Adaptive Coping Strategies in Learning General Mathematics Instructions Through Self-Learning Modules (SLMs)

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Abstract— When Filipinos experience pandemic due to COVID-19, the educational system adjusted through the interim guidelines like changing for a while the teaching instructions into modular distance learning and the main learning resources are Self-Learning Modules (SLMs). In this study, the authors determined the adaptive coping strategies in learning General Mathematics Instruction through SLMs by Grade 11 students in Mayon National High School, School Year 2020-2021. The researcher applied descriptive design, utilizing both qualitative and quantitative methods of research. The respondents were 30 randomly selected Grade 11 students from two different strands. A questionnaire in checklist form was the main instrument in this study that was validated by 5 mathematics and language experts. This undertaken a reliability test using Cronbach Alpha Analysis with 0.87 value which means fairly high and reliable. The researcher also gathered existing data which are the final grades of the respondents in General Mathematics. The data gathered were tabulated and analyzed using frequency, percentage, weighted mean, standard deviation, Pearson correlation coefficient, and coefficient of determination. The authors concluded that the adaptive coping strategies employed by the students along personal, family, environment, peer, and finances in learning General Mathematics instruction through SLMs varied. The responses of the students in learning General Mathematics along teacher and SLMs were mostly positive. In addition, there was moderate significant relationship between adaptive coping strategies employed by the students along personal factor while the other variables such as family, environment, peer, and finances were insignificant relationships on the performance level of students in General Mathematics through SLMs instructions. The problem observed was poor foundation in Mathematics under personal factor which was the main focus on the action plan proposed by the authors entitled Mathematics Tutorial: A Walk to Teach Amidst Pandemic.

Keywords— adaptive coping strategies, covid-19, cronbach alpha analysis, general mathematics, mathematics tutorial: a walk to teach amidst pandemic,

modular distance learning, pandemic, self-learning modules (SLMs).

I. INTRODUCTION

Pandemic brought chaos all over the world. This affects the education sector that conveyed changes especially in the Philippines where not everybody can afford to buy gadgets or smart phones for communication and facilitate or participate in online classes. Some places had poor internet connections that would limit others to learn using different platforms. In these situations, the Department of Education decided to adopt modular distance learning using SLMs as the main tool in the learning process. This alternative mode of delivering learning would cater all types of learners in whatever situation they may be in. Moreover, this is adopted to make sure that learning continues while assuring the health, safety, and wellbeing of all students, teachers, and other DepEd employees (Department of Education, 2020 p.2-4).

Daries (2009) describes module as an element work through instruction that is practically self-phase and a method of teaching that is based on the concept of developing and enhancing skills and knowledge. SLM is a pushing factor to develop independent learning among students.

The use of SLMs may not guarantee to produce a quality education but the mission and vision of educators still continue. Some of their missions are to develop and enhance critical thinking and problem-solving skills which are the twin goal of Mathematics in K to 12 Curriculum (Department of Education, 2016). Therefore, the researcher focused on General Mathematics since it satisfies all these skills in just one field of interest.

In a local context, General Mathematics is one of the challenging subjects in Grade 11 and the new learning modality which is modular approach may give huge impact to the students' learning. In fact, in the presence of teachers to learn this subject is relatively difficult for them, up to what extent do learners may continue and

learn from this subject through SLM instructions without the presence of teachers in the teaching-learning process.

Thus, modular approach in teaching inspired the authors to determine the adaptive coping strategies of Senior High School students in learning General Mathematics instructions which offered on the first semester during pandemic while the teachers used SLMs as learning resources in the learning process. Anchored on this topic are the adaptive coping strategies of learners along with the different factors such as personal, family, environment, peer, and finances; the different factors that affect the learning of students along teacher and the self-learning modules; performance level of students in General Mathematics; relationship between adaptive coping strategies along the identified variables and the performance level of students in General Mathematics; and the proposed action plan that can be implemented based from the results of this study.

Based on the observation of the authors in giving first quiz, where there were items that need solution the students did not answer while in multiple choice item, they had answers. In this case, the students just answered those items that may be answered correctly based on luck. Upon the intervention made by the researcher, she found out that the learner had difficulty in answering the questions especially those with required solutions. The varied observations stated ignite the interest of the researcher to investigate deeply and be able to find ways on how to help them and other learners to improve their academic performance not only in General Mathematics but also in other learning areas. This may also enlighten the learners and parents to realize the benefits of modular distance learning for the students to learn independently on their own pace and be the catalysts of change.

II. METHODOLOGY

A. Research Design
A descriptive design was used in this study. Both qualitative and quantitative methods of research were utilized.

B. The Sample
The sample of the study were Grade 11 students from Mayon National High School, School Year 2020-2021. There were 30 samples which is 32% of the population. They were chosen from two different strand such as Academic Strand- General Academic track and Technical Vocational and Livelihood Strand. To assure the validity of the results, the samples were chosen using simple random sampling applying the lottery system.

This was also applied to assure that everyone in the population had the chance to be chosen as respondents.

C. The Instrument
The main instruments used in this study was a questionnaire. This was divided into two parts, the first part intended for the possible adaptive coping strategies applied by the respondents in learning General Mathematics instruction through SLMs. The second part was the factors that affect the learning of students in General Mathematics along teacher and self-learning modules.

To quantify the answers of the students, the researcher used Likert Scales. Likert Scale is a type of rating scale used to measure attitudes or opinions. With this scale, students are asked to rate items on a level of agreement. The scale itself is essentially arbitrary but is commonly presented as a 5-point scale. These can be as followed: (5) strongly agree, (4) agree, (3) neutral, (2) disagree, and (1) strongly disagree (Beyer, 2002).

D. Validity and Reliability
To ensure the validity of the instrument, the researcher asked for three Mathematics Master Teachers to validate the content and its connections to the statement of the problem. The two English teachers also checked the grammar and language used.

The dry run test was administered to ten Grade 11 students in Oras National High School. Using Cronbac's Alpha, the researcher obtained 0.87 reliability which interpreted fairly high. According to Bruin (2011), Cronbac's Alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. Thus, the authors assured the internal consistency and reliability of the instrument used.

D. Data Analysis
The data gathered were presented using tabular and textual forms. The data obtained were analyze using frequency, weighted mean, standard deviation, percentage, Pearson r, and coefficient of determination depending on the purpose of interpretation.

To interpret the responses and the final grades of students in General Mathematics, the likert scale indicators and grading scales in that order were utilized. According to Llego (2021), the grading scales with corresponding descriptions were as followed: (90-100) Outstanding, (85-89) Very Satisfactory, (80-84) Satisfactory, (75-79) Fairly Satisfactory, (Below 75) Did not Meet Expectations.

III. RESULTS ANS DISCUSSION

Adaptive Coping Strategies in Learning General Mathematics Instructions through Self-Learning Modules (SLMs)

There were five identified factors on the adaptive coping strategies of the students in accomplishing their self-learning modules such as personal, family, environment, peer, and finances. Each finding was presented below.

Personal. Most of the students agreed on the identified adaptive coping strategies along personal factor having an overall weighted mean of 3.73 and this was supported by the overall standard deviation of 0.97 means their responses were clustered closely around the mean. The common adaptive coping strategies they employed and interpreted agreed were responsible in accomplishing modules with 4.30-weighted mean and 0.88 standard deviation (SD), follow the schedules in Weekly Learning Plan made by the adviser with 4.27-weighted mean and 0.87 SD, and use of gadgets/ cell phone to research for further information about the lesson having 4.13-weighted mean and 1.31 SD.

Furthermore, there were two neutral responses which identified difficulty in strengthening their foundation in Mathematics with 3.20-weighted mean having 1.10 standard deviation and could not manage their stress while accomplishing their tasks in Self-Learning Modules with 3.60-weighted mean having 1.10 SD. Both had high standard deviation among others that means there were still few of the students who could strengthen their basic knowledge in Mathematics and could able to manage their stress.

This result was connected to constructivism as a theory for teaching and learning. According to McLeod (2019), constructivism's idea is that student learning is constructed, that they build their new knowledge base from the foundation of previous learnings. Thus, students who had poor foundation in Mathematics could not easily learn new concepts.

In terms of stress management, Carnicer, Calderon, Garrido (2019) found out that the students who were under more stress performed worse and the most crucial effect is on the academic outcome of students especially the teacher could not guide the students personally.

Family. The most commonly employed adaptive coping strategies which interpreted agreed were parents exhibits fair treatment of their children with 4.17-weighted mean and 0.83 standard deviation (SD), maintain good family relationship having 4.03-weighted main and 0.10 SD, and siblings care for the welfare of students with 4.00-weighted main and 0.83 SD. Having small value of standard deviation means there responses

almost the same or nearest to the mean. Moreover, these results showed that one strategy to gain support of the family both the parents and siblings is to maintain good relationship with them.

The results were connected to the study of Madrazo and Dio (2020, p. 457), about students who satisfied with the utilization of the learning modules that bridged their learning gaps in the conic section through independent learning. They also indicated their developed contextualized learning modules promoted independent learning.

This study supported the results since self-learning module is self-paced, the learning activities developed were from simple to complex, there were key to correction to let students discovered whether their learning were on the right track and it promoted independent learning. The participants also developed this attitude towards their study through modular distance learning.

Environment. Based from the results, two adaptive coping strategies such as find a silent place to study with 4.10-weighted mean having 1.06 standard deviation and with stable internet connection with 3.50-weighted mean having 1.31 SD both were interpreted agreed. While the least response was finding place where music can be played while studying with 3.30-weighted mean having 1.29 SD and this interpreted neutral.

The common adaptive coping strategy employed by the students was finding a silent place to study. According to a student he was distracted when there is music playing that he encouraged to sing not to study. However, due to the value of SD which was the highest among the rest. This weaken the result because there were still few of them who like to study while music playing and this was supported by Lipoff (2011) she concurred that music encourages learner's memorization skills, it creates comfortable and enjoyable atmosphere. This offers opportunity to explore connection between music and math.

Peer. The most agreed adaptive coping strategies along peer factor were adaption of positive attitude of friends toward study having 3.97-weighted mean and 0.96 standard deviation, ask questions to their classmates on what to do about the modules with 3.67-weighted mean and 1.12 SD, peer tutoring/ group studying with 3.57 weighted mean and 1.28 SD and this had the highest standard deviation. Upon the interview conducted by the researcher, she found out that there were students who do not want to study with peers. For them they consumed time because instead of studying they were talking other things unrelated to their lessons.

The idea of Nawaz and Rehman (2017, p.27) supported the findings in peer factor. They studied about the effects of peer tutoring as a strategy of teaching on students' success in the subject of mathematics secondary level. They found out that peer tutoring strategy found fruitful in increasing the academic achievement of students who were weak and mediocre also.

Finances. The most employed adaptive coping strategy along financial factor was with smart phone for searching information having 3.83-weighted mean with 1.34 standard deviation followed by enough money to support their school needs having 3.63- weighted mean with 1.07 both were interpreted agreed. Having smart phone for searching information had the highest weighted mean and standard deviation. This only inferred that some students did not agreed on this coping strategy.

However, humanistic learning theory that was one principle of Reid, Jessop, Miles (2020) on their study. They found out that there were consistent evidence that financial concern may affect students experience like causing stress that may affect academic outcomes. Shraples, Taylor, & Vavoula (2005) concurred also that through mobile learning the students learn anytime, anywhere and move from one topic to another. This mobile learning is suited in modular distance learning that is why financial support of parents especially in providing smart phone to students is useful to cope with their difficulties in the modules especially the subject is General Mathematics that is complex in nature.

On the other hand, having high value of SD indicated that there were still students who did not agree on this indicator. When the researcher interviewed a student, the response was his parents could not afford to buy smart phone. However, he could still accomplish the modules in General Mathematics especially there are learning materials in this subject provided by the school that could be utilized for further information.

Factors that Affect the Learning of the Students in General Mathematics

The identified factors that possibly affect the learning of students in General Mathematics were teacher and self-learning modules. The findings were specified below.

Teacher Factor. Majority of the responses about their teacher were positive that encourage them to accomplish their modules. In fact, the overall weighted mean was 3.88 that was interpreted agreed. To support these results, the overall standard deviation was 0.94 value. According to the computed standard deviation in every indicator, the responses of the students were gathered

closely around the mean because of its small values. Thus, the results were more consistent and balanced.

The common factor were responses to feedback given by students with 4.13 weighted mean, immediately response when being asked by the students with 4.07 weighted mean, and fairly treated most of the respondents with 4.00-weighted mean.

In the study conducted by Afroz, Islam, and Rahman, & Zerin (2021) about the teachers' attitude towards online classes during pandemic, they found out that insufficient support from teacher was one of the recurrent negative aspects of online learning experience. In connection with the present study, the teacher had a big role in distance learning. Thus, the attitude of the teacher in supporting his students is one factor to consider. Thus, according to the result, the teacher showed support by responding immediately on students' queries and feedback.

Self-Learning Module Factor. The self-learning modules appropriate to the current knowledge and experiences of the learners and module deepened their understanding of the subject matter. Since it suited on their knowledge and experiences they will really learn meaningfully.

The result was connected to Piaget's Theory of Cognitive Development to Mathematics Instruction. According to Piaget as mentioned of Ojose (2008), the formal operational stage where Grade 11 students belong are capable of forming hypothesis and deducing possible consequences, allowing the child to construct his own mathematics. Furthermore, the child typically begins to develop abstract thought patterns where reasoning is executed using pure symbols without necessity of perceptive logically in the abstract. Thus, Grade 11 students are ready to learn independently through self-learning modules.

Performance level of the students in General Mathematics

The 18 students having 80-84 final grades which is 60% of the entire sample had the dominant result because of its high frequency compare to succeeding scales which interpreted satisfactory. Thus, the respondents had neutral grades means not low but not also high.

Relationship of the adaptive coping strategies to the performance level of the students

The authors found out the relationship between adaptive coping strategies of the students and their performance level in General Mathematics along the identified variables such as personal, family, environment, peer, and finances.

Among the variables involved only personal factor had significant relationship to the performance level of students in General Mathematics. With a degree of freedom of 28 and level of significance of 0.05, the computed Pearson r value for personal factor was 0.37 which means that there is a moderate relationship between the personal adaptive coping strategies of the students and their academic performance in General mathematics. The obtained result based on Appendix A also shows that with the p value of 0.044 which is less than significance level of 0.05, the researcher failed to accept the null hypothesis. This means that there is a significant relationship between the personal adaptive coping strategies of the students to their performance level in General mathematics through self-learning modules.

However, the coefficient of determination is 0.001936 which indicates that there was 0.19% of the variation on the significant relationship between the adaptive coping strategies employed by the respondents along personal factor in learning General Mathematics through SLMs and their performance level.

Moving forward, the results for the adaptive coping strategies employed by the students along family, environment, peer, and finances had insignificant relationships to the performance level of students in General Mathematics. Thus, the null hypothesis was accepted.

Proposed Action Plan based from the results of the study

The authors came up with an action plan entitled "Mathematics Tutorial: A Walk to Teach Amidst Pandemic". This is based on the striking results in personal and self-learning modules such as difficulty in strengthening their foundation in Mathematics and difficulty in understanding the discussion and Mathematical terms.

If this action plan will be implemented, the students who had poor foundation in Mathematics will be given opportunity to review and recall those concepts during vacation like operations on integers, algebraic expressions, polynomials, and rational expressions. Some lessons which were identified least learned competencies from the previous year will also be discussed such as inverse of one-to-one function and solving rational inequalities.

IV. CONCLUSION AND RECOMMENDATION

The adaptive coping strategies employed by the students in learning General Mathematics Instructions along personal, family, environment, peer, and finances factors that help them learn more through self-learning

modules were varying. The students may continue all the positive adaptive coping strategies they employed in learning General Mathematics Instructions through Self-learning Modules. In addition, the students may improve or enhance those neutrally employed strategies.

Most of the attitude of teacher and the content of the self-learning modules positively affect the learning of students in General Mathematics. The teacher may continue the attitude employed towards students. However, the teacher may be more accommodating even on negative comments for professional growth and improvement of teaching instructions. In addition, the self-learning modules promote independent learning but the language to be used must be simplified or explain clearly. Most of the students had satisfactory grades in General Mathematics. The students may improve their performance in General Mathematics through self-learning modules by joining the tutorial class proposed by the authors. There was a moderate significant relationship between adaptive coping strategies employed by the students along personal factor and their performance level in General Mathematics. The strategies they employed along personal factor may be improved and enhanced like strengthening their foundation in Mathematics. The conduct of the action plan entitled "Mathematics Tutorial: A Walk to Teach Amidst Pandemic" is crafted to strengthen the foundation of the students and maybe further reviewed.

APPENDIX

Relationship between the adaptive coping strategies and the performance level of the students.

Statistical Bases	PERSONAL	FAMILY	ENVIRONMENT	PEER	FINANCES
Statistical Analysis					
Degrees of Freedom	28	28	28	28	28
Level of Significance	0.05	0.05	0.05	0.05	0.05
Computed r value	0.37	0.30	0.09	0.01	0.13
Relationship	Moderate	Moderate	Low	Low	Low
p-value	0.044	0.107	0.636	0.958	0.494
Decision on Ho	Reject Ho	Accept Ho	Accept Ho	Accept Ho	Accept ho
Interpretation	Significant	Not significant	Not significant	Not significant	Not significant

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