Ciarrochi, 2003). Moreover, term grades were also used to represent academic performance in the study of self-efficacy and self-concept as predictors of academic performance (Choi, 2005).

Given the conceptions of different scholars, experts and practitioners in the field of education regarding the various factors (student's self-efficacy in science, study habits, and teacher's teaching strategies), this study assumed that these factors influence student science performance in Lapasan National High School.

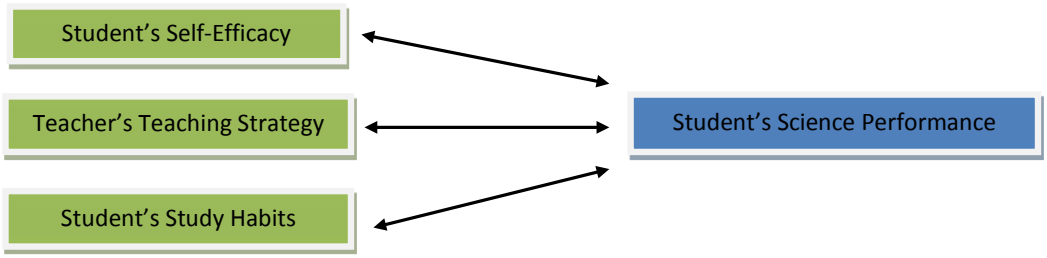

Figure 1. Schematic representation of the variables considered in the study.

Research Objectives

This study aimed to determine the influence of various factors on student's science performance in Lapasan National High School. Specifically, this study sought to:

1. determine the students' performance in their science class during the first and second quarter of the current school year;
2. determine how students assess the strategies used by the teachers in teaching science;
3. determine the study habits of students in science;
4. assess students' self-efficacy in science;
5. determine whether there is difference in science performance, teaching strategies, self-efficacy, and study habits of students when grouped by grade level; and
6. determine whether there is a relationship between the independent variables and science performance.

Research Methodology

The study utilized the descriptive survey design in determining the answers to the research problem. It is considered the most appropriate research design considering that the purpose is to establish the situation of the research setting regarding conditions, practices beliefs, processes, relationships, or trends (Best & Kahn, 2016). Descriptive design provides information useful to the solutions of local issues (problems), and the survey research employs applications of the scientific method by critically analyzing and examining the source materials, analyzing and interpreting data, and arriving at generalization and prediction (Salaria, 2012). In addition, a cross sectional research design was also utilized with the aim to describe the study population with respect to an outcome of interest. Furthermore, this method was also utilized to investigate associations between variables and the outcome of interest with a limitation that the study is carried out at one time point (Levin, 2006). Conventional questionnaire-based surveys were used to gather quantitative data as well as the application of statistical techniques of data analysis. In this study, factors such as students' self-efficacy, study habits, and teachers' teaching strategies were determined.

Respondents and Sampling Procedure

The target sample size was 323 junior high school students of Lapasan National High School, Division of Cagayan de Oro City for S.Y. 2016-2017 which has 1,460 total population. The sample size in each grade level was computed using Slovin's formula and was represented using stratified random sampling as shown in Table 1.

Table 1
Sample Size Computation and Representation

Grade Level	Population Size	Sample Size	Number of Sections	Sample size per section
7	396	88	7	13
8	363	80	7	12
9	361	80	7	12
10	340	75	6	13
Total	1460	323	27	

Research Instrument

The questionnaire was divided into four parts: the brief profile of the students which includes gender, grade level and the average grade in Science in three quarters/grading period (1st grading—3rd grading); questionnaire for self-efficacy; questionnaire for study habits; and questionnaire for teaching strategies as perceived by the students of their teachers.

Questionnaire for self-efficacy for the students' view regarding science was adapted from the science Attitude Scale (Fennema & Sherman, 1976) where only the personal confidence keys were used. The questionnaire was adapted and modified from Demata (1999) and Banuag et al. (2011), while the Study Skills Questionnaire was adapted from Didarloo and Khalkhali (2014) in addition to educational quality, student' intelligence, and their affective characteristics. There are 28 statements in this inventory and four alternatives, *always, usually, sometimes,* and *never* in which the students choose and put a check mark on only one that best describes them and how they study. All these are used to frame statements depicting good as well as bad study habits. There was no time limit for giving answers. The reliability of the questionnaire was 0.72 signified to be an acceptable reliability coefficient which was tested using Cronbach Alpha Reliability formula. Questionnaire for Teaching Strategies was adapted from Martins, Vieira, Gaspar, and Santos (2014).

Scoring Guidelines

Scoring guideline for the student's science performance is shown below (average grade in Science first and second quarter).

Table 2
Grade Range and Descriptive Rating

Grade Range	Descriptive Rating
96-100	Excellent
91-95	Outstanding
86-90	Very Satisfactory
81-85	Satisfactory
76-80	Fair
71-75	Poor

Table 3
Self-efficacy Scoring Guideline

Self-Efficacy	Scale	Code
Highly Positive	4.51-5.00	5
Positive	3.51-4.50	4
Fairly Positive	2.51-3.50	3
Negative	1.51-2.50	2
Highly Negative	1.00-1.50	1

Table 4
Study Habits Scoring Guideline

Response	Code	Scale	Description
Always	4	3.51-4.00	Excellent
Usually	3	2.51-3.50	Moderately Good

Sometimes	2	1.51-2.50	Fair
Never	1	1.00-1.50	Very Poor

Table 5
Teaching Strategies in Science Scoring Guideline

Responses	Code	Scale	Descriptive Rating
Every or most every lesson	4	3.51-4.00	Very Satisfactory
About half of the lessons	3	2.51-3.50	Satisfactory
Some lessons	2	1.51-2.50	Fair
Never	1	1.00-1.50	Poor

Data Gathering Procedure and Statistical Analysis

Permission and informed consent were secured from concerned authorities before the study was conducted. Random students from Grade 7 to Grade 10 were taken as respondents from their respective class sections. Descriptive statistical tools were used such as the mean and the frequency distribution of the original data to describe the students' science performance, the response of the students regarding their study habits, self-efficacy, and teacher's teaching strategies. Statistical measure using the multiple linear regressions was used to quantify the strength as well as the relationship between variables.

Results and Discussion

Student Performance

The frequency and percentage distribution of performances in science of the selected students are summarized in Table 6 as the average of first and second quarter grades for the S.Y. 2016-2017. Overall, the students performed "satisfactory" in Science with a mean of 82.95 in their first quarter and second quarter grade average. This result is contrary to the results in a recent study conducted among high school students in the Philippines where the majority of the students recorded low mastery (49% and below) (Imam, Mastura, Jamil, & Ismail, 2014a). Although the two ratings may be far from each other, the grading system utilized in this study was transmuted, which might explain the extreme range. Moreover, low performance in science was also noted in a study conducted in different provinces in the Philippines that might be due to different teacher's pedagogies (Bernardo, Limjap, Prudente, & Roleda, 2008). Furthermore, the performance of Filipino students in science is also reflective of the results in various international competitions (Carido & Bautista, 2000).

Table 6
Frequency and Percentage Distribution of Students' Science Performance for 1st and 2nd Quarter (Average Grade) of S.Y. 2016-2017

Range (%)	Description	Frequency	Percentage (%)
96-100	Excellent	1	0.3
91-95	Outstanding	21	6.5
86-90	Very Satisfactory	83	25.7
81-85	Satisfactory	116	35.9
76-80	Fair	84	26.0
71-75	Poor	18	5.6
	Total	323	100.0
	Mean Score	82.95%	

Teaching Strategies Used by Science Teachers

The most effective teaching strategy is the combination of strategies anchored on both behaviorism and constructivism. Moreover, effective teachers select varied instructional strategies that accomplish different learner outcomes both behavioral and cognitive. Particular strategies have been designed to achieve specific learning outcomes, but no single strategy can address them all (Japos & Hinay, 2010). Majority of the respondents claimed that they had experienced varied teaching strategies used by their teachers in teaching science about half of the lessons (71.5%), which is a satisfactory indicator while 11.1% or 36 respondents claimed that they experienced varied teaching strategies on some lessons only as shown in Table 7. Similar and consistent results were also found in the study Hurlburt, Kroeker, and Gade (1991) where students were found to have less positive opinions regarding their teachers' classroom behavior. The overall mean of 3.09 implies that teachers satisfactorily used varied teaching strategies in teaching science. This is a good practice in teaching science since varied teaching strategies can promote better learning (Sulaiman, Abdurahman, & Rahim, 2010). Moreover, the teaching of science is considered to be not easy (Guzey, Roehrig, Guzey, & Roehrig, 2009). Teachers experience various limitations stemming from lack of time, equipment, and pedagogical content knowledge, and pedagogical skills (Roehrig & Luft, 2004).

Table 7
Students' Assessment in the Strategies Used by Their Teachers in Teaching Science

Responses	Range	Frequency	Percent
Every or almost every lesson	3.51-4.00	56	17.3
About half of the lesson	2.51-3.50	231	71.5
Some lessons	1.51-2.50	36	11.1
Never	1.00-1.50	0	0
Total		323	100

Further data as shown in Table 8 summarize the responses for teaching strategies used by their science teachers. The statement "*We watch the teacher demonstrate an experiment or investigation,*" which is a constructivist approach gets the highest mean of 3.49 and with only a 0.04 difference. Close to it is "*We listen to the teacher giving a lecture-style of presentation*" receiving a 3.45, an indication of a behaviorist teaching approach. While the questionnaire item "*We begin our homework in class*" gets the lowest mean of 2.63. This belongs to a constructivist approach. The overall mean of the strategies used by teachers in teaching science is 3.09, which is a satisfactory rating, meaning that the teachers used both constructivist and behaviorist approaches and strategies in teaching science about half of their lessons. The implementation of inquiry-based lessons is influenced by many factors (Roehrig & Luft, 2004). Several researchers suggested that the implementation of inquiry-based learning by science teachers is dependent on their understanding of science concepts (Carlsen, 1993;

Hashweh, 1996). Teachers use a variety of discourse strategies to constrain student talk to a narrowly circumscribed topic domain. Beginning teachers are more found to possess limited practical knowledge of classrooms and students thus are also limited with the teaching pedagogies they employ (Grimmett & Mackinnon, 1992).

Table 8
Students' General Perception on the Teaching Strategies Used by Their Teachers

Questionnaire Items	Mean	Description
1. We make observations and describe what we see.	3.26 ±0.79	About half of the lessons
2. We watch the teacher demonstrate an experiment or investigation.	3.49 ±0.70	About half of the lessons
3. We design or plan an experiment or an investigation.	3.14 ±0.80	About half of the lessons
4. We conduct experiment or investigation.	3.04 ±0.83	About half of the lessons
5. We work in small groups on an experiment or investigation.	3.26 ±0.83	About half of the lessons
6. We read our science textbooks and other resource materials.	3.13 ±0.86	About half of the lessons
7. We memorize science facts and principles.	2.66 ±0.87	About half of the lessons
8. We use scientific formulas and laws to solve problems.	3.08 ±0.85	About half of the lessons
9. We give explanations about we are studying.	3.15 ±0.84	About half of the lessons
10. We relate what we are learning in science to our daily lives.	3.13 ±0.81	About half of the lessons
11. We review our homework.	2.95 ±0.91	About half of the lessons
12. We listen to the teacher giving a lecture-style of presentation.	3.45 ±0.78	About half of the lessons
13. We work problems on our own.	2.83 ±0.88	About half of the lessons
14. We begin our homework in class.	2.63 ±0.99	About half of the lessons
Overall Mean	3.09 ±0.84	About half of the lessons

Study Habits of Students in Science

Study habit is the pattern of behavior taken by students that serves as the vehicle for learning (Crede & Kuncel, 2008). As shown in Table 9, the overall mean is 2.67, an indication of a moderately good rating and the overall standard deviation is 0.86 indicating that the data do not differ much from each other. The students' study habits is a great factor in attaining excellent academic performance; however, teachers perceive students nowadays to have poor study habits (Descargar & Cardona, 2016). Similar results were also found in the study of Mendezabal (2013) where students were not found to have favorable study habits.

The highest mean among the items in the questionnaire is item 24 *"I focus on the major points while reading"* with 2.91 and a qualitative description of *usually* and a moderately good rating as shown in Table 9. It is followed by item *"I try to imagine possible test questions during my preparation for an exam"* with a mean of 2.86. Similarly with item *"I organize my notes on my lessons"*; next is item *"I am comfortable with my reading rate"* with a mean of 2.85. Last is the item *"I devote sufficient time to each of my subjects"* with a

mean of 2.84. These statements receive the top five highest means while items 3, 10, 11, 26 and 27 have a qualitative description of *sometimes* with a mean of 2.33, 2.45, 2.42, 2.41 and 2.42, respectively. These results are in congruence with the results of Aquino (2011) and Hassanbeigi et al. (2011) where high achievers were found to have better study habits compared to low achieving students. Furthermore, students who possessed better study habits and skills score better in their academic achievement compared to students with lower academic achievement (Fazal, Hussain, Majoka, & Masood, 2012; Mendezabal, 2013). Moreover, effective studying among students is not only dependent on their knowledge of studying techniques but also in terms of their sustained and deliberate effort, ability to concentrate, and sense of responsibility and valuing of their own learning (Hurlburt et al., 1991). Furthermore, learning institutions may consider exerting tremendous effort and strategies that will help develop good study habits and a generally positive attitude towards learning in students (Aquino, 2011).

In terms of availability of time, students rated *usually* for items 1 and 2. This result is similar to the study of Mendezabal (2013) which revealed that students did not have efficient time management skill and lack planning and concentration in their studies. Reading ability (8, 12, 17, 22, 23, and 24) were also rated *usually* similar to the findings of the previous author mentioned where students were noted to have poor reading skills. Having enough time to study is very important because study time is often associated with better performance (Nonis & Hudson, 2010). Moreover, the result in the scheduling of students' planned activities is consistent with the results of Nonis and Hudson (2010) where some students were noted to have a poor job scheduling their activities but performed well in the short term. Students were also noted to have poor (sometimes) study habits in terms of organizing their notes as shown in Table 10 (items 26 and 27). Although notes seemed to be a very important tool for students, it was found out that it influenced academic performance. Effective note taking is dependent on how the study time is efficiently utilized (Nonis & Hudson, 2010).

Table 9
Study Habits in Science

Responses	Range	Frequency	Percent	Rating
Always	3.51-4.00	9	2.8	Excellent
Usually	2.51-3.50	198	61.3	Moderately Good
Sometimes	1.51-2.50	116	35.9	Fair
Never	1.00-1.50	0	0	Very Poor
	Total	323	100.0	
	Mean	2.67 ±0.86		

Table 10
Students' General Perception on Their Study Habits in Science

Questionnaire Items	Mean	Description
1. I devote sufficient time to each of my subjects.	2.84 ±0.85	Usually
2. I schedule definite times and outline specific goals for my study time.	2.61 ±0.81	Usually

3. I avoid activities which tend to interfere with my planned activity.	2.33 ±0.85	Sometimes
4. I begin major subjects' assignments well in advance.	2.58 ±0.86	Usually
5. I have an accurate understanding of the material I wish to remember.	2.76 ±0.80	Usually
6. I study in a place free from noise and distractions.	2.61 ±1.05	Usually
7. I learn with the intention of remembering.	2.74 ±0.82	Usually
8. I recall readily those things which I have studied.	2.66 ±0.80	Usually
9. I organize my notes on my lessons.	2.86 ±0.86	Usually
10. I have a system in marking my textbooks as I read them.	2.45 ±0.91	Sometimes
11. I organize my notes in some meaningful manner (such as outline format).	2.42 ±0.86	Sometimes
12. When reading, I mark or underline parts I think are important.	2.82 ±1.00	Usually
13. I try to find out what the exam will cover and how the exam is to be graded.	2.73 ±0.85	Usually
14. I try to imagine possible test questions during my preparation for an exam.	2.86 ±0.88	Usually
15. I usually get a good night's rest prior to a scheduled exam.	2.65 ±0.89	Usually
16. I am calmly able to recall what I know during the exam.	2.65 ±0.83	Usually
17. When reading, I can distinguish readily between important and unimportant points.	2.57 ±0.84	Usually
18. I maintain a critical attitude during my study-thinking before accepting or rejecting.	2.59 ±0.85	Usually
19. I try to organize facts in a systematic way.	2.59 ±0.80	Usually
20. I use questions to better organize and understand the material I am studying.	2.70 ±0.87	Usually
21. I survey each chapter before I begin reading.	2.70 ±0.90	Usually
22. I am comfortable with my reading rate.	2.85 ±0.84	Usually
23. I am satisfied with my reading ability.	2.79 ±0.86	Usually
24. I focus on the main points while reading.	2.91 ±0.86	Usually
25. I find that I am able to express my thoughts well in writing.	2.73 ±0.82	Usually
26. I write rough drafts quickly and spontaneously from notes	2.41 ±0.79	Sometimes
27. I am comfortable using library sources for research.	2.42 ±0.93	Sometimes
28. I allow sufficient time to collect information, organize material and write the assignment.	2.81 ±0.88	Usually
Overall Mean	2.67 ±0.86	Usually

Self-efficacy in Science

Self-efficacy is defined as people's beliefs about their capabilities to produce selected levels of performance that exhibit influence over events that affect their lives (Bandura, 1977, 1986). It refers to how positively or negatively confident the students are in the subject matter. According to Alfassi (2003), self-efficacy is students' belief in their capabilities to master academic activities and how it affects their aspirations, level of interest in intellectual pursuits, and their academic performance. The self-efficacy of students has emerged to be a crucial construct in various educational researches over several decades (Van Dinther, Dochy, & Segers, 2011).

As shown in Table 11, the overall mean is 3.43 which is interpreted as *fairly positive*. It shows that most of the students had a *fairly positive* confidence in themselves in learning science. Table 12 presents data on students' general perception per item in the questionnaire. *"I am sure that*

I can learn science" has the highest mean of 4.09 which is rated as *positive,* which means students had confidence in learning science by themselves. The second is the item "*I know I can do well in science*" with 3.72 with a qualitative rating of *fairly positive*. The lowest mean, 2.97 with a qualitative rating of *fairly positive*, is in item *"I don't think I could excel in science*." The overall rating of *fairly positive* on positive self-efficacy is good because this can be translated into academic achievement. This follows the social-cognitive framework where stronger academic self-efficacy implies better cognitive and metacognitive strategies of students (Komarraju & Nadler, 2013). Moreover, students with strong academic self-efficacy are expected to be able to successfully manage their time and resources, pursue mastery goals, and believe on the malleability of intelligence. Although the rating in the perceived self-efficacy was positive, this could be expected to fluctuate all throughout the school year as reported by Zusho, Pintrich, and Coppola (2003). This complexity of the construct of self-efficacy makes it more a strong predictor of academic achievement (Komarraju & Nadler, 2013).

Table 11
Student's Self-efficacy in Science

Responses	Range	Frequency	Percent
Highly Positive	4.51-5.00	3	0.9
Positive	3.51-4.50	141	43.7
Fairly Positive	2.51-3.50	170	52.6
Negative	1.51-2.50	9	2.8
Highly Negative	1.00-1.50	0	0
Total		323	100.0

Table 12
Student's General Perception on Their Self-efficacy in Science

Questionnaire Items	Mean	Description
1. I am sure that I can learn science.	4.09 ±0.70	Positive
2. I don't think I could excel in science	2.97 ±0.97	Fairly Positive
3. Science is hard for me	3.14 ±0.99	Fairly Positive
4. I am sure of myself when I do science	3.70 ±0.89	Positive
5. I am not the type to do well in science	3.32 ±0.94	Fairly Positive
6. Science has been my worst subject	3.62 ±1.02	Positive
7. I think I could handle more difficult science	3.24 ±0.92	Fairly Positive
8. Most of the subjects I can handle OK, but I just can't do a good job in Science	3.06 ±1.09	Fairly Positive
9. I know I can do well in science	3.72 ±0.92	Positive
10. I am sure I could do advance do advanced work in science	3.39 ±0.88	Fairly Positive
11. I'm no good in science	3.50 ±0.96	Fairly Positive
Overall Mean	3.34 ±0.93	Fairly Positive

Performance in Science, Teaching Strategies, Self-efficacy, and Study Habits among Different Grade Levels

The performance in science, the different teaching strategies employed by teachers, and self-efficacy levels of students were also compared according to different grade levels. Across the four grade levels covered in this study, only Grade 8 level has a *fair* description regarding science performance which has a mean of 79.35, while other grade levels have a *satisfactory* rating thus showing a significant difference

in their mean performance as shown in Table 13. Although students in Grades 7, 9, and 10 scored satisfactory in their performance, much attention might be given to Grade 8 students. Interpretation of their performance in science class is more important than actual acquisition of skills especially on the perceived failure (Pajares, 2006). This highlights the importance that students must understand why their grades are like that so that they can develop the necessary confidence to attain mastery. Moreover, differences in academic achievement and performance can be attributed to age, ethnicity, gender, geographical belongingness, and socioeconomic status; thus differences in academic performance in different grade levels can be expected (Farooq et al., 2011).

Table 13
Test for Difference in Science Performance across Grade Levels

Grade level	Science Performance Mean	Description	F-value	Significance
Grade 7	83.20	Satisfactory	26.188	0.000
Grade 8	79.35	Fair		
Grade 9	84.99	Satisfactory		
Grade 10	84.33	Satisfactory		

In terms of teaching strategies used by science teachers, a significant difference was found across the grade levels as shown in Table 14. All grade levels from Grade 7 to Grade 10 have *about half of the lessons* description, and only Grade 8 level has the lowest mean of 2.95. The utilization of different teaching strategies is also related to the intention of teachers (Trigwell & Prosser, 1996).

Effective teaching is considered to be a complex activity that requires various forms of knowledge including pedagogical content knowledge (PCK) and curricular knowledge (Schroeder, Scott, Toison, Huang, & Lee, 2007). Moreover, the knowledge of teachers of their profession can be divided into three ways, knowledge in context, knowledge in content, and knowledge in person (Kagan, 1992). These three situations of knowledge grow richer and more coherent and become a personalized pedagogy or belief system which actually, in one way or another, controls the perception, judgment, and behavior of teachers.

Table 14
Test for Difference in Teaching Strategies across Grade Levels

Grade level	Teaching Strategies Mean	Description	F-value	Significance
Grade 7	3.22	About half of the lessons	5.524	0.001
Grade 8	2.95	About half of the lessons		
Grade 9	3.03	About half of the lessons		
Grade 10	3.13	About half of the lessons		

Study habits or strategies students utilize to learn include coming to class on time, and paying attention, taking good notes, completing homework on time, and reading the study material in advance. These strategies are known to improve student's performance in class (Nonis & Hudson, 2010). Across grade levels, there is no significant difference regarding study habits with a description of *usually* (Table 15). Students need to develop strong study habits as suggested by Nonis and Hudson (2010). The quantity of

time spent studying has an effect on the performance but this influence is moderated by the study habits students use.

Table 15
Test for Difference in Study Habits across Grade Levels

Grade level	Study Habits Mean	Descrip-tion	F-value	Signifi-cance
Grade 7	2.75	Usually	2.392	0.069
Grade 8	2.59	Usually		
Grade 9	2.65	Usually		
Grade 10	2.68	Usually		

On self-efficacy, that there is no significant difference across grade levels as shown in Table 16. All have a *fairly positive* description and the self-efficacy mean in each grade level does not differ much from each other. Several researchers suggested that the learning environment has meaningful and detectable effects towards self-efficacy (Schunk & Hanson, 1985). This suggests that the changes in the environment of learners affect their self-efficacy and that learners are expected to have similar levels of self-efficacy as a result of constant environment. Although the results showed similar levels of self-efficacy, a learning environment is believed not to give a common experience for all learners, and that this experience is subject to the relative interpretation and their response towards it as argued by Ames (1992). Moreover, the levels of self-efficacy is also dependent on how students perceive relevant information thus a student might perceive a discouraging teacher as an indication that the they lack ability (Fast et al., 2010).

Table 16
Test for Difference in Self-efficacy across Grade Levels

Grade level	Self-Efficacy Mean	Descrip-tion	F-value	Signifi-cance
Grade 7	3.47	Fairly Positive	2.542	0.056
Grade 8	3.31	Fairly Positive		
Grade 9	3.48	Fairly Positive		
Grade 10	3.47	Fairly Positive		

Science Performance and Its Relationship to Self-efficacy, Study Habits, and Teaching Strategies

The correlation between science performance and the rest of the independent variables were determined using Pearson correlation as summarized in Table 17. From the three variables only self-efficacy is found to be statistically significant on three grade levels (Grade 7, 9, 10) while the rest are not significantly correlated. The positive correlation between self-efficacy is consistent with literature (Bouffard-Bouchard, 1990; Komarraju & Nadler, 2013; Pajares, 2006; Pajares & Graham, 1999). Moreover, Zimmerman, Bandura, and Martinez-Pons (1992) suggested that high performing students have better self-efficacy and are more accurately calibrated. Although a not significant correlation is found between self-efficacy and science performance among Grade 8 students as further shown in the table, Collins (1984) suggested that underachieving students cannot be expected to possess requisite skills when utilizing perceived self-efficacy to explain poor academic performance. This goes to show that it

Table 17
Relationship Between Science Performance and other Variables across Grade Levels

Science Performance	Self-efficacy			Study Habits			Teaching Strategies		
	Pearson r	p-values	Mean	Pearson r	p-values	Mean	Pearson r	p-values	Mean
Grade 7 Level Mean= 83.20	0.340	.001*	3.47	0.103	0.340^{N}	2.75	-0.011	0.917^{N}	3.22
Grade 8 Level Mean= 79.35	0.150	0.184^{N}	3.31	0.209	0.062^{N}	2.59	0.106	0.347^{N}	2.95
Grade 9 Level Mean= 84.99	0.476	0.000*	3.48	0.183	0.104^{N}	2.65	0.202	0.072^{N}	3.03
Grade 10 Level Mean= 84.33	0.498	0.000*	3.47	0.248	0.032^{N}	2.68	-0.021	0.857^{N}	3.13

*correlation is significant at $\alpha = 0.01$, Ncorrelation not significant at $\alpha = 0.01$

is expected that students' self-efficacy cannot be correlated with their low performance. Moreover, students with high self-efficacy are more task-oriented thus will be expected to perform more (Bouffard-Bouchard, 1990). Further, Bouffard-Bouchard also pointed out that the perceived self-efficacy is correlated with both task persistence and the ability to determine and evaluate the correctness of responses which may explain why better performance can be expected from students with high self-efficacy.

Conclusion

The student science performance of the junior high school of Lapasan National High School is *satisfactory* which may imply that the science teaching-learning process in the school is sufficient. However, data show that there is still a need to improve students' science performance especially on the Grade 8 level. Teaching strategies, study habits, and self-efficacy all showed association in one way or the other to student science performance. This indicates that these variables should be taken into consideration when deciding changes and modifications of the existing curriculum to address science performance. However, only self-efficacy showed significant influence to science performance. Thus, the influence of the teacher in motivating the students to do more on science and to encourage and inspire them to be confident in learning science is vital and crucial as well as reinforcing the other variables. Self-efficacy is the key basis for motivation, well-being, and personal accomplishments. Motivation is influenced by self-efficacy when students with high self-efficacy persist longer than those with low self-efficacy. It was also highlighted that due to the nature of the study, it is impossible to infer causality. In addition, this study only provides a snapshot of the current situation of science performance, self-

efficacy, and study habits of students and teaching strategies employed by teachers and may provide a different result if another time frame had been chosen.

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