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Meta-Strategies and Academic Performance in General Biology 1 of Grade 12 Stem Students in Divine Word College of Calapan

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ABSTRACT:

This study titled Meta-Strategies and Academic Performance in General Biology 1 of Grade 12 Stem Students in Divine Word College of Calapan determined the extent of meta-strategies used by students in learning their lessons, particularly their performance in General Biology 1 subject. The research study covers the 116 grade 12 STEM student -respondents of Divine Word College of Calapan. In order to determine the relationship between the meta-strategies and academic performance in General Biology 1, descriptive correlational method was utilized. The respondents were selected using simple random sampling technique. The researcher adapted questionnaires from different sources to determine the relationship between the utilization of meta-strategies of the learners with respect to their academic performance. Pearson's r moment correlations were used to analyze the data gathered. Findings of the study revealed that the respondents extent of meta-strategies – storage and retrieval, self-regulation, and critical thinking, were being practiced by grade 12 STEM students of Divine Word College of Calapan and is interpreted in a high extent level. The academic performance in General Biology 1 of grade 12 STEM students of Divine Word College of Calapan is at advanced level. There was a significant relationship between the meta-strategies and academic performance of grade 12 STEM students of Divine Word College of Calapan in the course General Biology 1.

Keywords: Meta-strategies, Academic Performance, Biology, Senior High School

Introduction:

Learning, in today's society has been more challenging than the past years. The mode of education that our parents used to have was different from what we had and to what the future learners will be having. Along the years, education has always been improving with its continuous curriculum development in order to adjust the current needs of the society. It makes one to not only realize his/her potentialities but also enables one to use them for the development of oneself and the country. Awareness of the different learning style preferences of students will eventually lead to more effective learning experiences (Magulod, Jr., 2018).

One of the major subjects being highlighted and prioritized in today's curriculum is Science education. Science allows students to explore their world and discover new things. (Das, Amrita, & Singh, 2014). Their curiosity drives them to learn and discover how things work around them. Among other subjects, this is also an active subject, containing activities such as hands-on labs and experiments which excite and stimulate the students' learning. Senior High School, the additional 2 years in basic education under K-12 curriculum, "completes" basic education by making sure that the high school graduate is equipped for work, entrepreneurship, or higher education. This is a step up from the 10-year cycle where high school graduates still need further education (and expenses) to be ready for the world ((PCOO), 2013). In addition, finishing senior high school also allows students to study general education subjects that they would not have otherwise studied until their first or second year in college.

With the diverse learners in the country, academic track still leads the count of most number of enrollees in Senior High School. One among the most consistent number of students is the strand Science, Technology, Engineering Mathematics. "According to the report of the Department of Education (DepEd), the number of students who became interested in Science and Technology (S&T) has significantly increased to 60 percent all throughout the years,", said Fortunato dela Peña, Department of Science and Technology (DOST) Secretary in his interview with Philippine News Agency (Geminiano, 2018).

Understanding how student learns is perhaps one of the most important parts of helping the learner develop as a person. Learning styles vary from students and they know which method works best for them for them to learn. They are capable of taking charge of their own learning. Metacognition is often simply defined as, "thinking about thinking". The concept was created by John Flavell in the 1970s (Network, 2015). It includes all the processes involved in regulating how we think. Relating metacognition to developing one's self-knowledge and ability to 'learn how to learn' resulted in a high status feature of learning. Every child has different learning preferences but the common thing about children is that they all learn best when they can incorporate items and topics of interest in their studies (Noushad, 2008).

Meta-strategies relate to a person's control over his own thinking process. To some extent, they are dispositional but they regulate the whole process of thinking including attention and the choice of deployment of one or other specific types of thinking. There are several research directions, which deal with these questions. Meta-cognition is the broadest concept; beyond its importance in scientific reasoning it plays an important role in reading comprehension and mathematical problem solving as well (Csapó & Szabó, 2012). These meta-strategies are essential in learning sciences, especially in understanding and mastering complex scientific concepts and ideas. Students may not be aware of that they are already using meta-strategies as they learn and acquire new lesson or skills.

This study makes use of the following meta-strategies as variables (Csapó & Szabó, 2012): storage and retrieval, also known as meta-memory focuses on the memorizing, self-regulation which means the ability to attend to the relevant parts of a problem, and critical thinking in which the ability of learners to examine the validity of the information and its sources are being practiced.

After 2 years of teaching in this institution, the researcher assessed which learning strategy/strategies are mostly used and most effective to Generation Z learners. In the previous year, there were 130 Grade 12 STEM students enrolled in Divine Word College of Calapan. Their general average in General Biology 1 revealed that 11.5% of the students performed very low, 23.1% among them were categorized as low, majority of the population, 36.2% were average, 27.7% showed high in their performance and 1.5% performed very high. This study generally assessed meta-strategies used by undergraduate grade 12 students enrolled in academic track – science, technology engineering mathematics of Divine Word College of Calapan.

The notion that students have preferred learning styles, i.e., that they are visual, audio, or kinesthetic learners, is pervasive in education. While the theory sounds plausible enough, scientists have studied it time and again, and the data overwhelmingly suggest that students do not learn more when presented with information in their preferred style (Riley, 2016). Therefore, the study addressed how meta-strategies used by the selected respondents affect their performance in learning the lessons in General Biology 1 subject.

Methodology:

In order to carry out the study, this chapter presents the specific description of the methodology that was employed and appropriate research tools that have been utilized. Therefore, this part discusses the research design, data gathering instruments, population, locale of the study, data gathering procedures and statistical treatment of data.

RESEARCH DESIGN

The study is a quantitative research using a descriptive-inferential design to determine and explain the meta-strategies used by grade 12 STEM students. It assesses, determines and reports the way things are. Quantitative research describes the data that have been collected on research sample, describes "what is" about the data gathered. In line with the current study, descriptive correlational method was utilized. The study assessed the meta-strategies used by grade 12 STEM students and how it affects their performance in learning Science subjects. Quantitative research focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon. The final written report has a set structure consisting of introduction, literature and theory, methods, results, and discussion. (Babbie, 2010) According to Manuel and Medel 2014, descriptive research involves the description, recording, analysis, and interpretation of the present nature, composition or processes of phenomena. The focus is on prevailing conditions, or how a person, group, or thing behaves or functions in the present. It often involves some type of comparison or contrast. On the other hand, this study used correlational research which is a type of non-experimental research method in where a researcher measures two variables, understands and assesses the statistical relationship between them with no influence from any extraneous variable. In the book "Inferential Statistics: Definition, Uses", (Glen, 2014) defined descriptive statistics which describes data (for example, a chart or graph) and inferential statistics lead in making predictions ("inferences") from that data. With inferential statistics, the data from samples are being taken to generalize about a population.

RESPONDENTS OF THE STUDY

The study was conducted involving present grade 12 students enrolled under academic track - Science, Technology Engineering and Mathematics strand. A total of 116 students are currently enrolled in the present academic year but only 90 students were the respondents for this study.

Table 1

Distribution of respondents

Student-respondents	Total class size	Actual number of samples
Grade 12 – STEM A	40	30
Grade 12 – STEM B	37	30
Grade 12 – STEM C	39	30
Total	116	90

DATA GATHERING INSTRUMENTS

The study utilized questionnaires. The questions were adapted from the following sources: Motivated Strategies for Learning Questionnaire Manual, Self-Efficacy and Metacognition Learning Inventory-Science, Learning Style Survey, GEMA Online Journal of Language Studies and National Institution for Youth Education. The questionnaires were divided into three sections. Part 1 talks about storage and retrieval, second part was about self-regulation and the last part was related to critical thinking. Each section was composed of 10 questions. were distributed to grade 12 STEM students of Divine Word College of Calapan. Set of questions were included to address and fully assess the meta-strategies (storage and retrieval, self- regulation and critical thinking) being practiced by the students and which affects the learning of science subjects.

In determining the performance in General Biology 1, the researcher used the result of the students' 1st semester summative tests. In determining the strength or degree of relationship between the meta-strategies of Grade 12 STEM students and their academic performance in General Biology 1, the table of r-values by Basilia Blay, 2013 was used as basis of interpretation.

Table 2

Interpretation of Pearson's r-values (Correlation)

Range	Interpretation
± 0.01 to ± 0.19	Positive/Negative Negligible/Very Low Correlation
± 0.20 to ± 0.39	Positive/Negative Low Correlation
± 0.40 to ± 0.59	Positive/Negative Moderate Correlation
± 0.60 to ± 0.79	Positive/Negative Moderately High Correlation
± 0.80 to ± 0.99	Positive/Negative High Correlation
1.00	Perfect Correlation

Source: Blay, (Basilia, 2013) Elementary Statistics Revised Edition, Anvil Publishing Inc, Mandaluyong City Philippines

DATA GATHERING PROCEDURES

In the process of data gathering, the researcher sent a request letter to the Principal of Divine Word College of Calapan, asking for the approval to allow the researcher to distribute her questionnaires to the grade 12 students under academic track - STEM enrolled in the institution. The researcher brought the request letter personally to the principal and the questionnaires were distributed to the students through Google forms and administered. The respondents were given 15 – 25 minutes to answer and accomplish it. The average from the result of the summative tests in 1st semester of academic year 2020 – 2021 was the basis for describing the students' academic performance in General Biology 1.

SCALING AND QUANTIFICATION

To quantify the mean responses on the meta-strategies of the grade 12 STEM students, the researcher applied the 4 – point rating scale as follows.

Table 3

Scaling for interpretation of the students' meta-strategy learning skills

Numerical Scale	Description	Interpretation
4	Strongly Agree	Very High
3	Agree	High
2	Disagree	Low
1	Strongly Disagree	No Extent

Table 4

Scaling for the interpretation of the student's academic performance in General Biology 1

Score	Interpretation	Verbal Interpretation
49 – 60	Very High	Advanced
37 – 48	High	Proficient
25 – 36	Average	Approaching Proficiency
13 – 24	Low	Developing
1 – 12	Very Low	Beginning

STATISTICAL TREATMENT OF DATA

Pearson's product moment correlation coefficient, or Pearson's r was developed by Karl Pearson (1948) from a related idea introduced by Sir Francis Galton in the late 1800's. The advantage of using Pearson's r is that it is a simple way to assess the association between two variables; whether they share variance (covary), if the relationship is positive or negative, and the degree to which they correlate (Chee, 2015).

Pearson's r was used for the relationship that existed in the variables involved in the study. Pearson Product Moment Correlation Coefficient was utilized to validate the research instrument.

Results

The results of the analysis present the following findings:

1. In terms of meta-strategies – storage and retrieval, self-regulation, and critical thinking, were being practiced by grade 12 STEM students of Divine Word College of Calapan and interpreted as high extent. The respondents possessed the ability to store knowledge and retrieve them through various ways such as taking notes, making mnemonics, creating clues, reading and voicing out the terms as they memorize, and decluttering information by clumping related information with what they had already known. In addition, they were aware of their progress, and they strategized to make ways on how to develop their understanding in the lessons in General Biology 1. They made plans, adjusted to the situation and reflected on their learnings. Moreover, it was noteworthy that the respondents possessed the ability to think critically that extended beyond their horizons. The students' performance showed that they are flexible in switching their learning styles in one way to another in order to absorb the topics effectively.

2. The academic performance in General Biology 1 of grade 12 STEM students of Divine Word College of Calapan was at advanced level. The Divine Word College of Calapan – SHS Grade 12 students had mastered the subject matter as shown by the advanced level of their performance based on their summative tests. Even though struggling, the respondents adapted to the situation and worked to have high grades during this pandemic crisis.

3. There was a significant relationship between the meta-strategies and academic performance of grade 12 STEM students of Divine Word College of Calapan in the course General Biology 1. The meta-strategies obtained low correlation with positive direction.

4. Meta-strategies – storage and retrieval, self-regulation, and critical thinking had positive effect on academic performance of grade 12 STEM students of Divine Word College of Calapan in learning General Biology 1. Students may not have been aware about the result of this to their academic performance, but as the outcomes showed, even low, still it had a positive effect.

Conclusion

Based on the findings of the study, the researcher has come up with the following conclusions:

1. Divine Word College of Calapan – Senior High School Department has a high extent level in General Biology 1 in terms of meta-strategies: storage and retrieval, self-regulation and critical thinking.

2. The academic performance in General Biology 1 of Divine Word College of Calapan grade 12 STEM students is at advanced proficiency level.

3. Meta-strategies such as storage and retrieval, self-regulation, and critical thinking have low yet positive effect on the academic performance in General Biology 1. On the down side, however, there may be other factors affecting the academic performance of the students such as parents, teachers, classmates, strategy in teaching, online class set-up (availability of resources like android/ios phone, laptop, tablet, computer), technical difficulties (unstable internet connection, electrical interruption), environment, demographic profile and also curriculum.

4. The findings of the study are useful in the formulation of inquiry-based activities to further enhance the student's meta-strategies when integrated into the subject matter.

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