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# **MATHEMATICS PERFORMANCE AND MASTERY OF THE LEARNING COMPETENCIES IN GENERAL PHYSICS 1 OF SENIOR HIGH SCHOOL STUDENTS**

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## **ABSTRACT**

*The study aimed to find the significant relationship among the senior high school students' level of performance in general mathematics, pre-calculus and basic calculus and their mastery of the learning competencies in general physics 1. The purpose of this research is to address the difficulties experienced by the learners in learning general physics 1 as well as the contingencies made by the teacher to address those difficulties. This study employed the mixed methods of quantitative and qualitative research. The respondents of this study are grade 12 students in selected public senior high schools in Malvar, Tanauan City and Sto. Tomas, Batangas that offer Science, Technology, Engineering and Mathematics (STEM) strand. Raosoft sample size calculator and probability distribution were used. Verbatim transcription and Pearson Correlation were also used. Majority of the respondents are in Advanced Level of Proficiency in General Mathematics and Pre-Calculus; and Proficient Level in Basic Calculus. The results indicate that the respondents are experiencing different difficulties in learning the competencies in general physics 1. Results also infer that the teachers are doing measures to address the difficulties experienced by the learners in learning general physics 1. The senior high school students' level of performance in general mathematics and basic calculus is not significantly related to their mastery of the learning competencies in general physics 1. Only pre-calculus is significantly related to the respondents' mastery of the learning competencies in general physics 1. These results imply that the senior high school students' level of performance in general mathematics and basic calculus subjects has less effect on their mastery of the learning competencies in general physics 1 while pre-calculus has significant effect on their mastery of the learning competencies in general physics 1.*

*Keywords: Mathematics Performance, Learning Competencies, General Physics, Senior High School*

## **INTRODUCTION**

The K to 12 Basic Education Program aims to produce Filipino graduates who are holistically developed with 21st century skills prepared for higher education, middle-level skills development, employment, and entrepreneurship. Having quality education as a long-term solution to underemployment, malnutrition, and poverty and is line with the

agenda of the Aquino administration. As stipulated in DepEd Order no. 19, s. 2016, Filipino graduates are envisioned to possess sufficient mastery of basic competencies to develop themselves to the fullest; be emotionally developed and competent to live a meaningful life; be socially aware, pro-active, and involved in public and civic affairs and



contribute to the development of a progressive, just and humane society; be adequately prepared for the world of work or entrepreneurship or higher education; be legally employable; and be globally competitive. In addition, they are characterized as graduates who possess healthy mind and body, have a solid moral and spiritual grounding, appreciate and care for humanity, the world, and environment.

Some of the skills that must be possessed of a functionally literate individual are scientific skills, critical thinking, problem solving, creativity, innovativeness and resourcefulness. These skills are needed to master the competencies in general physics. General Physics 1 is one of the specialized subjects of Science, Technology, Engineering and Mathematics (STEM) students in senior high school. The subject description includes mechanics of particles, rigid bodies, and fluids, waves, and heat and thermodynamics using the methods and concepts of algebra, geometry, trigonometry, graphical analysis and basic calculus. General Physics 1 covers topics in mechanics to thermodynamics. The approach of is theoretical and at the same time experimental since laboratory activities are part of their learning experience to meet the intended learning outcomes. It is also learner-centered since the students will be taught on how to solve problems and explain concepts in physics with real-life applications. The activities are interactive where students are engaged in hands-on experiments that are economical and can be done in the school.

Teachers must stress the importance of studying physics because students may not fully appreciate the advantages of physics in everyday life. Physics is one of the fields of knowledge that underlies the physical universe and applies constantly to people's everyday lives. The advantages of physics in everyday life can be as basic as the conversion of electrical energy to heat to make the morning coffee or as complex as plotting a space shuttle flight from Earth into orbit. Even though some concepts are initially difficult to grasp, the reward in terms of satisfaction and knowledge can make all the effort worth it given the incalculable importance of physics in science.

Not all the benefits of physics involve material things because research and knowledge are themselves important. Astrophysics, quantum mechanics and investigations into atomic structure and energy have been able to explain much of the way the world works, even down to the original birth of the universe. Of course, the research results can also be used as the basis of new technology, as previously mentioned. At an individual level, studying physics can be personally rewarding as students begin to understand everyday objects and occurrences in terms of the concepts of physics that underlie them, such as acceleration of a car, gravity causing an apple to fall from the tree or electricity powering appliances (O'Keeffe, 2018).

The importance of studying physics can clearly be seen in the development of cutting-edge technologies. Advances in technology are often based on discoveries in physics and inventions based on a new interpretation of existing physics knowledge, thus demonstrating the importance of physics in science. Now the advantages of physics in everyday life are seen in the operation of nuclear energy plants that produce electricity to power homes and businesses worldwide.

The importance of physics in science extend to a wide variety of fields. For example, medical students need to know some basic physics to understand how blood and air flows in the body, considering concepts such as pressure, velocity of flow and changes in resistance to flow. Physics is also integral to engineering and is generally relevant for all the sciences.

The purpose of this research is to address the difficulties encountered by the students in learning general physics 1 like lack of learning materials and supplementary activities in the subject as well as the deficiency of the mastery of senior high school students on learning competencies. This determined the relationship of the senior high school students' mastery of the learning competencies in general physics 1 and their level of performance in general mathematics, pre-calculus and basic calculus. This study also determined the contingencies made by the



teachers to address the difficulties experienced by the students in learning general physics 1. Teaching general physics 1 may be reinforced with the development of different learning materials and activities.

## **OBJECTIVES OF THE STUDY**

The senior high school program as part of the K to 12 basic education curriculum is now being implemented in our country and has grade 11 and 12 levels in secondary schools. The study aimed to find the significant relationship among the senior high school students' level of performance in general mathematics, pre-calculus and basic calculus and their mastery of the learning competencies in general physics 1.

This study sought answers to the following questions.

1. What is the level of performance of senior high school students in
  - 1.1. general mathematics;
  - 1.2. pre-calculus; and
  - 1.3 basic calculus?
2. What is the senior high school students' level of mastery of the competencies in general physics 1?
3. What are the difficulties encountered by the senior high school students in learning the competencies in general physics 1?
4. What are the contingencies done by general physics 1 teachers to address the encountered difficulties by the learners?
5. Is there a significant relationship between the senior high school students' level of performance in general mathematics, pre-calculus and basic calculus and their mastery of the learning competencies in general physics 1?
6. What activities may be proposed to reinforce the teaching of general physics 1 to senior high school students?

## **METHODOLOGY**

This study employed the mixed methods of quantitative and qualitative research. This method was chosen because of its fitness on the investigated variables in this study. This method goes beyond mere gathering and tabulation of data. It involves the elements or interpretation of the meaning or significance of what is being described. Thus, description is often combined with comparison and contrast

involving measurements, classifications, interpretation and evaluation.

The respondents of this study are grade 12 students in selected public senior high schools in Malvar, Tanauan and Sto. Tomas, Batangas that offer Science, Technology, Engineering and Mathematics (STEM) strand. The schools are Tanauan City Integrated High School, Tanauan City College, Senior High School in Malvar and Sto. Tomas Senior High School. To produce valid and reliable results of this study, the respondents were selected using Raosoft sample size calculator and probability distribution. There are 33 STEM students in Tanauan City Integrated High School. Tanauan City College has 7. Senior High School in Malvar has 75 and Sto. Tomas Senior High School has 19. The computed sample size using Raosoft sample size calculator is 100. The sample from each schools are 24, 5, 54 and 14 respectively.

They were chosen to be the respondents of this study since they are currently taking general physics 1 subjects under the K to 12 basic education curriculum for senior high school. They provided necessary feedbacks and opinions regarding the said subject and the difficulties they have encountered, and the contingencies done by their teacher.

In order to elicit the information needed in this study, the researcher decided to use a self-constructed validated questionnaire and teacher-constructed and validated diagnostic test as sources of data. Part I is the respondents' profile in terms of their level of performance in general mathematics, pre-calculus and basic calculus. Part II are the difficulties encountered by the senior high school students in learning the competencies of general physics 1 and the contingencies of the general physics 1 teachers to address the encountered difficulties of the senior high school students in learning the competencies of general physics 1. To measure the respondents' level of mastery of the competencies in general physics 1, a diagnostic test is conducted. The diagnostic test is a 30-item multiple choice test which is based on the competencies in the curriculum guide of general physics 1. Those items were derived from the final examination in



general physics 1 validated by the principal, education program supervisor in science and division senior high school coordinator.

The questionnaire and the diagnostic test were submitted to the research adviser for checking for possible corrections. Afterwards, it was examined by the researchers' internal and external validators for the grammatical and structural construction correction. The researchers modified the questions so that they could apply them accordingly to the purpose of this study.

In first part of the questionnaire, the respondents wrote the different information needed. In the second part of the questionnaire, the respondents enumerated the difficulties they have encountered, and the contingencies done by their teacher in general physics 1.

The researchers sought permission from the school heads of the different senior high schools for administering the questionnaires through a request letter. Before administering the questionnaire to the primary respondents, a dry-run trial was conducted. The focus group of the dry-run trial were the grade 11 STEM class of Tanauan City Integrated High School. Since the focus group of the dry-run answered the questionnaires and diagnostic test successfully, the researchers assumed that the questionnaire diagnostic test are comprehensible enough for the grade 12 respondents to answer. After the dry-run results, there were few changes made in the questionnaire and diagnostic test.

The researchers asked a help from the general physics 1 teachers and class adviser of each class to assist them in administering the questionnaire. The questionnaires were retrieved on the same day also. The reason why the researcher asked for the assistance is that for the respondents to be able to give

information correctly and for them to answer the questionnaire more comprehensively.

The researchers brought home all the answered questionnaires for analysis, and interpretation of the data. Tallying and various computations were carefully done. The researcher evaluated the result carefully. Analysis and interpretation of every item in the questionnaire was done by the researcher in order to come up with meaningful findings, conclusions and draw some contributing recommendations.

The following statistical measures and test will be used to analyze the gathered data to answer the specified problems of the study.

Verbatim transcription of written responses was used to determine the difficulties encountered by the senior high school students in learning the competencies of general physics 1 and the contingencies of their teachers to address the encountered difficulties of the senior high school students in learning the competencies of general physics 1.

To statistically test the null hypothesis, the Person Correlation was used. This determined the significant relationship of the senior high school students' level of performance in general mathematics, pre-calculus and basic calculus and their mastery of the learning competencies in general physics 1.

**RESULTS AND DISCUSSION**

This part presents the details regarding the results of the study. It also consists of the analysis and interpretation of the congregated data. The findings presented in this are analyzed and interpreted to answer the research questions presented in this study.

**Table 1. Frequency Distribution of Respondents' Level of Performance in General Mathematics, Pre-Calculus and Basic Calculus**



Grade	General Mathematics	Pre-Calculus	Basic Calculus	Description
	f	f	f	
<b>90 and above</b>	100	67	37	Advanced
<b>85 – 89</b>	0	28	42	Proficient
<b>80 – 84</b>	0	5	21	Approaching Proficiency
<b>TOTAL</b>	100	100	100	

Table 1 presents the frequency distribution of respondents' level of performance in general mathematics, pre-calculus and basic calculus. 100% of the respondents are in advanced level in General Mathematics. Meanwhile in Pre-Calculus, 67% are in Advanced Level, 28% are in Proficient Level and 5% of the respondents are in Approaching

Proficiency level. Lastly in Basic Calculus, 37% are in Advanced Level, 42% are in Proficient Level and 21 % of the respondents are in Approaching Proficiency level. Majority of the respondents are in Advanced Level of Proficiency in General Mathematics and Pre-Calculus; and Proficient Level in Basic Calculus.

**Table 2. Senior High School Students' Level of Mastery of the Competencies in General Physics 1**

Percentage	f	Description
<b>66 – 85</b>	8	Moving Towards Mastery
<b>35 – 65</b>	67	Average Mastery
<b>15 – 34</b>	22	Low Mastery
<b>5 – 14</b>	3	Very Low Mastery
<b>TOTAL</b>	100	

Table 2 displays the senior high school students' level of mastery of the competencies in general physics 1. Eight students are in the "Moving Towards Mastery" level. Sixty seven students are in the "Average Mastery" level.

Twenty two students are in the "Low Mastery" level. Three students are in the "Very Low Mastery" level. Majority of the respondents are in the "Average Mastery" level of the competencies in general physics 1.

**Table 3. Difficulties Encountered by the Senior High School Students in Learning the Competencies of General Physics 1**



In learning general physics 1, I am experiencing difficulties...	Weighted Mean	Verbal Interpretation
due to lack of practice on problem solving.	2.93	Agree
in remembering related equations	2.90	Agree
in understanding the fundamentals of the subject.	2.82	Agree
in terms of availability of books and other resource materials.	2.80	Agree
due to insufficient laboratory practices.	2.67	Agree
in comprehending definitions, laws and basic principles	2.63	Agree
due to unfamiliarity in specific unit of measurements.	2.62	Agree
due to lack of intervention and supplementary activities.	2.58	Agree
due to inadequate examples presented by the teacher.	2.18	Disagree
due to lack of motivation and inexperience by the teacher.	2.05	Disagree
<b>Composite Mean</b>	<b>2.62</b>	<b>Agree</b>

Legend: 3.25-4.00 Strongly Agree 2.50-3.24 Agree 1.75-2.49 Disagree 1.00-1.74 Strongly Disagree

Difficulties due to lack of practice on problem solving, difficulties in remembering related equations and difficulties in understanding the fundamentals of the subject have the highest weighted means which are 2.93, 2.90 and 2.82, respectively. These results indicate that the respondents are having difficulties in the understanding the basic concepts and in the problem solving and mathematical application aspects of the subject.

Difficulties due to lack of intervention and supplementary activities, difficulties due to inadequate examples presented by the teacher and difficulties due to lack of motivation and inexperience by the teacher have the lowest weighted means which are 2.58, 2.18 and 2.05, respectively. These results infer that the respondents are experiencing difficulties in instruction-related factors. The overall mean 2.62 indicates that the respondents are experiencing different difficulties in learning the competencies in general physics 1.

Based on the question-guided focus group discussion, there are other difficulties that the senior high school learners encountered in mastery of the learning competencies in general physics 1. They lack experiments in laboratory or in field as well as performing the operative concepts. They also do not have enough time to conduct advanced study the next topics because of numerous take-home activities or

assignments. They also had trouble on memorizing numerous formulas. There are times that they cannot follow the process because the teacher is blocking the board while he or she is deriving the formula. They are also having challenges to perform individual activities. These results are supported of the study of Arellano (2004) which stated that there is a significant relationship between the level of performance of students in physics and the adequacy of instructional facilities and to the extent of the implementation of approaches utilized in teaching physics. The students and teachers perceived that there was moderate adequacy of instructional facilities.

The poor performance of senior secondary school physics students in external examinations has been a major problem in the teaching and learning of physics. The study of Telima and Temitope (2013) investigated the difficulties encounter by senior secondary physics students in reporting of physics practical in Rivers State. Results of the study revealed that there are insufficient physics apparatus in the schools and students lack understanding of instructions during physics practical activities. Also, students are not able to tabulate obtained value appropriately, Scale choosing is a major problem encountered by students while interpreting data graphically. The study suggested that the physics laboratories in the secondary schools be equipped because it



is an essential aspect of practical physics and reporting physics practical should be included in the physics curriculum so that students can possess the knowledge in carrying out such activities.

This is also similar to the study of Corpuz (2017) which determined the level of difficulty in the different topics in physics, causes of difficulties in physics, frequency of use of learning strategies to overcome the difficulties encountered in physics, and academic performance in physics of the respondents. The study also determined the relationship between the respondents' level of difficulty in physics and their frequency of use of learning strategies to overcome the difficulties encountered. It also looked into the relationship between the respondents' frequency of use of learning strategies to overcome the difficulties encountered and their academic performance in physics. Findings showed that the respondents found majority of the physics topics to be difficult. The students cited that their difficulty in physics was caused by their poor background in mathematics and that they had inadequate time

for studying. Listening attentively to the lectures, note-taking, and studying alone were often utilized by the respondents to overcome the difficulties encountered in physics. The respondents' academic performance in physics was fair. The respondents' level of difficulty in physics has no bearing on their frequency of use of learning strategies to overcome such difficulties. The more frequent the respondents took notes, listened attentively to lectures and studied alone; the better is their performance in physics. The results are also related to the study conducted by Cadorna, et al (2013) which showed that the students had a low level of performance in physics. Among the physics concepts considered, the students performed at an average level in forces and work, energy and power, but they performed low in vectors and scalars. The students got an average performance in knowledge, but low in comprehension and application skill levels. Alegre (2012) found out that physics was a real big frustration to students who confirmed that their achievement in physics was very much affected by their attitudes and anxiety.

**Table 4. The Contingencies Done by General Physics 1 Teachers to Address the Encountered Difficulties by the Learners in Learning the Competencies of General Physics 1**

To ease the difficulties in general physics 1, our teacher...	Weighted Mean	Verbal Interpretation
motivates us to learn and exhibit hard work and perseverance on the subject.	3.33	Agree
explains clearly the fundamentals of the subject.	3.22	Agree
gives techniques for us to remember related equations like proper derivation of formula.	3.20	Agree
clarifies and enlightens us on the definitions, laws and basic principles of the subject.	3.18	Agree
presents adequate examples for us to understand the lesson clearly.	3.13	Agree
help us to be familiar in specific unit of measurements in the subject.	3.10	Agree
let us have frequent practice to develop our problem solving skills.	3.07	Agree
delivers intervention and supplementary activities to reinforce our learning.	2.97	Agree
provides us additional materials that we can use to study our lessons.	2.95	Agree
conducts laboratory and field experiments.	2.70	Agree
<b>Composite Mean</b>	<b>3.09</b>	<b>Agree</b>

Legend: 3.25-4.00 Strongly Agree 2.50-3.24 Agree 1.75-2.49 Disagree 1.00-1.74 Strongly Disagree

"To ease the difficulties in general physics 1, our teacher motivates us to learn and

exhibit hard work and perseverance on the subject", "To ease the difficulties in general



physics 1, our teacher explains clearly the fundamentals of the subject” and “To ease the difficulties in general physics 1, our teacher gives techniques for us to remember related equations like proper derivation of formula” have the highest weighted means which are 3.33, 3.22 and 3.20, respectively. These results indicate that the physics teacher addresses the difficulties experience by the learners in the understanding the basic concepts and in the problem solving and mathematical application aspects of the subject.

“To ease the difficulties in general physics 1, our teacher delivers intervention and supplementary activities to reinforce our learning”, “To ease the difficulties in general physics 1, our teacher provides us additional materials that we can use to study our lessons” and “To ease the difficulties in general physics 1, our teacher conducts laboratory and field experiments” have the lowest weighted means which are 2.97, 2.95 and 2.70, respectively. These results infer that the difficulties experienced by the learners in terms of additional learning activities, learning materials and experiences in laboratory and field activities are least addressed by the teacher. The composite mean 3.09 infers that the teachers are doing measures to address the difficulties experienced by the learners in learning general physics 1.

There are other contingencies made by the physics teacher to address the difficulties that the senior high school learners experienced in mastery of the learning competencies in general physics 1, based on the question-guided focus group discussion. The teacher

gives those examples and some operative definitions to better understand the principles in physics. The teacher explains the process gradually and step-by-step. The teacher also relates the topics in real life situations. The teacher cites examples about the real applications of physics in daily life. The teacher eases the difficulties by simplification of explanation. They explain the lesson in a way that the learners can understand. The teacher also sends softcopies of supplemental notes and lectures. The encouragement, motivation and reminders coming from their teacher inspire them to study harder.

These results are related to the studies of Snetinova (2012) which found out that students often contend with many difficulties during problem-solving in physics, so it is important to determine the causes of these difficulties and address those with contingencies and solutions. Realizing the students’ perception that physics is tedious and irrelevant, the researcher was motivated to conduct the study which aimed to determine the (a) level of difficulty in the different topics in physics, (b) causes of their difficulties in physics, (c) frequency of use of learning strategies to overcome the difficulties encountered in physics, and (d) academic performance in physics of the respondents. The study also looked into the relationship between the respondents’ (a) level of difficulty in physics and their frequency of use of learning strategies to overcome the difficulties encountered, and (b) frequency of use of learning strategies to overcome the difficulties encountered and their academic performance in physics.

**Table 5. Correlation of Senior High School Students’ Level of Performance in General Mathematics, Pre-Calculus and Basic Calculus and Their Mastery of the Learning Competencies in General Physics 1**

Variables	Mean	r-value	p-value	Interpretation	Decision
General Mathematics	94.37	.209	.108	Not Significant	Failed to Reject $H_0$
Pre-Calculus	89.97	.394**	.002	Significant	Reject $H_0$
Basic Calculus	88.32	.203	.121	Not Significant	Failed to Reject $H_0$

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

The senior high school students’ level of performance in general mathematics ( $r = .209$ )

and basic calculus ( $r = .203$ ) is not significantly related to their mastery of the learning



competencies in general physics 1. Only pre-calculus ( $r = .394$ ) is significantly related to the respondents' mastery of the learning competencies in general physics 1 at 0.01 level of significance. These results imply that the senior high school students' level of performance in general mathematics and basic calculus subjects has less effect on their mastery of the learning competencies in general physics 1 while pre-calculus has significant effect on their mastery of the learning competencies in general physics 1.

This is similar to the study of Reddy and Panacharoensawad (2017) which evaluated the student's problem-solving skills and the factors influences the problem-solving difficulties in physics. The results of the study indicated and revealed that poor mathematical skills and lacking of understanding the problem are the major obstacles in the domain of problem solving skills in physics. To overcome these obstacles teachers, need to give enough assignments and need to recruit well qualified physics teachers. The results of the study revealed that the high failure rate in physics due to their inability to understand the basic subject matter content, principles of physics in formulas. It leads to lack of remembering problem-based equations in physics. To overcome these obstacles, it is recommended that each student should be given the ample time and opportunity to solve the physics problems during the process of learning physics. Science educators and curriculum developers need to incorporate and emphasize on mathematical concepts which are necessary to the understanding of physics and its new dimensions. Eventually, the study has revealed that the stakeholders should take initiative steps to strengthen the educational practices. It is clear that the lack of problem-solving skills in physics in nationwide is of alarming magnitude, but also of great intricacy.

Also, in a study conducted by Ogunleye (2009), lack of students' understanding of the problem and their poor mathematical skills constitute the major obstacles in the circle of difficulties that students experience in solving physics problems. Harper (2006) stated that students skip the qualitative steps in solving

physics problems because they are not aware of the valuable information contained in the qualitative representations.

According to Ali (2012), students fail to engage in meaningful learning because of their inability to demonstrate a good understanding of the very basic concepts of the subject. Learning strategies are techniques employed by students to help them learn and understand physics concepts. Success in a physics class requires commitment of time and perseverance. Learning and mastering takes time and patience. Learners must identify their personal preferences for learning and seek the resources that will best help them in their studies. Learning style is the way in which each person absorbs and retains information and/or skills. Learning strategies is a factor to active learning like small group, cooperative work, case studies, simulation, discussion, problem-solving and journal writing. To be successful in college, students need to invest in their education with a commitment of time.

The results are also related to the study of Siscar (2009) which revealed that values were integrated in the curriculum along with the skills in English, Mathematics and other science subjects. Such help in accelerating the development of linguistic and logical-mathematical intelligences. It also provided a laboratory life for the learners to acquire experiential, interactive, interdisciplinary and value-laden activities. Problem solving and question answer methods were most often used by the respondents while team games tournament were often used strategy in Physics teaching. Physics teachers rated that the laboratory was good because it was spacious enough to accommodate a good number of students assigned at a particular time. As a whole, the physics laboratory in private secondary schools was rated fair by the teachers. They used workbook and blackboard as traditional materials in teaching the subject. They also used computer software, CPU, monitor, ACR, memory stick or flash drives as instructional aids in teaching Physics. Physics laboratory was rated to have limited functioning facilities.

## CONCLUSION



The alternative hypothesis “there is a significant relationship between the senior high school students’ level of performance in general mathematics, pre-calculus and basic calculus and their mastery of the learning competencies in general physics 1” is *partially supported* in this study.

## RECOMMENDATIONS

The findings and conclusions stated evolved to the following recommendations that the researcher offers:

1. It is suggested for the high school physics teachers to utilize different teaching strategies in their class. This is to promote students’ enthusiasm, interest and purpose in learning general physics. Since learners are having difficulties in mastery of competencies in learning general physics 1 due to insufficient laboratory practices and inadequate examples presented by the teacher, it is recommended that high school physics teachers should be meticulous in selecting the teaching strategies that they utilize in terms of frequency, quantity and quality.

2. Since learners are having difficulties in mastery of competencies in learning general physics 1 due to lack of practice on problem solving, lack of intervention and supplementary activities and difficulty in remembering related equations, the high school physics teachers could involve a variety of contexts from problems related to daily routines to mathematical situations that arise from real-life situations. They could pose problems and generate questions in problem context guiding students to organize thoughts and improve their computational fluency, abstract and logical reasoning.

3. The high school physics teachers were recommended to assure that the physics classes should not only focus on learning theoretical concepts and ideas but also should help the students to realize the practical application and importance of physics in real life situations. For the attainment of these learning demands, the high school physics teachers could consider the embedding enhanced

problem solving and laboratory activities in the study of physics to provide a context in which concepts and skills are learned.

4. Since the study found that the are having difficulties in understanding the fundamentals of the subject and comprehending basic laws and principles in physics, it is suggested for high school physics teachers to consider the readiness and prior knowledge of the learners so that the students could be aware of the importance and relevance of the lessons in daily life. In the selection of gradual teaching strategies in physics, it is also recommended for the teachers to also consider their students’ learning styles and multiple intelligence.

5. It is also suggested for the mathematics teachers to utilize diverse teaching strategies in their mathematics class. They may give students opportunities to use and extend their knowledge of concepts in each of the content standards through guided discussion and meaningful lectures. They could pose problems and generate questions in problem context guiding students to organize thoughts and improve their computational fluency, abstract and logical reasoning of the learners.

6. Since the high school physics teachers are finding ways to address the difficulties encountered by the students in learning general physics 1, the education administration, PTA and local government may provide assistance in sufficing school facilities, science laboratories, instructional tools and learning materials since those have considerable effects on the mastery of the learning competencies in general physics 1. They may also support teachers in terms of training and seminars to be attended as well as pursuing higher education in graduate schools.

7. Finally, schools, teachers and our education sector may consider the solutions to address the challenges of the young senior high school curriculum that is being implemented. Utilizing scientific terms, acquiring the needed mathematical skills, developing conceptual understanding and enhancing the creating and application capabilities of the learners may be strengthened for them to be the total, holistic and functional



citizen dreamt by our new curriculum in this 21st century.

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## REFERENCES

- Alegre, H. C. (2012). *Revisiting students' early and recurring experiences and perceptions about physics*. Philippine Physics Journal, Volume 34, pp. 1-9.
- Ali, T. (2012). *A case study of the common difficulties experienced by high school students in chemistry classroom in Gilgit-Baltistan (Pakistan)*. SAGE Open. April-June 2012: 1-13.
- Arellano, E. (2004). *Performance in physics of the fourth year students in Nasugbu for the academic year 2003-2004*. (Unpublished Master Thesis). Batangas State University, Batangas City, Batangas, Philippines.



Asuncion, A. J., et. al. (2012). *Physics works*. ARMVET Printing Company, Inc., Makati City

Cadorna, E. A., et. al. (2013). *Mathematics anxiety and performance in physics 102 of non-physics students*. Philippine Physics Journal. Volume 35, pp. 24-34

Corpuz, A. C. (2017). *Difficulties encountered, learning strategies and academic performance in physics of Psychology students* (Master's thesis). Retrieved from <http://centrefexcellence.net/J/JSS/PDFs/jss.2017.6.2.365.374.pdf> (ISSN (E): 2305-9249 ISSN (P): 2305-9494)

Cruzat, D. (2008). *Critical thinking skills and academic performance in physics of fourth year high school students in Sta. Teresa College, Bauan, Batangas*. (Unpublished Master Thesis). Batangas State University, Batangas City, Batangas, Philippines.

Panacharoensawad, B. et. al. (2017). *Students problem-solving difficulties and implications in physics: an empirical study on influencing factors* (Master's thesis). Retrieved from <https://pdfs.semanticscholar.org/fd61/41677fc100a9c4496e48575c004d0e171acf.pdf> (ISSN (E): 2305-9249 ISSN (P): 2305-9494)

Siscar, W. (2009). *Proposed reinforcement exercises for physics teaching enhancement in secondary schools*. (Unpublished Master Thesis). Batangas State University, Batangas City, Batangas, Philippines.

Telima, A. et. al. (2013). *Difficulties students encounter in reporting physics practical at the senior secondary school level in Rivers State, Nigeria* (Master's thesis). Retrieved from [https://www.researchgate.net/publication/312623483\\_Difficulties\\_Encountered\\_By\\_Science\\_Teachers\\_During\\_Teaching\\_Concepts\\_Of\\_Science](https://www.researchgate.net/publication/312623483_Difficulties_Encountered_By_Science_Teachers_During_Teaching_Concepts_Of_Science) (ISSN: 2321 – 2454)

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