

Department of Education  
Region X  
Division of El Salvador City



*Transforming Schools,  
Forging Partners*



# THE SAVIOR PEN

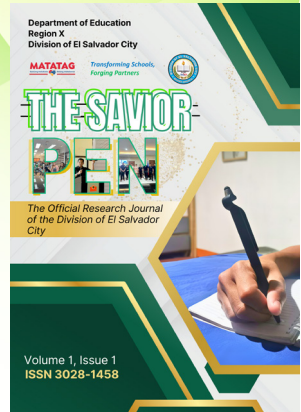
*The Official Research Journal  
of the Division of El Salvador  
City*

Volume 1, Issue 1  
**ISSN 3028-1458**



# About The Cover

The cover *The Savior Pen* glitters with vibrant hues of yellow and green, embodying the emblematic colors of the Division of El Salvador City. At the right side of a backdrop, brilliant yellow shines symbolizing enlightenment and discovery, a figure of a scribe, wielding a pen as a tool for expression and transformation.



Behind *The Savior* are two horizontal lines which create a paradoxical element of division and unity. The lines visually divide the words into segments, indicating a form of division; nevertheless, within the word itself, it also serves to unite these segments, creating a cohesive whole. The lines visually divide the words, but it also contributes to its overall unity, serving as a symbolic representation of the complexity and interconnectedness inherent in research and innovation.

Each letter of the word *PEN* is adorned with images of the researchers who authored significant studies this school year. Each image captures moments of inspiration, collaboration, and breakthrough. Their faces reflect the diversity of expertise and backgrounds that contribute to the richness of research within the division. Green accents dance across the cover, mirroring the Division's commitment to sustainability and growth through technological advancements and groundbreaking research initiatives.

This fusion of yellow and green speaks volumes about El Salvador City's relentless pursuit of knowledge and ingenuity. The pen represents not only the preservation of wisdom, but also the relentless quest for innovation that drives its personnel forward. As readers delve into the pages beneath this cover, they embark on a journey through the cutting-edge research and transformative ideas that define El Salvador City as a beacon of intellectual curiosity and a forward-thinking organization.

Department of Education  
Region X  
El Salvador City Division



# The SAVIOR PEN

*The Official Research Journal of the Division of El Salvador City*

Volume I, Issue I  
ISSN 3028-1458

Year 2024

Published Annually by:

DepEd Division of El Salvador City  
Zone 3, Poblacion, El Salvador City

Telefax No: (088) 555-0475

Email Address: [elsalvador.city@deped.gov.ph](mailto:elsalvador.city@deped.gov.ph)

Website: [depedelsalvadorcity.net](http://depedelsalvadorcity.net)

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Congratulations to the people behind the success of the publication. Indeed! You are the true jewel of the department worth commendable of your contribution and achievement. It is with great pride and enthusiasm that I extend my heartfelt gratitude to each and every one of you for your dedication and commitment to our shared vision of progress and enlightenment in the education sector.

As you embark on the noble endeavor of publishing the volumes of the The Savior Pen, we are not merely committing ink to paper; we are forging pathways to knowledge, understanding, and innovation. In the pages of the journals about to publish lie the stories of our collective journey towards excellence in education, where every word penned, every idea explored, and every discovery made serves as a beacon lighting the way forward. Through diligent research, tireless dedication, and boundless creativity, we have cultivated a treasure trove of insights that have the power to transform lives, shape futures, and build a brighter tomorrow. But our journey does not end with the publication; it is merely the beginning of a new chapter in our quest for excellence. As stewards of knowledge and champions of progress, it is our duty to ensure that these invaluable resources reach every corner of our community, empowering educators, inspiring learners, and fostering a culture of lifelong learning.

Therefore, I call upon each and every one of you to join hands in extending our support to the publication and dissemination of the The Savior Pen. Let us pledge our resources, our expertise, and our unwavering commitment to ensuring that the light of knowledge shines bright in every classroom, in every home, and in every heart.

Together, let us continue to write the story of our community’s success—one page, one discovery, and one act of generosity at a time. For in the pursuit of knowledge, there are no limits to what we can achieve, and no obstacles we cannot overcome.



**HON. EDGAR S. LIGNES**

The Division of El Salvador City recognizes the indispensable role of research in identifying and fostering breakthroughs within the educational domain with a keen emphasis on delving into research perspectives. The Division aims to effectively address challenges encountered in the field, ultimately fostering a transformative impact among educators and stakeholders.

With immense pride and heartfelt gratitude, we are excited to present the inaugural volume of *The Savior Pen*, in alignment with the mandates outlined in DepEd Order 39, s. 2016 (Adoption of the Basic Education Research Agenda). This esteemed research platform underscores the scholarly inquiry in shaping policies and realizing objectives that directly impact the educational journey of learners, thereby propelling the Department of Education towards its vision.

I extend my profound appreciation to the members of the Editorial Board and our invaluable partners whose unwavering dedication and expertise have been instrumental in bringing this endeavor to such realization. Furthermore, I extend warm congratulations to the proponents of this volume for their innovative practices and methodical approach in conceiving, executing, and documenting interventions and innovations that promise to catalyze positive change in our educational landscape.



**RANDOLPH B. TORTOLA**

Research stands as the cornerstone of our nation’s educational framework. With the Department of Education’s mandate to formulate policies and mechanisms fostering a perpetual enhancement in the provision of quality basic education services, it is an imperative for its personnel to engage in educational research and studies across all themes, serving as the substratum for progressive reforms and policy evolution.

DepEd advocates the cultivation of a research-centric ethos within educational settings. Consequently, educational innovations are expected to be rooted in data and evidence, with a focus on enhancing the leadership acumen of school administrators, pedagogical prowess of educators, and academic achievements of students.

This maiden issue of *The Savior Pen* serves as a testament of continuous improvement and a platform to showcase the findings and innovations stemming from the dedicated efforts of our educators and school administrators as they navigate the challenges thereof. Furthermore, it implores both teaching and non-teaching personnel to introspect on their experiences and glean insights from their innovative practices.

I extend my heartfelt felicitations and profound gratitude to the researchers, editorial board, members of the Schools Division Research Committee (SDRC) and esteemed panel of experts from various prestigious educational institutions. Likewise, I acknowledge the unwavering support of local government officials led by Hon. Edgar S. Lignes for his dedication and commitment toward the enhancement of educational services, enriching the lives of our cherished Tagnipan-on learners.

May each member of our educational community be emboldened to pursue research endeavors fervently, bridging the existing knowledge and fostering a culture of continuous improvement. Wishing you all a fulfilling journey in scholarly pursuits.



**CONNIEBEL C. NISTAL, PhD**

**Asst. Schools Division Superintendent  
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# PREFACE

The Savior Pen (*a rebranding from the previously released volumes*) is a peer-reviewed journal, providing a platform for showcasing classroom-based interventions by teachers, innovative initiatives by school leaders, and Division-wide endeavors underpinned by rigorous research methodologies. In accordance with its vision, it embodies principles of responsible governance, the pursuit of quality education, and efficient management practices.

As one of the breakthroughs of the Division's Research Agenda, this journal presents ten (10) meticulously reviewed research studies, endorsed by both internal and external peer reviewers, which offer significant insights to enhance the delivery of basic education services. Furthermore, the Division Research Committee diligently evaluates the utilization of these interventions, ensuring alignment with the standards set forth by the Department of Education.



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# DEVELOPMENT OF LSAG AS AN INTERVENTION MATERIAL IN LEARNING REIMANN SUMS

Liza May D. NobI, Chuchie A. Quiring<sup>2</sup>  
Cogon National High School

## ABSTRACT

Technology integration in teaching and learning Mathematics has been proven to address many of our learners' needs and interests. Technology influences our learners' learning styles – they prefer to see, touch, and experience the topics they encounter in school. The present study developed a learner-led simulation-based activities using GeoGebra (LSAG) in Basic Calculus for Grade 11 as an intervention material for learning the concepts of area approximation of bounded regions using Riemann sums under irregular partitions. The study employed a one-group pretest-posttest design with qualitative support. The participants of the study were five (5) in-service mathematics teachers and thirty-five (35) Grade 11 STEM learners in one of the public high schools of El Salvador City. Four (4) LSAG were developed using the five (5) stages of the ADDIE Instructional Design Model (Aldoobie, 2015) which include (1) analysis, (2) design, (3) development, (4) implementation, (5) evaluation. Four (4) math teachers and one (1) designated and trained school LR evaluated the developed activities using the DepEd evaluation tools for printed materials. Results revealed that the material PASSED the required criteria in all four factors (content, format, presentation, organization, and accuracy). Experts evaluated the developed activities using the DepEd LRMSD Evaluation Tools for Printed Materials. This implies that the developed material was ready for the implementation. An achievement test was used to measure the learners' level of achievement in the pretest and post-test. The results revealed that one hundred percent (35) of the participants had improved their level of achievement after the implementation of LSAG.

The paired t-test also revealed that there is a significant difference between the learners' pretest and post-test scores at  $p=0.000$ . Thus, the LSAG was able to help learners improve their conceptual understanding of the topics. The learners' perceptions further revealed that learner-led simulation-based activities using GeoGebra helped them visualize and understand the topics of Riemann sums under irregular partitions.

**Keywords:** conceptual understanding, GeoGebra, learner-led simulation

## INTRODUCTION

Technology influences our learners' learning styles— they prefer to see, touch, and experience the topics they encounter in school. Teachers should design mathematics teaching and learning process to enhance learners' creativity and capacity for building new information to increase their grasp of the subject matter (Defi & Qohar, 2022). The use of computer simulations has been adopted in mathematics learning with the role of improving teaching and learning. As such, the introduction of these technologies triggered pedagogical changes in terms of who leads the use of technology.

GeoGebra is one of the most effective, award-winning, and popular software programs for learning mathematics. In the use of GeoGebra, questions arise about how it is best implemented, either teacher-led or learner-led. Teacher-led learning is defined as classroom activity where the teacher is central to what happens in the classroom (Barnecutt, 2019). Wei & Cheng (2022) similarly describe teacher-led simulations as a teacher-directed demonstration in which the teacher initiates the whole process of unlocking the topics and gaining participation from learners through discussions. On the other hand, learner-led learning is achieved by providing learners with greater responsibility for their learning and encouraging more collaboration within the classroom, while ensuring that active and meaningful learning occurs (Maclean, 2022). It stresses the importance of developing independent and critical thinking and problem-solving skills and increasing engagement in the classroom.

Numerous studies have demonstrated GeoGebra's effects on teaching and learning mathematics to learners and teachers, from their attitudes (Zengin (2017) to the development of their critical thinking (Mushipe & Ogbonnaya, 2019) and problem-solving skills (Misrom et al. (2020); Erdogan & Seker (2017)). Based on the extensive literature review conducted by the researchers, the learner-led simulation approach using GeoGebra needed to be explored. A learner-led simulation provides learners more autonomy to create and manipulate their simulations for their learning. As in creating their simulations, learners are actively involved in modeling situations to aid in learning the subject using a learning activity as their guide.

The main objective of this study was to develop and validate learner-led simulation-based activities using GeoGebra in Basic Calculus (LSAG) in the topics of area approximations of bounded curves using irregular Reimann sums. The researcher developed the LSAG using the ADDIE Instructional Design Model to help improve learners' conceptual understanding of area approximation of regions bounded by curves using the Reimann sums. The learners' achievement level and perceptions were the ground for investigation using the LSAG. Moreover, part of the limitation

of the study was the selection of one (1) section only for the Grade 11 STEM since the targeted school has only one section available in the Grade 11 STEM strand. The researcher-made perception questionnaire was then given to learners for qualitative support. Furthermore, the implementation of the study was covered within one week only in a face-to-face manner—results gathered during the implementation served as part of the pilot implementation of the development of LSAG.

## **THEORETICAL FRAMEWORK**

One significant limitation of education is that teachers cannot simply transmit knowledge to learners. Learners must actively create information in their minds. In other words, they discover and transform information, compare new and old knowledge, and change rules when they no longer apply. In the constructivist view of learning, the learner is viewed as an active agent in the knowledge-acquisition process. As cited by Olesugun (2015), constructivist-learning theories have their historical roots in the work of Dewey (1919), Bruner (1921), others (1961), Piaget (1980), and Vygotsky (1962). Constructivists believe learning is affected by the context in which an idea is taught and learners' beliefs and attitudes. To do this, learners must be able to ask questions, explore, and assess what they know. GeoGebra software was created for this same learning theory. Ziatdinov and Valles (2022) cited the works of Hohenwarter (2002), who originated the idea of free and open-source software with a combined feature of interactive geometry software and computer algebra systems. Today, this mathematical software could expand its use even in statistics, probability, calculus, physics, and many other fields. These features allow learners to explore areas and concepts of mathematics by providing a more dynamic learning environment. Moreover, this study utilized the ADDIE model, one of the well-known Instructional Systems Designs (ISD). ADDIE model is an acronym for the five major processes of ISD: Analyze Design, Development, Implementation, and Evaluation. It is one of the most widely used models in the field of instructional design as a guide to creating a successful design (Aldoobie, 2015). It has been utilized to create curricula for various subjects, including library instruction (Reinbold, 2013). The steps of this model are considered not only sequential but also iterative (Widyastuti, 2019) (see Figure 1). Allen (2006) points out that in many new iterations of the ADDIE process, evaluation assumes a central function at every phase.

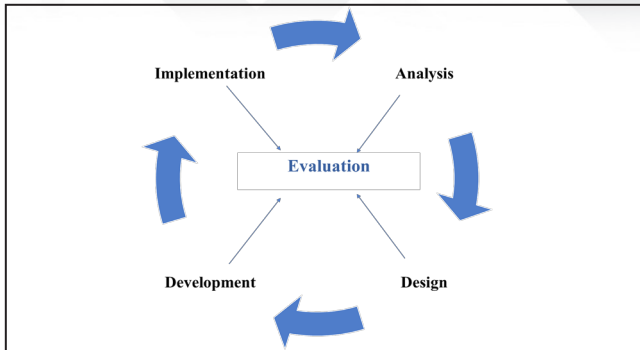


Figure 1.1 The ADDIE Model

## Conceptual Framework

Simulation activities through GeoGebra provide an environment for learning that is very interactive and collaborative between the learner and the teacher (Ziatdinov & Valles, 2022). It is designed to enable proactive teaching and can, thus, focus on problem-solving and assist with developing mathematical experiments and concept introductions both face-to-face and in remote class settings. Of this, the learner-led simulation-based activities were developed for learning selected topics in Basic Calculus. The learners' prior knowledge of Basic Calculus through a pre-achievement test served as the input. The LSAG was developed and evaluated by the evaluators and panel members using the evaluation tools prescribed by the Department of Education Learning Resources Management and Development Systems (DepEd LRMSD). After a thorough evaluation, the LSAG using GeoGebra was implemented to the participants. The expected output was the improved learners' achievement in Basic Calculus and their positive perceptions towards the learner-led simulation-based activities. Figure 1.2 was the graphical presentation of the abovementioned paradigm of this study.

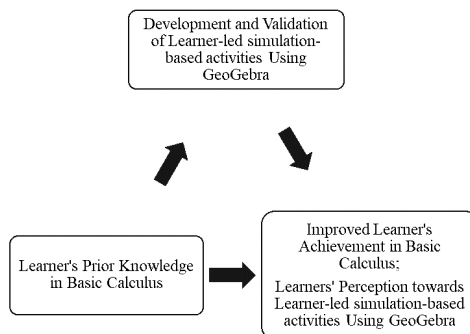


Figure 1.2 The Conceptual Framework of the Study

## METHODOLOGY

This study employed a quasi-experimental research with both quantitative and qualitative support. The learners' scores in the achievement test were used as the quantitative part, while the perception using an open-ended questionnaire served as the qualitative part. The learners' scores in the pretest and post-test were analyzed using the paired t-test since the data was found to be normal using the Shapiro-Wilk test. Lastly, a conceptual content analysis was used to analyze the learners' perceptions of the use of LSAG in learning Basic Calculus. This study was conducted in one of the public high schools of the Division of El Salvador City, Misamis Oriental which offers a STEM strand in the Senior High School Curriculum. In this study, the researcher made use of a complete enumeration technique since the entire section was set as the target participants. Moreover, the chosen participants is the only Grade 11 STEM section in the school where the subject Basic Calculus is their specialized course. Participants of the study was composed of 35 (17 males and 18 females) enrollees in the second semester of SY 2022-2023. The main instruments of the study were the DepEd LRMSD evaluation tools for the material evaluation and validation, the achievement test, and the student perception questionnaire. The study used the ADDIE model in the development of the learning activities following the five stages: Analysis, Design, Development, Implementation (Pilot Testing), and Evaluation (Validation). The gathered quantitative data were analyzed and interpreted using descriptive and inferential statistics with the aid of the SPSS tool. For the qualitative data, qualitative content analysis was used to analyze the transcribed responses of the learners from the perception questionnaires (Morgan, 1993).

## RESULTS AND DISCUSSIONS

### 5.1 Development of LSAG Using the ADDIE Model

In this study, the researcher developed four (4) learner-led simulation-based activities using GeoGebra (LSAG) utilizing the ADDIE Instructional Design model. These materials contained the selected topics in the Grade 11 Basic Calculus Curriculum Guide in specialized subjects for the STEM strand. Specifically, the researcher developed GeoGebra simulation activities that include "The Concepts of Riemann Sum, Step Size, and Partition Points" (Activity 1)," and "Area Approximation Using Left, Right, and Midpoint Riemann Sum Involving Irregular Partitions" (Activity 2 to 4). The discussion that follows presents the thorough steps conducted in the development of the LSAG.

#### ***Analysis Stage***

The first step of ADDIE is the analysis stage. In this stage, the researcher started

by examining the list of least mastered competencies (LMCs) using the previous Division Monitoring, Evaluation, and Assessment (DMEA) report of SY 2021-2022. The most suitable topic given the time constraint and the report was the area approximation of a region under a curve using the Riemann sums.

In selecting the participants, the researcher looked back at the subject at hand and decided to consider the Grade 11 STEM learners since Basic Calculus was offered at their level. Basic Calculus was offered during the second semester among Grade 11 STEM learners. The researcher also considered the available resources such as (1) Android phones, tablets, or computers to be used, (2) the evaluation tools for the developed learning activities, and (3) assessment tools (e.g. achievement tests, rubrics, perception questionnaires). The researcher noted the most important feature of the activity to be learner-centered, which make use of a tool to aid in the visualization and exploration of mathematical concepts to improve learning.

### **Design Stage**

The major tasks in the design stage were to establish learning objectives, identify learning strategies, adapt the learning activity template, and select the appropriate GeoGebra version for compatibility purposes. The learning objectives guided the learning activity. Table 3.2 presents the parts of the learning activity with (A) the original template and (B) the modified template of the learning activity.

**Table 5.1 Original vs. Modified Learning Activity Template**

<b>Original Template</b>	<b>Modified Template</b>
I. Background Information for Learners	I. Overview
II. Learning Competency with Code	II. Learning Competency with Code
III. Directions/Instructions	III. General Instructions for Simulation Activities
IV. Exercises	IV. Guide Questions
V. Guide Questions	V. Rubric for Scoring Short Answer Questions
VI. Rubric for Scoring	VI. Reflections
VII. Reflections	VII. Evaluation
VIII. References for Learners	
IX. Answer Key	

### **Development Stage**

In the development stage, the creation of the LSAG was based on the modified template in the design stage. Seven (7) parts of the developed LSAG followed the same template throughout the development stage.

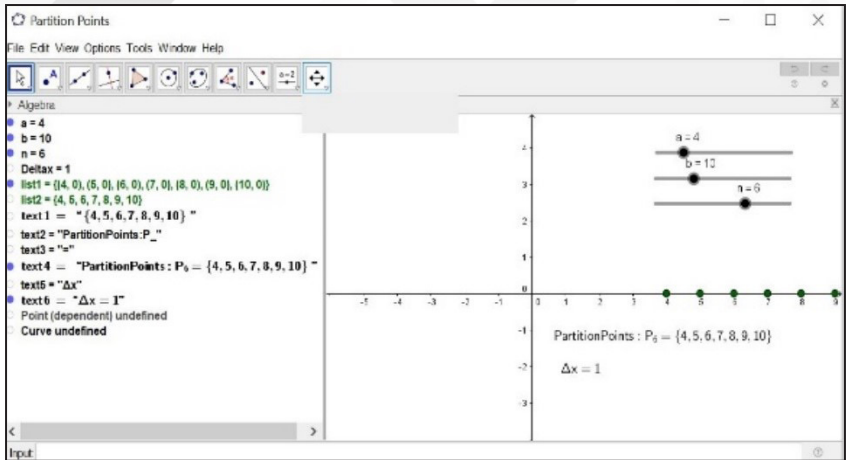


Figure 5.1 Simulation Output in LSAG No. 1

## 5.2 Results of the Experts Validation of the LSAG

The first evaluation tool was the Evaluation Rating Sheet for Print Materials and the second tool was the Educational Soundness Evaluation Checklist.

**Table 5.2** Summary of Evaluation Results of the LSAG Using Evaluation Tool 1

Factors	Panel of Evaluators					Mean	Remarks
	1	2	3	4	5		
Content	28	28	28	28	28	<b>28</b>	<b>Passed</b>
Format	64	68	69	70	68	<b>67.8</b>	<b>Passed</b>
Presentation and Organization	18	19	20	18	19	<b>18.8</b>	<b>Passed</b>
Accuracy of Information	24	24	24	24	24	<b>24</b>	<b>Passed</b>

The mean of each factor falls within the passing interval based on the tool's numerical criteria. This further implies that the resources were proved to be valid and acceptable. In terms of utilizing the DepEd LRMDS Educational Soundness Evaluation Checklist, the developed learner-led simulation-based activities were all recommended for reproduction and distribution in their current format (see Table 5.3).



**Table 5.3 Evaluation Results using Educational Soundness Checklist**

E	Specifications (No. of Observable Qualities)				Total	Remarks
	I (6)	LF	U	A		
	(8)	(3)	(5)			
	<i>f</i>	<i>f</i>	<i>F</i>	<i>F</i>		
1	6	8	3	5	22	Recommend reproduction and distribution in the current format. Resource acceptable as is.
2	5	8	3	2	18	
3	6	8	3	5	22	
4	6	8	3	5	22	
5	6	8	3	5	22	

Legend: E-Evaluator, I-Integrity, LF-Learner Focus, U-Usability, A-Accessibility,  
*f*-Frequency of Observed Qualities by the Evaluator

Before implementing the learner-led simulation-based activities utilizing GeoGebra, the researcher administered a pre-test to evaluate the learners' prior knowledge of the selected topic in Basic Calculus. After the implementation of the learning material, a post-test was administered to measure the achievement levels of the learners.

**Table 5.4 Learners' Achievement Scores, Achievement Level, and Percentage**

Score Scale	Transmutation (%)	ITP	Pretest		Post-test	
			F	%	f	%
21-25	90-100	A	0	0	9	26
19-20	85-89	P	0	0	4	11
17-18	80-84	AP	0	0	12	35
15-16	75-79	D	0	0	6	17
0-14	60-74	B	35	100	4	11
	<b>Total</b>		35	100	35	100

Legend: ITP-Interpretation, *f*-frequency, A-Advanced Proficient, P-Proficient,  
 AP- Approaching Proficient, D-Developing Proficient, B-Beginning Proficient

This implies that all the learners were at the Beginning Proficiency level at the start of the study. As observed, the pretest scores of the learners did not meet the passing score (15) of the given test using the prescribed transmutation table by the Department of Education. Pretest results show low performance in most cases since many of the learners were only starting and lacked the necessary knowledge to answer the questions (Lai et al., 2020). After the implementation of LSAG, a post-test was administered. The results revealed that 9 (26%) learners got a score between 21-25 which is on the level of Advanced Proficient, 4 (11%) learners got

a score between 19-20 which is Proficient, 12 (35%) learners got a score between 17-18 which is Approaching Proficient, and 6 (17%) learners got a score between 15-16 which is on Developing Proficient. In addition, 4 (11%) learners whose scores remained in the Beginning Proficient were found to have missed some of the activities during the implementation and considerably took the post-test. Additional follow-up was done to make sure that the learners were able to catch up with the discussion.

**Table 5.5** Summary of the Achievement Test Scores in the Pretest and Post-test

			<i>Paired Differences</i>		t	df	p
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Pretest	7.91	2.45					
Post-test	18.31	2.83	10.4	2.77	22.23	34	.00*

\*significant at  $p < 0.05$

As a result, a paired sample t-test shows that the mean difference is statistically significant at  $p < .00$ , which means that the test score after the implementation of the learner-led simulation-based activities ( $M = 18.31$ ,  $SD = 2.83$ ) is significantly higher than the test score before the implementation ( $M = 7.91$ ,  $SD = 2.45$ ). This implies that there is a significant improvement in the learners' achievement scores after the implementation. The results suggested that the LSAG had increased learners' conceptual understanding of the Riemann sums in Basic Calculus.

### 5.3 Learners' Perception of the Use of LSAG

There are four notable themes emerged from the students' experiences during the implementation of LSAG: 1) the learners were motivated to learn the topics; 2) the material allows the learners to work collaboratively; 3) improve their reasoning skills; and 4) the material provides detailed procedures for the task that learners can follow on their own. The potential of simulation-based instructional materials was also reinforced in the study of De las Penas et. al, 2019. The text that follows presents the theme based on the three (3) structured open-ended guide questions thrown during the interview of the learners and is summarized in Table 5.6.

#### I. The learners were motivated to learn the topics through the integration of LSAG.

Participants commented that learning math topics using LSAG is full of excitement because they can visualize the outputs of their simulation. The feeling is also very fulfilling for them to answer the guide questions by following the procedures accordingly. Below are a few of the learners' responses as proof of their excitement while performing the activities.

*“We are very excited with my teammates whenever we have simulation activities to perform because we can always visualize whatever we input for example the graph a function. Mas masabtan nako ang concepts sa Riemann sum tungod sa mga simulation activities. Mas makareason out napud ko kay Nakita naman nakko ang concepts.”***P7**

The improvement of the student’s motivation using LSAG is consistent with the result of Bakar et al’s (2010) study where learner-centered environments were found to increase learner’s internal motivational orientation. Erdoğan and Şeker (2017) who stressed that simulation-based activity made mathematics learning fun and entertaining support this. Moreover, in the case of LSAG, learners are exposed to interactive simulation activities. According to Radović et al., (2020), learners emphasized that tasks with interactive applets and new kinds of learning materials inspired them to learn more, both in school and at home. Thus, LSAG could be a great motivational tool for learners in learning mathematics subject. Teachers may also use this as an intervention tool to improve the level of motivation among their learners.

## **2. The LSAG allowed the learners to work collaboratively.**

Students perceived the LSAG to have promoted collaboration. It was initiated in different contexts. For some, collaboration starts especially when one commits an error in the simulation. Here, the student starts seeking assistance from his/her teammates. For some, it happens from the start itself of the simulation activities until answering the guide questions. Below are a few of the learners’ responses as proof of their collaboration.

*“With my partner, we helped each other to accomplish the activity. Mostly, we shared ideas to answer the different guide questions. Usahay mag.argue pud mi asa nga values ang masunod ug insakto. By this, we are able to help communicate our ideas properly.”*

**P28**

This only means that collaboration is indeed an important factor that allowed the learners to accomplish the LSAG. This result is consistent with the findings of Bayaga et al., (2019) that interactive activities involving GeoGebra allowed the learners to be highly engaged in the learning processes and actively collaborated with other learners rather than remaining passive learners. Moreover, Shadaan & Leong (2013) encouraged a more interactive teacher-student interactional environment where everyone worked as a team to guide, help and assist one another to reach the required goals.

## **3. The LSAG allowed the learners to improve their reasoning skills.**

Learners have made mentioned that LSAG allowed them to improve their reasoning

skills. As a result, they are able to provide correct justifications in their answers. They are also able to analyze carefully each other's ideas and able to select the best solution to the problem.

Similar results were also found in the study of Bayaga et al., (2019) where 78 % of the learners strongly agreed that learning Euclidean geometry using GeoGebra activities improved their reasoning skills. Figure below shows the extract from one of the guide questions in the activities answered by the learners.

6. In general, what do you think will happen to the area approximation relative to the actual area if  $n$  gets very large say  $n \rightarrow \infty$ ?  
Answer:  
As the number of subintervals used in the area approximation increases towards infinity, the accuracy of the approximation relative to the actual area will improve.

Figure 5.2 Sample Answer

The findings agree with the study of Shadaan & Leong (2013) findings where 79% of the learners perceived that they were able to make logical assumptions when attempting to hypothesize in learning circles involving interactive GeoGebra activities.

#### 4. The LSAG provides detailed procedures for the task that learners can follow on their own.

Moreover, learners revealed that LSAG provided them with a detailed procedure of the task allowing them to answer the activities independently. It is worth noting that even in the absence of a teammate; a student was able to do it on his own. Moreover, learners could also check if they are doing the right thing or not because the output of the simulation is presented instantly. Below are excerpts of the learners' responses as proof of this claim.

However, despite the advantages presented by most learners who have improved their achievement score two (2) steps higher, there are two (4) learners in Table 5.4 whose scores have improved but still on a beginning level. Upon reviewing their responses in the perception questionnaire, most of them viewed the material as helpful in learning the topics, only that they had experienced some challenges which includes needing more time and disturbed by non-academic activity.

### CONCLUSIONS AND RECOMMENDATIONS

Based on the analyses of both quantitative and qualitative data, the following were the findings of the study:

1. The development of the learning material adhered to the Most Essential Learning Competencies (MELCS) in the Senior High School under the STEM strand. Using the two (2) DepEd LRMDs Evaluation Rating Sheet for Print Materials and the Educational Soundness Checklist, the learner-led simulation-based activities passed all the criteria including the content quality, format, presentation and organization, and accuracy and up-to-datedness of information. In addition, the materials were also recommended for reproduction and distribution in their current format and were accepted as they were.

2. The learners' scores in the pretest were all in the interval of 0-14 and had a mean of 7.91. This means that all (35) learners were in the Beginning Proficient level prior to the conduct of the study. After the implementation, the learners got a mean score of 18.31. Using the paired t-test, the results showed that there is a significant difference between the pretest and post-test scores of the learners.

3. Learners were motivated to learn using the learner-led simulation-based activities with GeoGebra as they claimed.

4. School administrators may encourage teachers to develop learning materials that make use of the ease and advantages of GeoGebra in learning mathematics at all levels.

5. Future researchers may conduct a similar study on developing LSAG, specifically on other least learned competencies in mathematics. They may implement it using a control and experimental group to attain higher reliability of the results and a more extensive investigation of the effects of the implementation.

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# STRESS, COPING, AND LIFE SATISFACTION: DETERMINING MENTAL HEALTH AMONG EL SALVADOR DEPED TEACHERS

Faith Quinal-Colarte, RGC  
District I, Division Office

## **ABSTRACT**

This research delves into the complex interplay between stress, coping mechanisms, and life satisfaction among teachers in District I of the Division of El Salvador City. Through a comprehensive analysis of data collected from a sample of teachers, the study investigates the relationships between perceived stress, coping mechanisms, and satisfaction with life. In the study, 100 elementary and high school teachers participated. To gather data, purposive sampling was conducted using the Perceived Stress Scale, the Scale of Life Satisfaction, and the Inventory of Stress Coping Resources as measurement tools. The influencing effect of coping mechanisms on the interaction between perceived stress and life satisfaction was examined using descriptive statistical analysis utilizing mean and standard deviation as well as regression analysis and item analysis on the variables. Key findings reveal a high prevalence of stress among teachers, with female participants reporting higher stress levels compared to their male counterparts. Variations in stress levels across different positions underscore the need for targeted interventions to support teachers in high-stress roles. The study highlights the significance of effective coping mechanisms, such as wellness strategies, thought control, and tension reduction, in mitigating stress and enhancing overall well-being. Recommendations stemming from the study include the provision of mental health resources and support for teachers, addressing gender disparities in stress levels, offering tailored support to teachers in high-stress positions, promoting the use of effective coping mechanisms, and maintaining a proactive approach to monitoring teacher well-being.

**Keywords-** *Perceived stress, stress coping resources, life satisfaction*



## I. INTRODUCTION

Teaching is a noble profession that shapes the minds of future generations. However, behind the classroom doors lies a reality that often goes unnoticed—the mental health challenges faced by educators. In the Philippines, where education plays a pivotal role in societal progress, teachers grapple with stress, anxiety, and burnout. Let's delve into this phenomenon, supported by relevant research studies. A study investigated workplace stress and depression among educators. The research shed light on the impact of organizational factors, such as inadequate resources and lack of professional development opportunities, on teachers' mental health. It emphasized the importance of creating supportive work environments and promoting self-care practices (Ventayen & Ventayen, 2021).

The pandemic disrupted education worldwide, affecting teachers profoundly. Pekas et.al, 2022, during this challenging period examined the mental health problems faced by Filipino teachers. Isolation, fear of infection, and adapting to remote teaching were major stressors. The study highlighted coping strategies like mindfulness exercises and virtual support groups. The mental health of teachers is a crucial aspect of their professional well-being, directly influencing their performance and the quality of education they deliver. In the Philippines, educators encounter a myriad of stressors that can profoundly impact their mental well-being. Studies have shown that factors such as workload, student behavior, administrative demands, and personal challenges contribute to heightened levels of stress among teachers (de los Santos, 2021).

In the Schools Division of Central Luzon, researchers explored the relationship between teachers' mental health, stress levels, and learning resource development. The study emphasized that educators' well-being directly impacts their ability to create effective teaching materials. Addressing mental health concerns can enhance overall educational quality. Furthermore, the research has highlighted the importance of understanding how teachers cope with stress, their level of life satisfaction, and the implications for their mental health and overall job satisfaction (Jimenez, 2021). Despite these insights, there remains a gap in comprehensively examining the interplay of stress, coping mechanisms, and life satisfaction as determinants of mental health among teachers in specific educational settings, such as DepEd District I, El Salvador City.

Chen et al. (2019) conducted a mixed-methods study to examine the relationship between stress, coping mechanisms, and mental health outcomes among a sample of 995 public school teachers in New York City. Results indicated that coping mechanisms (specifically, active coping and seeking social support) mediated the

relationship between stress and mental health outcomes. In other words, teachers who used these coping strategies were less likely to experience negative mental health outcomes, even in the face of high levels of stress.

According to prior studies (Cao et al., 2019; Yoo et al., 2019), stress and burnout have a major negative impact on teachers' mental health and wellbeing. This can ultimately result in decreased job satisfaction, life dissatisfaction, and even psychological and physical health issues.

During the timeframe spanning from August to November 2022, subsequent to the resumption of classes post the health crisis induced by the COVID-19 pandemic, the Guidance Office District I facilitated wellness and self-care activities for the basic education teachers. These initiatives aimed to evaluate the prevalence of mental health concerns by assessing their stress levels, discerning their coping strategies, and gauging their overall satisfaction with life. Preceding the administration of assessments such as stress perception, life-scale satisfaction, and stress-coping inventory, the guidance counselor provided psychoeducational and psychosocial support activities.

This study aims to address this gap by investigating how stress, coping strategies, and life satisfaction influence the mental health of teachers in DepEd District I. By exploring these factors, the research seeks to provide valuable insights into the well-being of teachers in the district and propose interventions to support their mental health and overall job satisfaction. The research study aims to address the following questions or objectives:

1. How does stress impact the mental health of teachers in DepEd District I?
2. What coping mechanisms do teachers in the district employ to manage stress?
3. How does life satisfaction contribute to the overall mental well-being of teachers?
4. Are there significant relationships between stress, coping mechanisms, life satisfaction, and mental health among teachers?
5. What interventions or support systems can be implemented to enhance the mental health of teachers in the educational setting of DepEd District I, El Salvador City?

## **2. BRIEF LITERATURE REVIEW**

### *Transactional Model of Stress and Coping*

The Transactional Model of Stress and Coping, initially developed by Richard Lazarus and Susan Folkman, has evolved into the Modified Transactional Model

of Stress and Coping. This modified version incorporates personality traits and individual differences in coping strategies into the model. The model consists of five stages: recognizing a stressful event, evaluating the event, initiating coping mechanisms, evaluating outcomes, and potentially reassessing the event. This framework highlights the importance of coping strategies, which can be either emotion-focused or problem-focused and can be influenced by personality traits.

The Modified Transactional Model of Stress and Coping provides a more comprehensive understanding of the stress-coping process by considering individual characteristics and coping mechanisms that can impact how stressful situations are perceived and managed. This model underscores the dynamic nature of stress and coping, emphasizing the role of individual differences in shaping responses to stressors (Folkman, S., & Moskowitz, J. T., 2004).

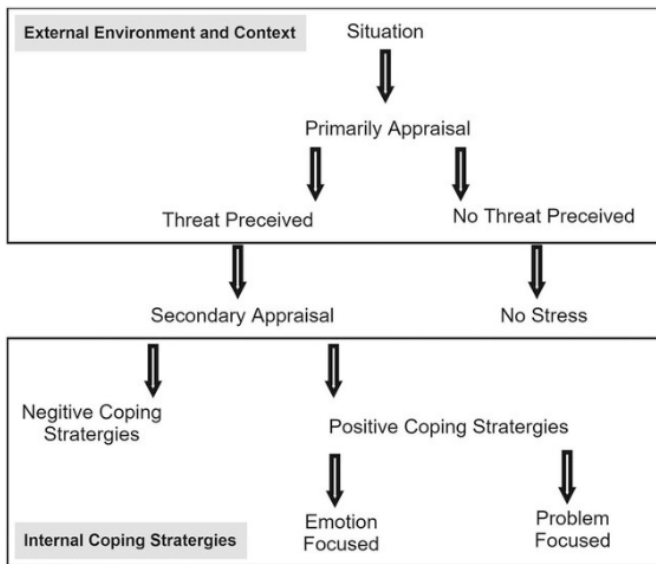


Figure 1. The transactional model of stress (Folkman and Moskowitz 2000; Lazarus and Folkman 1984).

### Perception of Stress

An individual's perception of stress, whether in a moment or over time, is expressed through feelings or thoughts and can impact daily life. The belief that stress negatively affects health is separate from the actual experience of stress; someone may feel they have little stress while still believing it impacts their health. How people perceive stress's impact on health can affect their health outcomes differently than the intensity of their stress. The transactional model of stress and coping, as proposed by Lazarus & Folkman (1984) and others, suggests that a

person's perception of a stressor determines its effects. The model emphasizes the importance of how individuals assess the intensity of an event and their susceptibility to it.

### **Stress Coping Resources**

Effective assessment and intervention are essential for providing proper care for teachers' mental health and wellness. Coping mechanisms play a vital role in protecting against disorders such as anxiety and depression (Bisschop, et.al, 2004; McCarthy, et.al., 2009) and are highly predictive of psychological well-being (Hobfoll, 2002). Common coping mechanisms include social support, self-assurance, faith or spirituality, stress management skills, a sense of control, physical health, and problem-solving abilities. Positive coping strategies include regular exercise, healthy eating, adequate sleep, medication and alcohol use, mind stopping, cognitive reappraisal, and distraction methods. Being aware of the problem or situation is also a coping mechanism, and some people find interacting with others, religious practices, relaxation exercises such as meditation or counseling helpful. Additionally, thinking positively, finding humor, problem-solving, managing time and priorities, spending time outdoors, and reaching out to supportive family and friends can be other effective coping strategies.

### **Life Satisfaction**

Life satisfaction is an essential factor that can influence teachers' job satisfaction, involving assessments of enjoyment of life and cognitive impressions of subjective well-being. The Satisfaction with Life Scale (SWLS) is a reliable and valid measure of life satisfaction, evaluating the judgmental component of subjective well-being. Life satisfaction is a cognitive component of subjective well-being that depends on the comparison between actual life circumstances and aspirations for a good life. Studies show that life contentment and job satisfaction are positively correlated in teachers (Sung-Mook, Giannakopoulos, 1994), and the SWLS has been proven to be a valid and reliable measure of life satisfaction as a measure of the judgmental component of subjective well-being (Diener, et.al., 1985). Although it is vital to education, empirical studies on teachers' life satisfaction are limited, particularly compared to studies focusing on teacher work satisfaction (Dal & Baysal, 2017)

## **3. METHODOLOGY**

### **3.1 Research Design**

The study makes use of quantitative research methodology. The respondent's state of mental health is described using a descriptive study design. This approach aids in deepening comprehension of the teacher's situation. It was conducted to schools under the Division of El Salvador City District I, namely, Cogon National High School

(CNHS), Cogon Elementary School (CES), El Salvador City National High School (ECNHS), Kalabaylabay Integrated School (KaIS), Kibonbon Elementary School (KES), San Francisco de Asis National High School (SFDANHS), San Francisco de Asis Elementary School (SFDAES), Hinigdaan Elementary School (HES), Hinigdaan National High School (HNHS).

### **3.2 The Instruments**

The participants had to fill out a questionnaire with their full name, sex, plantilla/position, and department assignment. The information was gathered using three survey questionnaires. Survey instruments employed included the 10-item Perceived Stress Scale, the 32-item Stress Coping Resources Inventory, and the 5-item Satisfaction with Life Scale.

Perceived Stress Scale (PSS). Sheldon Cohen's research claims that the Perceived Stress Scale (PSS) is the most used psychological tool for assessing stress perception. The PSS questionnaire includes ten questions that ask respondents to reflect on their feelings throughout the month before their survey. The scale measures how stressful individuals perceive various circumstances in their lives, and the questions are general in nature, making it useful for any specific demographic group. By adding up the scores and reversing the responses, an overall score is obtained that indicates the individual's level of perceived stress. Additionally, a short 4 item scale can be used to measure stress perception. A short 4 item scale can be made from questions 2, 4, 5 and 10 of the PSS 10 item scale. (Cohen, S., Kamarck, T., & Mermelstein, R., 1983). The Perceived Stress Scale, which consists of ten items measuring responses to the perception of stress experienced in the last month. The analysis revealed a Cronbach's alpha coefficient of 0.578, indicating the level of reliability in the Perceived Stress Scale. Additionally, the inter-item correlations within the scale were found to be 0.270, highlighting the relationships between the individual items in assessing the perception of stress.

Stress Coping Resources Inventory (SCRI). The self-assessment inventory test measures an individual's ability to cope with stress and contains 32 statements related to factors directly linked to stress management. The test uses six coping resource scales, including the Wellness Scale, Thought Control Scale, Active Coping Scale, Social Ease Scale, Tension Reduction Scale, and Spiritual Practice Scale, each with 5-6 statements. Each statement carries a score between 1 and 4, and the individual's total score categorizes them as an outstanding, above-average, average, or below-average stress-coper. The test aims to measure stress-coping abilities, and participants are asked to complete it before and after participating in stress-management training to measure their progress. (Matheny, K.B.& McCarthy, C. J., 2000). In the study assessing the internal consistency reliability of the Stress

Coping Resources Inventory, Cronbach's alpha was calculated to be 0.689. This value indicates moderate reliability, suggesting a reasonable level of consistency among the items within the inventory. Additionally, the inter-item correlations in the inventory were found to be 0.309, reflecting the relationships between the different variables. The inventory consists of six variables: Wellness Scale, Active Coping Scale, Thought Control Scale, Social Ease Scale, Tension Reduction Scale, and Spiritual Practice Scale. These results imply that the inventory effectively measures stress coping resources, with the variables showing some level of correlation with each other.

Satisfaction with life scale (SWLS). The Satisfaction with Life Scale is a 5-item tool that measures respondents' overall satisfaction with their quality of life. The tool does not measure happiness with specific life domains such as health or finances, but rather measures an individual's conscious evaluation of their life according to their own standards. The tool uses a 7-point scale, ranging from 7 (strongly agree) to 1 (strongly disagree), and normative data is provided. The tool has strong convergent validity with other subjective well-being measurements and can be used in addition to scales that measure psychopathology or emotional health. (Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S., 1985). The analysis yielded a Cronbach's alpha coefficient of 0.867, indicating a high level of reliability in the Satisfaction Scale. Additionally, the inter-item correlations within the scale were found to be 0.578, highlighting the relationships between the individual items in measuring life satisfaction.

### **3.3 The Respondents**

Schools in District 1 were included in a Total Population using purposive sampling under the researcher's supervision. One hundred basic education (Elementary and Secondary school) teachers participated in the study. There were 4 school heads, 31 elementary teachers, 51 junior high school teachers, and 15 senior high school teachers among the 82 female respondents and 18 male respondents. The study utilized purposive sampling to select participants based on specific inclusion criteria, ensuring a diverse and representative sample. Participants were chosen from school-based employees who are full-time employees of the Department of Education, encompassing a mix of male and female respondents to capture a comprehensive perspective. The selection process considered the availability and willingness of participants per school assignment, with teachers ranging from Teacher I to Head Teacher III included to gather varied experience and expertise. Additionally, participants were distributed across different school levels, including elementary, junior high school, and senior high school teachers, enhancing the breadth of insights gathered in the study. Overall, the study's participant selection process aimed to capture a wide range of perspectives from educators in various

roles and educational settings through purposive sampling.

### **3.4 Data-Gathering Procedure**

After receiving approval from the Division Office to conduct this Psychoeducational and psychosocial activities were conducted to foster emotional and social connection, as well as to provide knowledge on how to enhance self-care and flourishing oneself before the survey questionnaires were distributed, and the design of the Mental Health and Wellness program was endorsed by the school head to and approved by the School's Division Superintendent that included data collection through School Learning Action Cell (SLAC) activity. Schools with poor connectivity were given a paper and pen survey test questionnaire, whereas schools with reliable internet were given a link to an online google survey. Each survey test questionnaire contained clear instructions, and participants were reassured of the anonymity of the results while being urged to answer honestly. The survey's objective was discussed to determine the needs of the teachers and serve as a foundation for developing new activities for sessions on mental health and wellness. Data were examined for the intended purpose after data collection. Gathering of data was conducted from August to November 2022 as part of the mental health and wellness workshop among those teachers and staff who participated in the activity.

### **3.5 Statistical analysis.**

Data interpretation relies on descriptive statistics. Basic statistical studies (calculus of mean and standard deviation) were carried out to determine the stress level, perception of stress, and coping. Item analysis and Regression analysis were used to show the relationship between the variables. Cronbach's alpha was utilized to measure the validity and reliability of the instrument and its internal consistency.

### **3.6 Ethical considerations.**

To observe the proper protocols for conducting this study, approved program design was sought from the division office. The questionnaire has a section for data privacy consent with a statement asking for respondents' active engagement as an option. Additionally, it stated that their neutrality, secrecy, and anonymity would all be maintained. The researcher used the appropriate citations for all the data and prior research used in this study.

## 4. RESULTS AND DISCUSSION

Table I.

*Norm Table of Participants Profile*

<b>VARIABLE</b>	<b>N %</b>
<b>Gender</b>	
Female	82
Male	18
<b>Department Assignment</b>	
Junior High School	51
Elementary	31
Senior High School	15
JHS/SHS	2
Non-Teaching Staff	1
<b>Plantilla/Position</b>	
Teacher 1	68
Teacher 2	12
Master Teacher 1	8
Teacher 3	4
School Head	4
Special Science Teacher I	3
Librarian I	1
Total	100

The distribution of respondents based on gender, department assignment, and plantilla/position variables provides valuable insights into the unique stressors and coping mechanisms among educators.

The predominance of female respondents (82%) underscores the importance of gender-specific mental health support programs within the framework of



the Modified Transactional Model. Tailoring interventions to address the distinct stressors experienced by female educators can enhance their coping strategies and overall well-being. This aligns with the concept of Perception of Stress, emphasizing the significance of individual differences in appraising and managing stressors.

The distribution across department assignments, with the majority from junior high school (JHS), suggests potential variations in stressors based on educational levels. Understanding these differences is crucial for implementing targeted stress management interventions tailored to the specific needs of educators in different departments. This relates to the Stress Coping Resources aspect, highlighting the importance of providing adequate support and resources to address stress effectively.

Furthermore, the prevalence of Teacher I position holders (68%) underscores the need to invest in professional development and mental health training for this group. Enhancing coping mechanisms and well-being among Teacher I educators aligns with the goal of improving job satisfaction and creating a positive educational environment. This approach resonates with the concept of Life Satisfaction, emphasizing the importance of supporting educators in achieving a sense of fulfillment and contentment in their professional roles.

**Table 2**  
*Summary of Perceived Stress on Gender and Position*

Plantilla/Position	High Perceived Stress		High Perceived Stress	Low Perceived Stress		Low Perceived Stress	Moderate Perceived Stress		Moderate Perceived Stress	Grand Total
	F	M	Total	F	M	Total	F	M	Total	
	Librarian I	0	0	0	1	0	1	0	0	
Master Teacher 1	1	0	1	2	0	2	2	3	5	8
School Head	0	0	0	1	1	2	2	0	2	4
Special Science Teacher 1	0	0	0	1	0	1	2	0	2	3
Teacher 1	4	0	4	9	4	13	43	8	51	68
Teacher 2	0	0	0	1	0	1	10	1	11	12
Teacher 3	0	0	0	1	0	1	2	1	3	4
<b>Grand Total</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>16</b>	<b>5</b>	<b>21</b>	<b>61</b>	<b>13</b>	<b>74</b>	<b>100</b>
Mean	0.71	0.00	0.71	2.29	0.71	3.00	8.71	1.86	10.57	14.29
SD	1.50	0.00	1.50	2.98	1.50	4.43	15.46	2.91	18.17	23.96

Based on the results presented in Table 2, the data indicates that all five participants reporting high perceived stress levels were female, suggesting a potential gender difference in stress perception. Targeted interventions focusing on understanding and addressing the specific stressors faced by female participants can be beneficial in supporting their mental well-being. The concept of Perception of Stress emphasizes individual differences in how stressors are appraised. Gender can influence stress

perception. Understanding specific stressors faced by female teachers is crucial for targeted interventions to support their mental well-being.

Notably, the standard deviation values for perceived stress levels are notably high, indicating significant variability in participants' responses. This variability suggests that stress levels vary considerably among participants and across different plantillas/positions suggesting a potential gender difference in reporting high perceived stress levels, with females more likely to report high stress levels than males. While most participants reported moderate stress levels, disparities in stress levels across plantillas/positions were observed. The Modified Transactional Model of Stress and Coping highlights that stress experiences are dynamic and influenced by individual factors and variability in stress responses underscores the need for personalized coping strategies.

**Table 3**  
*Respondents' Perception of Stress*

<b>Item Description</b>	<b>Mean</b>	<b>SD</b>
1. In the last month, how often have you been upset because of something that happened unexpectedly?	54%	0.80
2. In the last month, how often have you felt that you were unable to control the important things in your life?	44%	0.86
3. In the last month, how often have you felt nervous and "stressed"?	58%	0.86
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	33%	0.77
5. In the last month, how often have you felt that things were going your way?	39%	0.73
6. In the last month, how often have you found that you could not cope with all the things that you have to do?	41%	0.93
7. In the last month, how often have you been able to control irritations in your life?	41%	0.96
8. In the last month, how often have you felt that you were on top of things?	50%	0.79
9. In the last month, how often have you been angered because of things that were outside your control?	47%	0.80
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	47%	0.84

The results presented in Table 3 offer valuable insights into the distribution of responses to the 10 items related to stress, control, and well-being among participants. Item 3 (Nervous and Stressed) has the highest mean of 58% indicating that over half of the participants felt nervous and stressed in the last month after results are recorded. This item highlights a significant prevalence of feelings of nervousness and stress among participants, emphasizing the need for interventions

targeting stress management and coping strategies. Participants had varying experiences with stress, control, and well-being over the last month. The results highlight the importance of examining the distribution of responses to each item to gain a more detailed understanding of the construct being measured.

The items 1 and 8 (Being Upset Unexpectedly and Feeling on Top of Things) with a mean of 54% suggested that more than half of the participants experienced being upset unexpectedly and feeling on top of things, respectively. Understanding these contrasting experiences can guide the development of interventions to enhance emotional regulation and feelings of control among participants. The range of standard deviations across items indicates varying levels of agreement or disagreement among participants. Items with higher standard deviations, such as Items 6 and 7, reflect widely varying experiences with coping and controlling irritations, highlighting the diverse responses within the sample. Conversely, Items with lower standard deviations indicate a more consistent agreement among participants regarding their experiences.

**Table 4**  
*Respondents' Stress Coping Responses*

<b>Stress Coping Resources Inventory</b>					
<b>Wellness Scale</b>	<b>Male</b>	<b>Female</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Average Stresscoper	11	61	72	2.74	0.46
Above Average Stresscoper	7	20	27	3.09	0.21
Superior Stresscoper	0	1	1	3.71	0.00
<b>Thought Control Scale</b>	<b>Male</b>	<b>Female</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Average Stresscoper	10	56	66	3.05	0.46
Above Average Stresscoper	6	24	30	2.97	0.28
Superior Stresscoper	2	2	4	3.50	0.00
<b>Active Coping Scale</b>	<b>Male</b>	<b>Female</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Average Stresscoper	17	81	98	2.84	0.29
Above Average Stresscoper	1	1	2	2.93	0.21
<b>Social Ease Scale</b>	<b>Male</b>	<b>Female</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Average Stresscoper	9	54	63	2.92	0.37
Above Average Stresscoper	9	28	37	3.09	0.28
<b>Tension Reduction Scale</b>	<b>Male</b>	<b>Female</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Average Stresscoper	11	58	69	2.72	0.67
Above Average Stresscoper	3	18	21	2.86	0.23
Superior Stresscoper	4	6	10	3.70	0.26

Spiritual Practice Scale	Male	Female	N	Mean	SD
Average Stresscoper	9	54	63	3.06	0.64
Above Average Stresscoper	5	15	20	2.95	0.31
Superior Stresscoper	4	13	17	3.78	0.19

Overall Score	Male	Female	N	Mean	SD
Average Stresscoper	11	61	72	2.89	0.48
Above Average Stresscoper	5	18	23	2.98	0.25
Superior Stresscoper	3	6	8	3.67	0.11

The assessment of coping resources among participants revealed insights into their thought control ability and active coping strategies for managing stress and promoting well-being. The mean score of 3.05 for the Average Stresscoper category on the Thought Control Scale indicates that, on average, teachers had good control over their thoughts and attention. This suggests that teachers possess the ability to regulate their thoughts effectively, which can contribute to better stress management and mental well-being. The assessment of coping resources among basic education teachers in the Division of El Salvador City revealed that, on average, teachers exhibited good thought control ability and actively used coping strategies to manage stress.

The findings indicate that teachers have the capacity to regulate their thoughts effectively and engage in proactive coping behaviors. While there was some variability in thought control ability, the use of active coping strategies showed less variability. These insights suggest that teachers possess positive coping behaviors, highlighting their resilience and resourcefulness in addressing stressors.

**Table 5**  
*Regression Analysis on Stress Coping Resources*

<i>Regression Statistics</i>						
Multiple R	0.68					
R Square	0.47					
Adjusted R Square	0.43					
Standard Error	0.35					
Observations	100					

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Result</i>	<i>Hypothesis</i>
Intercept	4.64	0.47	9.90	0.00		
Wellness Scale (SRWS)	-0.28	0.09	-3.20	0.00	Significant	Supported
Thought Control Scale (SRTS)	-0.51	0.10	-5.04	0.00	Significant	Supported
Active Coping Scale (SRAC)	-0.13	0.13	-0.95	0.34	Insignificant	Supported
Social Ease Scale (SRSE)	-0.05	0.11	-0.49	0.62	Insignificant	Supported
Tension reduction Scale (SRTTR)	-0.12	0.06	-2.10	0.04	Significant	Supported
Spiritual Practice Scale (SRSP)	0.13	0.07	1.90	0.06	Significant	Not Supported

\*Significant at  $p < 0.05$

The regression analysis on coping mechanisms revealed valuable insights. The study highlighted the strong connection between coping strategies and teachers' stress and satisfaction levels, with 47% of coping mechanisms significantly impacting the response variable. The Wellness and Thought Control scales emerged as key predictors of teachers' well-being, emphasizing the importance of maintaining physical and mental health and controlling thoughts. While active coping and social support showed no significant effects, effective stress-reduction techniques were crucial in managing stress. The analysis also hinted at the potential influence of spirituality on stress and satisfaction levels, suggesting a need for further research in this area. Overall, prioritizing educator well-being, promoting effective coping strategies, and exploring the role of spirituality can enhance stress management and satisfaction among teachers, benefiting the entire education community.

**Table 6**  
*Summary of Respondent's Satisfaction with Life*

Description	M	F	N	Mean	SD
Satisfied	12	44	56	28.54	1.28
Extremely Satisfied	4	18	22	32.64	1.56
Slightly Satisfied	2	16	18	24.17	1.62
Slightly dissatisfied	0	3	3	17.00	0.00
Neutral	0	1	1	20.00	0.00

Table 6 presents an overview of the satisfaction survey results for participants who reported a relatively high level of satisfaction as basic education teachers in the Division of El Salvador City. The mean satisfaction score for these participants was 28.54, indicating a general satisfaction with their work.

The majority of participants, 56 in total, selected the "Satisfied" response category, implying contentment with their work. Additionally, 22 participants chose the "Extremely Satisfied" category, indicating a significant level of satisfaction among educators.

Notably, the mean satisfaction score was highest for the "Extremely Satisfied" category at 32.64 points and lowest for the "Slightly Dissatisfied" category at 17.00 points. These results suggest that highly satisfied educators have better overall well-being and a more positive view of their job.

Gender differences were also observed in the survey results, with women more likely than men to select the "Satisfied," "Extremely Satisfied," and "Slightly Satisfied" response categories. This finding implies that female educators may have higher job

satisfaction compared to their male counterparts. The gender differences observed suggest potential variations in job satisfaction between female and male educators.

**Table 7.**  
*Item Analysis on the Life Satisfaction Result*

Item Description	Mean	SD
1. In most ways my life is close to my ideal.	80%	1.07
2. The conditions of my life are excellent.	79%	1.02
3. I am satisfied with my life.	84%	1.11
4. So far, I have gotten the important things I want in life.	83%	1.06
5. If I could live my life over, I would change almost nothing.	78%	1.38

The high mean scores above 78% for all survey questions indicate that the participants in the study were generally satisfied with their lives and work, reflecting positive perceptions of stress coping resources and life satisfaction. Specifically, the highest mean score of 84% for question 3 (“I am satisfied with my life”) underscores the significance of personal satisfaction in educators’ well-being. This finding resonates with the literature emphasizing the importance of life satisfaction, which is linked to various positive outcomes such as better physical health, psychological well-being, and increased life expectancy.

On the other hand, the lower mean score of 78% for question 5 (“If I could live my life over, I would change almost nothing”) suggests that while most participants were satisfied with their lives, some may have harbored regrets or unfulfilled aspirations. This nuanced insight adds depth to understanding educators’ perceptions of satisfaction and coping mechanisms within the context of stress. The low standard deviations across all survey questions indicate a high level of agreement among participants in their responses, implying clarity and accuracy in the survey instrument. This consistency in responses enhances the reliability of the findings and provides valuable insights into the satisfaction levels of basic education teachers in the Division of El Salvador City. Overall, the results underscore the importance of personal satisfaction in educators’ well-being and highlight the need for further exploration of coping mechanisms and stress perception in relation to life satisfaction.

**Table 8***Regression Analysis: Coping Mechanisms' Impact on Stress and Life Satisfaction*

<i>Regression Statistics</i>	
Multiple R	0.59
R Square	0.34
Adjusted R Square	0.33
Standard Error	0.21
Observations	100

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Result</i>	<i>Hypothesis</i>
Intercept	3.19	0.20	15.72	0.00		
Perceived Stress Scale	-0.28	0.05	-6.21	0.00	Significant	Supported
Satisfaction with life Scale	0.05	0.03	1.79	0.08	Insignificant	Supported

The research statement of the problem delves into the inquiry of whether significant relationships exist between stress, coping mechanisms, life satisfaction, and mental health among teachers. Through a detailed analysis of the data, key insights emerge regarding these interconnections, as illuminated by the regression coefficients and p-values in the statistical analysis, which focused on the perceived stress scale, satisfaction with life scale, and coping mechanisms as variables.

The negative regression coefficient of -0.28 attributed to the perceived stress scale unveils a crucial relationship: as perceived stress levels escalate, there is a corresponding decrease in satisfaction with life. This outcome aligns with established knowledge that heightened stress levels can detrimentally impact mental health and overall quality of life. The negative coefficient underscores an inverse correlation, indicating that as stress levels rise, life satisfaction tends to decline, emphasizing the pivotal role of stress management in fostering a fulfilling and contented life.

Conversely, the satisfaction with life scale yields a modest positive regression coefficient of 0.05, hinting at a weak positive association between satisfaction with life and coping mechanisms. While this correlation may initially appear promising, the small coefficient value suggests that the relationship may lack substantive significance. Moreover, the p-value of 0.08 casts doubt on the robustness of this correlation, implying that the observed link between satisfaction with life and coping mechanisms may be incidental rather than a meaningful connection.

These findings underscore the critical importance of stress management in enhancing life satisfaction among teachers. However, the weak or insignificant relationship between satisfaction with life and coping mechanisms implies that additional factors may play a pivotal role in maintaining overall well-being. This highlights the complexity of factors influencing well-being and underscores the

necessity for further research to gain a comprehensive understanding of the intricate relationships between stress, coping mechanisms, life satisfaction, and mental health among teachers. By delving deeper into these relationships and exploring additional variables, researchers can unravel the nuanced interplay shaping teachers' well-being and mental health outcomes.

## **CONCLUSION & RECOMMENDATION**

This study aimed to assess participants' stress levels, coping strategies, and life satisfaction to understand the extent of mental health challenges among teachers. By integrating all variables into a single model, the study sought to identify interrelationships and distinct contributions to life satisfaction among teachers.

While the study confirmed the transactional model, the interaction effect was minimal. Even with coping resources as an intervention, the significant relationship between perceived stress persisted. The findings highlighted a high prevalence of stress among teachers, with female participants more likely to report high stress levels. Variations in stress levels were observed across different positions, emphasizing the importance of addressing stress and promoting effective coping mechanisms for improved well-being and job satisfaction.

Recommendations from the study include providing mental health support, addressing gender disparities in stress levels, offering support to teachers in high-stress positions, encouraging effective coping mechanisms, and monitoring teacher well-being. The study contributes to understanding how teachers in district I manage stress and underscores the need for further research to identify coping mechanisms that enhance personal and professional well-being.



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# **ANALYSIS ON THE FUNDS UTILIZATION OF THE DIVISION OFFICE AND SCHOOLS IN THE DEPARTMENT OF EDUCATION DIVISION OF EL SALVADOR CITY**

Stephanie P. Saligumba, Eleonor M. Remonsada, Leah Mae C. Akut  
SDO-Budget Office

## **ABSTRACT**

The research titled “Analysis on the Funds Utilization of the Division Office and Schools in the Department of Education - Division of El Salvador City”, analyzed the utilization of Division MOOE, School MOOE and Downloaded MOOE funds in the Department of Education- Division of El Salvador City for a 3-year period. The study looked into the level of perception of the respondents as to the reasons for high or low utilization rate and the challenges the agency faced in maximizing the funds. It applied the convergent parallel mixed-methods research design which investigated the utilization of funds of the Division Office and the schools for three consecutive years and to determine the level of perception on the current funds’ utilization of the School Based Personnel for School MOOE and Division Office Personnel for Division MOOE and Downloaded Funds. The participants of the study were 246 teaching and non-teaching personnel of the Division of El Salvador City. Stratified random sampling was utilized so that each of the 26 schools will be equally represented. The study utilized a researcher- made survey questionnaire using google form with two different sets of survey questionnaires which will be accordingly distributed to two groups namely the Division Office Personnel and the Teaching Personnel using the 5 Point Likert scale. Open-ended questions were integrated in the questionnaire to gather qualitative data. The study revealed that the Division MOOE funds for the 3 consecutive years is insufficient given that the Office requested for additional MOOE to support the program and activities for 3 consecutive years. The insufficiency of funds was supported by the responses of the participants of the survey. The findings further revealed that amendments of the Approved Annual Procurement Plans were done all throughout the fiscal year for three consecutive years in order to address the pressing concerns especially during the time of pandemic. The procurement process in utilizing the Division MOOE, School MOOE and downloaded funds needed immediate intervention due to the issues mentioned by the select teaching and non-teaching personnel as respondents in the open-ended questions. Further, the management played an imminent part in the utilization of the funds and had foreseen the needs of the organization for the delivery of services and is concerned with the status of the fund’s utilization.

## I. INTRODUCTION

Budget is a management instrument used by any entity, financially ensuring the dimension of the objectives, revenues, expenses, and results at the management centers level and finally evaluating the economic efficiency through comparing the results with those budgeted. (Nicolae, 2010). It is a primary management tool for planning, monitoring, and controlling the finances of a project or organization. (World Bank, 2007). Budgeting brings real help to the company. It is necessary to compare the predictions with the results of budget execution to identify the reasons for non-compliance and to develop appropriate solutions. (A.I. Sulaymonov, 2002).

The budgeting process is a budget cycle that runs through the entire financial year. It is a participatory process that involves the active participation of all stakeholders. (E.Omol, 2017). In the Philippine Government, the budget process is a cycle and involves four phases, Budget preparation, Budget authorization or legislation; Budget execution or implementation; and Budget Accountability (FMOM).

### **Conceptual Framework of Deped Budget Cycle (FMOM)**

DepEd's financial management structure covers all the Offices (Central, Regions, Divisions and Schools). The budget has always been supportive of and consistent with the socioeconomic development plan, prepared within the context of the long-term plan of a long-term budget program. (Financial Management Operations Manual Draft, 2016). It is the concern of a particular educational institution to ensure and to keep track that there is a proper, adequate and accountable utilization of resources budgeted for education in the right manner. Thus, it is imperative that existing financial resources be managed efficiently. Under and over utilization of budgets happen due to late starting of project budget and improper planning. Budget variances are not reviewed and revised on a regular basis. Conducting regular review meetings is needed for budget utilization, this gives the opportunity to assign tasks to different staff and to know the status of budget and its accomplishment.

Since this study focuses on the analysis on the utilization of budget, this paper gives emphasis on the third phase which is the Budget Execution and Implementation. It is at this phase where authorizations are issued by DBM to the departments and agencies in order that the implementation of the programs, activities, projects authorized for the year and disbursement/accounting of funds can take place. At the start of the year, program holders conducted the procurement process for the scheduled programs, activities and projects based on the Approved Annual Procurement Plan (APP). The Budget Section certifies the allotment availability

for the Purchase Requests, Requisition and Issue Slips and/or Activity Designs received from the program holders. The served Purchase Orders were the basis of obligation for the procurement of goods and services, thus, signifying that the fund has been utilized. At the school level, School MOOE are downloaded to schools through granting of cash advance and the same procurement procedure applies in the utilization of funds. On the other hand, upon receipt of downloaded funds from Central and Region Office, the program holders prepared the necessary documentary requirements for the utilization of their funds and followed the same procurement procedure unless otherwise stated in the attached guidelines for the specific fund/s.

Moreover, there are three types of allotment class namely the Personnel Services (PS), Maintenance and Other Operating Expenses (MOOE) and Capital Outlay (CO). This study focuses on the MOOE allotment alone since the utilization of Personnel Services is programmed monthly and quarterly, and for the Capital Outlay, it has a specific timeline for implementation and has a different procurement process. MOOE as defined in DepEd Order No. 008, s. 2019, refers to an expenditure category/expense class for support to the operations of government agencies such as expenses of supplies and materials; transportation and travel; utilities (water, power, etc.) and the repairs, etc. The MOOE is generated using the parameters given by the Central Office during the preparation and submission of Budget Proposals. In 2010, the Department adopted the Boncodin Formula in computing the MOOE allocation, as it was introduced by former Department of Budget and Management (DBM) secretary, Emilia Boncodin.

In the actual implementation of the budget, there are instances that the approved budget is insufficient to fund the programs and projects of the agency. For instance, the Division Office had requested for MOOE augmentation at the Central Office for three consecutive years to support the deficiency of funds. The Division Office grew as additional schools were established and consecutively, new division office personnel were hired, hence the need for additional allotment for mandatory expenses such as electricity, internet and other mandatory expenses for the delivery of services.

In contrast, not all the funds received by the Office were fully utilized. DepEd adopts the sub-allotment procedure wherein an Allotment directly released to ROs for the Division Offices and Implementing Units Schools, are also sub-allotted to them by ROs. (FMOM, 2019). These Sub-AROs have specific guidelines and cannot be used as other sources of funds, hence the unutilized allotment will lapsed and cannot be used after the validity period.

In the Budget Call for FY 2016 (National Budget Memorandum No. 123, dated 28 January 2015), it was mentioned that “slow budget utilization and significant under-spending afflicted the 2014 budget execution” (and this has been so in the past years). The more significant part of the problem was attributable to weak budget planning and program preparation (e.g., delays in procurement, poor coordination with implementers, etc.). It is in this context, that the procurement system, activities, standard procedures, as well as funding requirements and timetable, should be linked with the planning and budgeting systems to help address the issue of slow disbursement and under-spending. (Financial Management Operations Manual Draft, 2016).

## **2. REVIEW OF RELATED LITERATURE**

DepEd’s financial management structure covers all the Offices (Central, Regions, Divisions and Schools). The budget has always been supportive of and consistent with the socioeconomic development plan, prepared within the context of the long-term plan of a long-term budget program. (Financial Management Operations Manual Draft, 2016). It is the concern of a particular educational institution to ensure and to keep track that there is a proper, adequate and accountable utilization of resources budgeted for education in the right manner. Thus, it is imperative that existing financial resources be managed efficiently.

Under and over utilization of budgets happen due to late starting of project budget and improper planning. Budget variances are not reviewed and revised on a regular basis. Conducting regular review meetings is needed for budget utilization, this gives the opportunity to assign tasks to different staff and to know the status of budget and its accomplishment.

At the school level, though at certain times, the school head could not put as many items within the given budget, other sources of funds can be used to cover or augment the costs of such. More than half of the MOOE went to items that were critical to the day-to-day operations of the school; hence, leaving the school head with limited discretionary funds. (Romanes, 2018). The extent of utilization of MOOE, SEF and other financial resources was well implemented and the development it has given to the school facilities and services for students and teachers were very satisfactory. The higher the extent of utilization of MOOE, SEF and other financial resources, the better the development of the school is.

Based on the study conducted by Krishna and Saheb (2020), the Management support, Organizational Work culture, employees related factors such as experience in budget preparation and execution, and effective monitoring and evaluation has a

significant effect on budget utilization. The overall effect of the budgeting process, employee motivation, accounting reporting, monitoring activities and information and communication are very important for the budget practice effectiveness in the public organization.

Tafa and Bessie (2016) has found out that the cause for mis-utilization of public budget are mainly due to lack incapacitated budget staffs in terms of skill and knowledge in each respective budget offices, lack of knowledge in the use of information (ICT) by management and the experts at each level, inadequate human resources, lack of continuous monitoring and evaluation, lack of commitment of top management, among others.

According to Tafa and Bessie (2016), he concluded that the causes for underutilization of budget are mainly due to lack of coordinated effort in purchasing, lack of consistency and delay in purchase processes, incapacitated budget staffs in terms of skill and knowledge and lack of information by management to evaluate the budget utilization status which lead towards underutilization.

### **3. RESEARCH QUESTIONS**

The study sought to analyze the utilization of Division MOOE, School MOOE and Downloaded MOOE funds in the Department of Education- Division of El Salvador City for a 3-year period. This study also looked into the level of perception of the respondents as to the reasons for high or low utilization rate and the challenges the agency faced in maximizing the funds. Moreover, this study sought to answer the following questions:

1. What is the profile of the agency in terms of the following?
  - 1.1 Division MOOE Total Allotment and Utilization for 3 years ;
  - 1.2 School MOOE Total Allotment and Utilization for 3 years; and
  - 1.3 Downloaded funds from Central and Region Office Total Allotment and Utilization for 3 years
2. How does the Agency utilize the funds in terms of the amount of total expenses by item of expenditures? (reference FARIA, Consolidated LR)
3. What is the level of perception on the current funds utilization of the following:
  - 3.1 School Based Personnel for School MOOE; and
  - 3.2 Division Office Personnel for Division MOOE and Downloaded Funds from Central and Regional Office.

## 4. METHODOLOGY

This study applied the convergent parallel mixed-methods of research design that aims to analyze the utilization of funds of the Division Office and the schools for three consecutive years and to know the level of perception on the current funds utilization of the School Based Personnel for School MOOE and Division Office Personnel for Division MOOE and Downloaded Funds. Creswell and Clark (2011) called this the method of using both quantitative and qualitative strands at the same time in the same phase of the research process, putting both equally high on the priority list, keeping the strands separate during analysis, and then combining the results in the overall interpretation.

### 4.1 Participants and Sampling Technique

The participants of the study were 246 teaching and non-teaching personnel of the Division of El Salvador City. Stratified random sampling was utilized so that each of the 26 schools are equally represented. The respondents comprise of School Heads, newly hired teachers and non-teaching personnel, teaching and non-teaching personnel involved in the procurement process and personnel who were 20 – 30 years in service.

#### Summary Table on the Breakdown of Participants per Office/School

Office/Unit	Number of Participants
1st Group	
Elementary Schools	117
Secondary Schools	79
<b>Sub-Total</b>	<b>196</b>
2nd Group	
Schools Governance Operations Division	14
Curriculum Implementation Division	17
Office of the Schools Division Superintendent	19
<b>Sub-Total</b>	<b>50</b>
<b>GRAND TOTAL</b>	<b>246</b>



## 4.2 The Instruments

The study utilized a researchers-made survey questionnaire using google form with two different sets of survey questionnaires which will be accordingly distributed to two groups namely the Division Office Personnel and the Teaching Personnel. The respondents were asked to answer a 26 and 29 item survey questionnaire respectively, about factors that may affect the Budget utilization in the Division Office and in the school. Respondents were asked to evaluate each statement if the factors are observed in the Division Office or in School using the 5 Point Likert scale with scores represented by Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4) and Strongly Agree (5). Open-ended questions were integrated in the questionnaire to gather qualitative data.

Agreement Scale	Value	Range
Strongly Disagree	1	1.00-1.80
Disagree	2	1.81-2.60
Undecided	3	2.61-3.40
Agree	4	3.41-4.20
Strongly Agree	5	4.21-5.00

The questionnaire was validated by three SDO personnel with expertise in Finance, Human Resource Management and Research.

## 4.3 Data Gathering

Administration of the research questionnaire to the respondents was conducted via online through google forms. The results were presented to the Management Committee members of the Division Office about the factors that affected the budget utilization in the Division Office and in the schools. The researchers were able to draw personal perceptions and thoughts of the members regarding the sufficiency of the budget allotment per year, the challenges of budget constraints and the level of efficiency in the utilization of funds. Further, researchers collected the data from the Budget and Financial Accountability Reports (BFARS) that were submitted yearly to the Department of Budget and Management (DBM) and Commission on Audit (COA).

## 4.4 Statistical Treatment/ Data Analysis

After conducting the survey, the data was gathered, analyzed, and interpreted using the following statistical tools; Problem No.1, 2 and 3 used descriptive

statistics (frequency, percentage, and mean). The frequency, mean, and percentage distribution was utilized to present the level of the respondents in terms of the utilization of Division MOOE, School MOOE and Downloaded MOOE funds in the Department of Education- Division of El Salvador City for a 3-year period.

## 5. RESULTS AND DISCUSSION

The table above shows that for three consecutive years, the Division Office and Schools were able to fully utilize the allocated funds. On the other hand, the utilization of Downloaded funds from Central and Region Office ranges from 84 - 93% only. Factors such as delays in the procurement process as well as late issuance of Sub-Allotment Release Orders contributed to the unutilized allotments.

**Table 1.** Profile of the agency in terms of total Allotment and Utilization for 3 years

Allotment Class	FY 2019			FY 2020			FY 2021		
	Adjusted Allotment	Utilization	Utilization Rate	Adjusted Allotment	Utilization	Utilization Rate	Adjusted Allotment	Utilization	Utilization Rate
Division MOOE GAA	3,208,000.00	3,205,375.25	100%	3,267,000.00	3,266,730.00	100%	3,326,000.00	3,326,000.00	100%
School MOOE	12,888,000.00	12,885,000.03	100%	15,937,000.00	15,621,000.00	98%	15,213,000.00	15,213,000.00	100%
Downloaded Funds	12,087,033.38	11,184,094.06	93%	5,516,021.40	4,619,036.07	84%	10,530,924.28	9,251,842.15	88%

The table above shows that for three consecutive years, the Division Office and Schools were able to fully utilize the allocated funds. On the other hand, the utilization of Downloaded funds from Central and Region Office ranges from 84 - 93% only. Factors such as delays in the procurement process as well as late issuance of Sub-Allotment Release Orders contributed to the unutilized allotments.

It can be noted that the Division Office spent a higher percentage of its MOOE allotment in procurement of Office supplies, traveling expenses, training and electricity expenses with 16.22%, 6.15%, 14.83% and 14.82%, respectively in Fiscal Year 2019. On the other hand, the least percentage of the allotment was spent on transportation 0.02%. In 2020, the spending on traveling expenses decreased by 11.42% and 12.26% for training expenses while the procurement of office supplies and electricity expenses increased by 5.37% and 9.1%, respectively. The decrease in the traveling and expenses was due to the required health standards in Basic Education Offices and Schools. Travel and activities of learners and personnel was limited to those most essential.

Baseline data also shows the program support funds received by the Division Office from Regional and Central Office through Sub-Allotment Order. Such programs were the General Management Supervision-Central and Regional Office, Physical Fitness and School Sports, Learner Support Programs, Building Partnership and Linkages Program, Organizational and Development for Non-Teaching Personnel, DRRM Program, Basic Education Curriculum, Policy and Research Program, IPED Program, School Based Feeding Program, Computerization Program, Textbook and Other Instructional Materials, HRD for personnel in schools and learning centers, Flexible Learning Options, National Assessment System for Basic Education, Joint Delivery Voucher for SHS TVL, School Dental Health Care Program, Special Education Program, Planning and Management System and Multigrade Education.

It can be noted that the allotment for the mentioned programs was not consistently provided for the three consecutive years. Most of the MOOE downloaded funds were used for the traveling and training expenses of the personnel, procurement of office supplies and semi-expendable items. It can be observed that almost Two Million Five Hundred thousand pesos was spent on the procurement of office supplies and semi ICT equipment for the reproduction of modules as this was an action pursuant to the Department of Education Basic Education Learning Continuity Plan in time of Pandemic. The BE-LCP allows multiple learning delivery modalities such as distance learning and blended learning, either on top or in place of face-to-face learning. (BE-LCP).

In addition, to help learners, parents, and teachers implement these learning delivery modalities, it was mandated that Self-Learning Modules (SLMs) shall be made available in print and offline/online digital formats, for use last SY 2020-2021. Thirteen Million Three Hundred Forty Thousand One Hundred Three and 49/100 Pesos was received and spent on the supplies needed for the implementation of distance learning. Other than that, Four Hundred Fifty Two Thousand Seven Hundred Eighteen and 74/100 Pesos was used to procure semi-expendable ICT equipment such as tablets and distributed to the learners as part of the Office's action in transitioning from modular learning to digital blended learning.

For the School Based Feeding Program (SBFP), the allotment was spent on the procurement of food supplies, communication expenses, transportation, traveling, training, and medical supplies and equipment intended for the learners who were recipients of the said program as well as to the SBFP program holder and school coordinators.

It can be noted that elementary schools spent a higher percentage of its MOOE allotment in the procurement of Office supplies, electricity and training expenses

with 39.17%, 18.43%, and 11.72%, respectively for FY 2019. On the other hand, the least percentage of the allotment was spent on repairs of ICT equipment with 0.01%. In 2020, the spending on office supplies increased to 58.20% due to the in-house reproduction of learning materials. Various semi-expendable ICT equipment was procured for FY 2021 as indicated in the 14.44% utilization rate as part of the transitioning period of the department from module learning to digital learning.

Further, data also indicates that high schools spent a higher percentage of its MOOE allotment in the procurement of Office supplies, electricity and training expenses with 29.84%, 10.50%, and 10.19%, respectively for FY 2019. On the other hand, the least percentage of the allotment was spent on taxes, duties and licenses with 0.02%. In 2020, the spending on office supplies increased to 59.91% due to the in-house reproduction of learning materials. Various semi-expendable ICT equipment were procured for FY 2021 as indicated in the 14.65% utilization rate as part of the transitioning period of the department from module learning to digital learning.

Senior high schools spent a higher percentage of its MOOE allotment in the procurement of Office supplies, electricity and training expenses with 36.85%, 14.04%, and 10.95%, respectively for FY 2019 as shown in the table above. On the other hand, the least percentage of the allotment was spent on postage and courier expenses with 0.01%. In 2020, the spending on office supplies increased to 62.09% due to the in-house reproduction of learning materials. Various semi-expendable ICT equipment was procured for FY 2021 as indicated in the 8.85% utilization rate as part of the transitioning period of the department from module learning to digital learning.

**Table 2.** Perception of the respondents in relation to the 5 Factors -Division MOOE

<b>Category</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Interpretation</b>
Budget Planning	4.13830	0.92187	Agree
Management	4.32624	0.67641	Strongly Agree
Procurement Process	3.54787	0.97646	Agree
Budget Policies	4.14894	0.75119	Agree
External Factors	4.08511	0.63904	Agree

As presented in Table 2, the mean score of the responses for the items under Budget Planning is high. It showed that the respondents observed good practices in each section of budget planning for each coming year. According to DepEd Order No. 25, s. 2010, all DepEd operating units must go through a strategic planning exercise of 3-year or 6-year periods, as appropriate, prior to the formulation of various programs/projects and agency budget to ensure alignment of all programs and projects with the Agency's policy trusts/directions. But it was noted that under

item number 3 & 4, 17.02% and 12.77% of the respondents answered that the section had not conducted an inventory of items every end of the calendar year and there was unfair budget allocation per section. Some of the respondents answered in the open-ended question that one of the factors that affected budget utilization was poor planning. Various programs and projects were not included in the original plan for the year.

In addition, the respondents were positive that the management was able to foresee the needs of the Office that were necessary for the delivery of services as agreed by respondents with 4.33 mean. As to the procurement process, the respondents agreed that the procurement process is efficient and timely with 3.55 mean. The answers of the respondents in the open-ended question regarding what are the other factors that affect funds utilization concerning procurement were as follows: not all program holders were oriented on the process of procurement in the division office, canvassing being slow because of the scheduled trip to suppliers due to the increasing trend and unstable price hike of gasoline, delayed processing of requested items, the delivery of goods was not on time, and the goods requested that were delivered after the actual program implementation was not yet addressed.

Moreover, amendment in the Approved Annual Procurement Plan (APP) is necessary if the Office has saved up from previous procurement. Amendment of the funds is necessary if the market price of the purchased item is less than the amount indicated in the APP. hence there is savings generated from the fund. Accordingly, these savings must be fully utilized within the year. An office can also amend the approved budget if there are unforeseen programs, activities, and projects that need to be implemented within the year as supported by the Department's issuance of implementing guidelines.

As to the external factors that affect the low/high funds utilization rate, the respondents commented in the open-ended question that goods and specifications set by the department were not readily available in the local market. For the respondents who were undecided, the researchers assumed that they were indirectly involved in the procurement process.

**Table 3.** Perception of the respondents in relation to the 5 Factors -Downloaded Funds

<b>Category</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Interpretation</b>
Budget Planning	4.36559	0.66745	Strongly Agree
Procurement Process	3.58065	0.79723	Agree
External Factors	3.83871	0.74080	Agree

The table 3 shows program holders who received various downloaded funds from the Central Office and Region Office for the implementation of their assigned programs, activities, and projects based on the existing budget policies and guidelines. One of the respondents answered in the open-ended question that it was inevitable that the funds cannot support all programs and projects. However, it would be best if the resources were taken seriously where it is purpose and impacts the calling of the agency.

The following were some of the answers to the open-ended question that contributed to the level of perception of the respondents: some funds have a specific purpose and needed the expertise to ensure a relevant implementation of the project, some factors were beyond their control, Central Office gave a small percentage of what they originally requested, and late receipt of downloaded funds, especially during last quarter of the year.

As to the procurement process for the downloaded funds, the respondents answer in the open-ended question the following: slow mobilization in the canvass and pre-canvassing process that led to slow procurement and delivery, items in the APP programmed in the first quarter were not yet delivered as of the fourth quarter of the year, not all program holders were oriented on the procurement process, delayed processing on the requested items, and the delivery of goods are not on time.

As to the external factors. The following are the answers of the respondents in the open-ended question: there were suppliers or service providers that bid on products but were later unavailable or out of stock upon service of Purchase Order, market prices changed abruptly that greatly affected the budget, service provider's overlapping of workloads, and specification set by the department were not available in the market.

**Table 4.** Perception of the respondents in relation to the 5 Factors -School MOOE

<b>Category</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Interpretation</b>
Budget Planning	4.47487	0.65625	Strongly Agree
Management	4.47638	0.61144	Strongly Agree
Procurement Process	4.19095	0.73408	Agree
Budget Policies	4.50084	0.61222	Strongly Agree
External Factors	4.02513	0.77986	Agree

The above table 4 shows the level of perception of the respondents from the schools with regards to budget planning, Budget Policies and Guidelines, Management, Procurement Process & External Factors at the school level. The respondents commented on the open-ended question that constant communication with the bookkeeper, school head and BAC members regarding the needs of the school aligned to the projects in the SIP is needed. Also, respondents answered that there is a need for a proper allocation / prioritization of the MOOE Budget in school. According to the respondents, a thorough consultation with teachers before submitting the final AIP for approval can affect the low/high budget utilization rate of the school.

It was noted among the answers that there was no proposal of projects made to the faculty and stakeholders. As a result, there are supplies that are less important that were purchased, while those supplies needed by the school were not procured. Respondents stated that one of the factors that affects budget utilization rate is that there are clear guidelines on what projects are applicable for MOOE funding and the specific attachments. Late deliveries on procurement of materials were observed in the school and abrupt increase in operating expenses like electricity, unavailability of other items, other stores/suppliers were not PHILGEPS registered, unforeseen needs and adjustments, service providers are competent, unforeseen activities and stores do not follow Suggested Retail Price (SRP) are the other external factors that mentioned by the respondents.

As to if the allocated budget is sufficient to fund the programs, activities and projects, given the Annual Division MOOE budget generated from the Parameters provided by DepEd Central Office, most of the answers was that the budget was insufficient. Some answers were the following: (1) considering that there are so many different programs, activities, and projects in DepEd; (2) the allocated budget is insufficient since the DO always waits for augmentation every year; (3) budget is insufficient to fund the programs, activities and projects. Possible reasons may be misallocation of funds, unforeseen needs of the Department and Market prices changes abruptly which may greatly affect the budget; (4) MOOE budget is not enough for the programs, activities and projects provided by Deped Central Office some projects like wash in school program a very wide scope in terms of sustainability would be left behind or having less priority because of insufficient funds ;and (5) The existing allocation will only fund the identified/limited activities. All other activities will have to be funded without a budget or may source out from other sources.

In addition, respondents had a positive response as to if the school sought for additional funds from other sources (such as internal and external stakeholders) to

implement unforeseen yet necessary programs or projects. Some answered that during the pandemic, the Division sought aid from the SEF to provide machines to help reproduce Self-Learning Modules for the learners and to give select learners' educational tablets to help continue the delivery of learning. Another respondent answered that usually they solicit or resort to passing the hat for certain activities. Most of the answers agreed that the Division Office and school sought funding to the LGU fund for the construction and repairs of classrooms, training for teachers in the different programs and projects (PAPs) and for necessary expenditures that cannot be covered by the MOOE.

## **6. CONCLUSION AND RECOMMENDATIONS**

It has been known that the study focused on the analysis of the MOOE funds utilization of the Division Office and the School by presenting the 3 year period data on the allotment and utilization and gathering data on the level of perception of the personnel using the four components that may affect the funds utilization namely the Budget Planning, Budget Policies and Guidelines, Procurement Process and External Factors.

It can be concluded that the Division MOOE funds for the 3 consecutive years is insufficient given that the Office requested for additional MOOE to support the program and activities for 3 consecutive years. The insufficiency of funds was supported by the responses of the participants of the survey. At the school level, it was known that schools reached out to stakeholders to ask for financial assistance to implement several unfunded programs. On the lighter side, it can be noted that the organization has a strong partnership with LGU since almost all of the additional funds was contributed by the LGU of El Salvador City.

The findings further revealed that amendments of the Approved Annual Procurement Plans were done all throughout the fiscal year for three consecutive years in order to address the pressing concerns especially during the time of pandemic. The researchers believe that teachers should be included in the planning of the Annual Procurement Plan.

The procurement process in utilizing the Division MOOE, School MOOE and downloaded funds needed immediate intervention due to the issues mentioned by the respondents in the open-ended questions. The effectiveness and efficiency of funds utilization does not tantamount to the full utilization of funds at the end of the fiscal year but is reflected in the ability to conduct the whole procurement process within the prescribed rules and regulations.



The management plays an imminent part in the utilization of the funds. The management was able foresee the needs of the organization for the delivery of services and is concerned with the status of the funds utilization.

It can be concluded that external factors such as change in the prices of the items and incompetence of the supplier to provide the items contributed to the low utilization of the funds. Since changes in the prices of the items will lead to the delay and requires amendment of Annual Procurement Plan (APP).

With this, the researchers would like to present three recommendations.

1. Crafting of Manual for the Budget and Procurement Process of the Office since many of the respondents were undecided on their answers. The manual must contain the contextualized procedures and detailed protocol per stages in the procurement which is in accordance with Republic Act No. 9184. This will guide them in implementing the programs and activities efficiently and effectively.

2. There is a need to deploy more non-teaching personnel to all schools and in the Procurement Unit of the Division Office. Procurement is vital in the organization and several mandates were issued on how it should be implemented, yet it can be noted in the findings that delays were observed in the procurement process. Creation of additional non-teaching items will aid in the efficient implementation that can address the pressing procurement concerns encountered for the past three years.

3. Revision of DepEd and other government agencies' policies in deriving the parameters in allocating funds to implementing units as well as the early issuance of Sub-Allotment Release Orders. It can be noted that the insufficiency of funds for three consecutive years was due to the unrealistic parameters used, thus, it is timely to revisit the existing policies and make amendments in order to address the problem. In addition, programs, activities and projects were already identified and included in the General Appropriations Act through lump-sum allocations to the Central Office and Regional Office. The Sub-Allotment Release Orders and the corresponding guidelines should be issued to all implementing units during the first quarter of the calendar year in order to give ample time for the program holders to utilize the funds.

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# PREVALENCE OF BULLYING VICTIMIZATION AMONG JUNIOR HIGH STUDENTS, PARENTAL SUPPORT & SCHOOL CLIMATE: IMPLICATIONS FOR A SCHOOL ANTI-BULLYING INTERVENTION

Marilou Yugo-Descallar, RGC  
Division Office-SGOD

## ABSTRACT

This study examined the prevalence of bullying experiences of high school students, their perceived parental socioemotional support and school climate. A descriptive correlational design was used in the study using the adapted and revised Olweus' Bullying Questionnaire and Descallar (2009). One thousand and three-hundred thirty-one (1,331) Junior High School students from six (6) public schools in the Division of El Salvador City participated in the study. Data were analyzed using linear regression, mean, percentage, standard deviation, and Spearman Rank Correlation. Findings reveal that the participants' perceived school atmosphere and parental socioemotional support were received as adequate. Verbal bullying is the most frequent form of bullying that occurs in the classrooms and other school environments; followed by physical, social, and cyberbullying. Walking away from the aggressor, ignoring them, and reporting them to a teacher are among the majority of ways to deal with bullying. Moreover, bullying occurs mostly in the classroom while the teacher is out. Students experiencing less bullying are typically those whose parents provided them with greater socio-emotional support. Participants who thought their school had a better atmosphere generally experienced bullying far less. Additionally, it was found that there is a comparable decline in their bullying experience for every unit rise in parental support, and a matching decline in their bullying experience for every unit increase in favorable view of the school climate. The results of this study point out to the need for school administrators and staff to consider making policy suggestions and guidelines about an anti-bullying intervention program in schools and implement it within the entire academic year.

**Keywords:** *Bullying, Parental Support, School climate*

## INTRODUCTION

Globally, the prevalence of bullying victimization among adolescents has been reported to be high and has become a major public health concern. According to one study by Smith et al (2023), the mean prevalence of bullying victimization across all surveys was 39.4%. Furthermore, there was a large variation in the trends of bullying victimization across countries with a significant increasing and decreasing trend being observed in 6 and 13 countries, respectively. Myanmar, Egypt, and the Philippines showed the sharpest increase. Among adolescents in Southeast Asian countries, the prevalence of past-month bullying victimization in the Philippines is 45.0% in 2011 (Peltzer & Pengpid, 2015).

Bullying is a widespread problem in our schools and communities (Inocencio et al, 2021). Any severe or frequent use of a written, spoken, or electronic expression, a bodily act or gesture, or any combination thereof directed at another student, creating or placing the latter in reasonable fear of physical or emotional harm or damage to his property, is considered bullying (RA 10627, 2013). It entails “repeated activities meant to cause harm, such as taunting, threatening, striking, and stealing, that are initiated by one or more children against a victim or victims” (New York University Child Study Center, 2003). Students who have been bullied are more likely to develop psychological distress and is associated with a myriad of adverse health outcomes that can also be long-lasting. Consequences of bullying includes “educational consequences during childhood and adolescence” (e.g., more likely to skip school, feel anxious for a test, end education at a secondary level), “health consequences during childhood and adolescence” (e.g., poor mental health, sleeping difficulties, back pain, headaches, dizziness), and “all consequences during adulthood” (e.g., poor mental health, criminality, illicit substance use). Importantly, experiencing bullying during adolescence may be particularly problematic as adolescence is a crucial period in the development of the human life course with respect to intellectual capabilities and behavioral proclivities (Smith, et al 2023). Bullying incidents persist at an alarming rate in secondary schools (Galabo, 2019). The government and the Department of Education have been working hard, it is distressing to see that bullying incidents have been rising (Gonzales & Madrigal, 2021). In a public school in El Salvador, bullying is also prevalent. This claim is reinforced by the students’ expressed need and concern regarding bullying prevention that was revealed in the needs survey that was carried out in the first quarter of the academic year 2022-2023 among the chosen junior high school students in the Division of El Salvador City. Currently, there are no research studies on bullying awareness and extent of bullying incidence in a public school in the Division of El Salvador. As a result, the researcher believes that it is crucial to pay particular attention to the student’s actual experiences of bullying, the school’s climate and

support, as well as the significance of the Department's school system.

These parental support and school climate are part of the students' social contexts as espoused by Bronfenbrenner (1979) in his ecological theory. The theorist argued that parental support influences the students' development and behavior. High levels of parental support, encouragement, and better parent-child communication was found to reduce the risk of a student being bullied and minimize emotional distress and behavioral problems in the bullied student (Abdirahman, Fleming and K.H., 2012). Moreover, youth who experience physical and emotional maltreatment from parents are at increased risk of peer victimization. Other studies also revealed that psychological distress accompanying bullying is significantly less among individuals who have positive relations with their parents (Baldry, 2004; Davidson & Demaray, 2007; Rigby, 2013). The social climate in school is seen by many experts as a crucial factor in student learning. The psychological feeling of being safe, secure and healthy cannot be underestimated in promoting healthy development and holistic growth of the students. On the other hand, negative school experiences such as social marginalization, not being accepted by peers, being teased for being overweight or obese may lead to a manifestation of low self-esteem (Abdirahman, Fleming and K.H., 2012). This finding was consistent with the findings of Kapari and Stavrou (2010) which revealed that schools with more positive climate have less victimization. However, there is a scarcity of multi-country studies on bullying victimization trends as well as those that focus on low-income and middle-income countries (Smith, et al 2023). There is also insufficient research on the prevalence and factors associated with different forms of bullying in a large sample of Philippine adolescents.

Hence, the researcher is inspired to carry out this study. It sought to learn 1) how much emotional and social support the participants received from their parents or other caregivers, 2) how they felt about the school climate, 3) how prevalent is their experience with physical, verbal, social, cyberbullying and gender-based bullying, including where the bullying occurred and how they reacted to it, 4) how the variables of parental support, school climate and bullying interacted, and 5) what implication can be derived resulting from bullying experiences, parental support and emotional support to the school's bullying intervention.

## **RESEARCH QUESTIONS**

- I. What is the profile of bullying and victimization among the respondents in terms of;
  - a. Sex and Grade Level
  - b. Grade Level Experience of Being Bullied

c. Summary of Ratings in their Frequent Involvement in Bullying Per Grade Level  
d. Over-all level of student's experience in terms of bullying behaviors in terms of;

- d.1 Verbal Bullying
- d.2 Physical Bullying
- d.3 Social Bullying
- d.4 Cyber-Bullying
- d.5 Gender-Based Bullying

2. What is the extent of emotional and social support the participants received from their parents or caregivers ?
3. What is the participants' perception of their school climate?
4. Is there a significant relationship of Parental Support, School Climate and Bullying?
5. What is the implication of bullying experiences, parental support and emotional support to the school's bullying intervention?

## **METHODS**

The study employed the descriptive correlational design. The research tool to elicit the participants' experience of bullying and school climate were adapted from Olweus' Bullying Questionnaire, and the section on parental support was from Descallar (2009). The tool which comprised (40) questions was distributed to the randomly sampled of the one thousand and three-hundred thirty-one (1,331) Junior High School Students from (6) Junior High School of the Division of El Salvador City. The instrument was then revised and translated into Visayan dialect for easier comprehension, validated and was pilot-tested as reliable before the administration of the survey was conducted. The study recognized the limitation of the scale in bullying since it adapted the western scale used by Olweus. The data collected were organized and analyzed using descriptive statistics such as Spearman Rank Correlation, linear regression,, mean, percentage and standard deviation.

## **DISCUSSION OF RESULTS AND RECOMMENDATION**

### **A. Profile of bullying and victimization**

Prevalence and frequent involvement in bullying.

The results of the survey show a high prevalence of bullying and victimization among DepEd high school students in the Deped, El Salvador City. A total of 877 (65.89%) out of 1,331 respondents reported that they were bullied in the past three (3) months before the conduct of the survey and, only 454 (34.11%) said otherwise (Table 2). Table 2 shows that Grade 8 had the highest number of students (72.65%)

or 263 who disclosed being victimized by bullying, followed by Grade 7 (67.70%) and Grade 9 (66.55%), then Grade 10 (57.87).

Table 2 presents the mean distribution of the participants' perception of the school climate. The participants rated the school climate as average as indicated by the grand mean of 3.05. Establishing a welcoming environment and students' sense of belongingness were rated as average; while their capacity to report harassment or abuse to school authorities is rated as the lowest ( $M=2.58$ ), but still on the average.

Responses on their experiences of being bullied in various dimensions are presented in Table 3. Data show that the highest mean is related to verbal, followed by social, physical and cyber bullying.

Table 4 reveals that overall, the participants rated the socio-emotional support from their parents as average ( $M=2.94$ ). This means that their support is felt as adequate. The areas of support perceived by the students are on their parents/caregivers availability when they need help, parents/caregivers are happy when they are happy ( $M=3.36$ , respectively) and parents spending time with them ( $M=3.08$ ). The items rate relatively lower is when parents comfort them when they are sad and lonely ( $M=2.50$ ). Details of the nature of bullying experienced by the participants are found in Table 4. Findings show that the prevalent form of bullying experienced by the participants are feeling embarrassed or humiliated ( $M=2.63$ ), called hurtful names ( $M=2.38$ ), belongings being taken without their knowledge ( $M=2.13$ ) and physically hit by someone ( $M=2.11$ ).

Findings show in Table 5 that 50.71 percent of the bullying occurs in the classroom while the teacher is out. One-hundred seventeen (117) participants disclosed that it is happening in social media. Other places were also identified such as in the classroom when even when the teacher is present, on the way to and from school, hallways, at the school event, stairways, and comfort rooms.

Asked about their reactions when bullied, the data reveal that twenty-one-point seventy one percent of them (21.71%) ignore the bully, (16.45%) walk away from the bully, (12.47%) tell a teacher, 10.67 percent tell the bully to stop, (10.59%) tell their parents. A few prefer to get even with the bully, stay home from school, tell their friends, adults, sibling and others.

### **Table 7. Spearman's Rho Values Showing Relationships of Parental Support, School Climate and Bullying (n=1,331)**

Table 7 reflects Spearman's Rho values showing Relationships of Parental Support, School Climate and Bullying.



	1 (Parental Support)	2 (School Climate)
1. Parental Support (M= 2.94; SD= 1.011)	1.00	
2. School Climate (M= 3.05; SD= 1.009 )	.483** (p = .000)	1.00
3. Bullying (M= 1.83 ; SD = 1.023)	-.149** (p = .000)	-.102** (p = .000)

\*\*significant at 0.01 level

Spearman's rho at 0.01 significant level likewise reveals a negative correlation between parental support and the participants' experience of being bullied ( $r = -0.149$ ). This result implies that students who received more socio-emotional support from their parents tend to have less experiences of being bullied. Otake et al (2019) found out that a higher perceived emotional support among students was associated with decreased victimization and perpetration. A better perceived relationship with the teacher among students was also associated with decreased victimization and perpetration. It was also suggested that to reduce bullying among students, school personnel and other professionals should promote more regular contact with parents and the provision of emotional support by professional and family caregivers. Zhang et al (2021) reported that perceived family support was found to be more significantly associated with bullying behaviors than perceived peer support. Findings corroborate the importance of perceived social support among early adolescents and emphasize a need to not only examine how perceived social support is associated with bullying behaviours, but to account for the significant role of the family during the early adolescence period.

It also shows that there is a negative correlation between school climate and the participants' experience of being bullied ( $r = -0.102$ ). This result implies that students who perceived a higher school climate tend to have significantly less experiences of being bullied.

**Table 8. Linear Regression of the Influence of Parental Support and School Climate on their Bullying Experience (n= 1,331)**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.18	.099		21.97	.000
Parental Support	-.101	.029	-.109	-3.49	.000
School Climate	-.018	.034	-.016	-.519	.604

Model Summary:

F (2,1321) = 9.19\*\* ; p <.001    Std. Error or the Estimate: .595    Adjusted R2 = .012

Considering this relationship to be significant, a further test of linear regression was used to determine the extent of their association. Table 8 shows that the whole model is significant,  $F(2, 1321) = 9.19^{**}$ ;  $p < .001$ . The regression coefficient ( $B = -0.101$ ,  $p < .000$ ) shows that for every unit increase in parental support, there is a corresponding .101 decrease in their bullying experience. On the other hand, the regression coefficient ( $B = -.018$ ,  $p < .000$ ) shows that for every unit increase in positive perception on school climate, there is a corresponding .018 decrease in their bullying experience.

However, the percentage of variation is minimal with only 1.2% of the variance in bullying being accounted for by their parental support ( $R^2 = .012$ ). This means that a number of factors other than parental support account for variations in their bullying experience. These factors may include school climate, previous trauma, social media and the like sex, grade level, and family monthly income. Grunin et al (2021) posits that many family factors affect children’s health and developmental outcomes. Examples include family structure, financial and other resources, social supports, networks, and culture.

## DISCUSSION

The study intended to find out the participants' social context particularly the socio-emotional support of parents and their school climate, in relation to their experiences of being bullied.

In relation to socio-emotional support, participants perceived their parents' support as adequate, and they recognized the gift of time, encouragement for them to improve their talents, and sharing their happiness as strong among their parents. However, the giving of comfort during sad and lonely moments, and the opportunity to be allowed to express their feelings were among the items rated low, which may imply that they need an atmosphere at home characterized by empathy where they are being listened to especially in their difficult moments. This finding may have resonated Bowlby's contention (1969) who underlined the importance of parenting for the effective social and mental functioning of children. He posed that a reduced capacity to relate effectively to others and poor mental health derives from inadequate parental bonding. The finding can be aligned to the notion that warm accepting relations with parent figures can provide a child with the necessary security and confidence to reach out and interact effectively with others, thus avoiding being victimized by others (Mitropoulos et al, 2013).

This parent's socio-emotional support was also found to be significantly related to their perception of the school climate, where they admitted that the establishment of a welcoming environment and students' sense of belongingness are moderately high; while their capacity to report harassment or abuse to school authorities is rated as low. This positive correlation may be due to the reality that students who are more affirmed by their parents also perceive their school ambiance more positively. Findings of the study of Lee, et al (2012) showed that parental involvement influences school climate.

Part of the data on school climate is the students' tendency not to report harassment or abuse. This finding is confirmed with the result where the victim refuses to tell their teachers, parents, another adult in school nor their siblings. Their refusal to disclose experiences of bullying may be due to their fear of retaliation. This is supported with the qualitative study of deLara(2012) as he explored the perspectives of adolescents on their reasons for not reporting incidents or seeking help with bullying. His study found out that some of the reasons are a sense of helplessness, concerns over inappropriate adult action, self-reliance, shame, parental omniscience, and a different definition of bullying than adults use. Conclusions in his study reflect the need to understand bullying from the multiple perspectives of adolescents to minimize it and encourage reporting.

This result finds consonance with the “culture of silence” found by Smith and Shu (2000) and Naylor, Cowie & del Rey (2001); and reasons include the cloak of secrecy, power of the bully, self-blame, retaliation, vulnerability, fear of losing a friendship and fear that adults will do nothing (review done by the social workers in the University of Toronto, 2005 as acknowledged by Pappas, 2010).

On their experiences of being bullied, this current investigation found that participants experienced verbal, followed by social, physical and cyber bullying; the prevalent forms of which are being called hurtful names, teased in a mean way, belongings being taken without their knowledge, and rumors being spread about them. This finding finds similarity with a study among 255 students in a private school in the Philippines where verbal-relational bullying was also rated as the highest, and participants reported experiences of being the object of “name-calling, teasing and gossiping” (Ouano, et al, 2013).

In relation to places where this occurs, the classroom is identified, both while the teacher is out, and even then the teacher is around. Stairways, hallways, gymnasium and comfort rooms were also identified. This is in line with what Carpenter and Ferguson (2013) found that a “large portion of bullying occurs in the classroom, right under the teacher’s nose, because the teacher can’t be watching all the students all of the time.” The occurrence of bullying in these places is an important input for educators and other school personnel. This has implications on the need for everyone in the campus to be oriented on the need to prevent bullying and protect the right of every student from abuse.

Responses to bullying vary from ignoring the bully, disclosure to friends, telling the bully to stop, walking away or ignoring the bully. This finding is aligned with the study of (Naylor, P., Helen Cowie & Rosario del Rey, 2001) which states that other than telling someone about being bullied, the most commonly used coping strategy is ‘ignoring or enduring it’.

While there may be external structures to prevent bullying, some internal mechanisms must also be put into place for pupils to gain strength and confidence not to allow the bullies to abuse them. One is the strengthening of parental support which is found in this study to significantly contribute to decrease in incidents of bullying in some students.

This finding finds semblance with results of various studies where high levels of parental emotional support / encouragement, positive parenting behavior expressed through warm and affectionate relationship, parental supervision, and parent–

child communication significantly reduced the risk of a student being bullied and minimize emotional distress and behavioral problems in the bullied (Abdirahman, Fleming and K.H., 2012; Lereya, Samara and Wolke, 2013; Baldry, 2004; Davidson & Demaray, 2007; Rigby, 2013; Totten and Quigley, 2005).

## **IMPLICATION**

From the findings of this study, an anti-bullying intervention program is proposed.

## **ANTI-BULLYING INTERVENTION PROGRAM**

### **Rationale of the Program**

Based on the findings of this study and cognizant of the provisions of Republic Act 10627 other known as the Anti-bullying Law of 2013, Department of Education commits to observing the rights of the students to a safe environment for learning. Particularly, it requires all schools to establish their anti-bullying programs which includes the formation of a committee that would ensure the protection of children against abuses from their peers as well as adults, formulation of awareness programs to increase students' knowledge of bullying, and provision of counseling programs for both bullies and victims. Educators, school personnel, and students are also encouraged to report school bullying they have witnessed to the proper channels(Sanapo, 2017).

This proposed Anti-Bullying Program is a collaborative work designed for all stakeholders namely the students, teachers, administrators, staff and parents. The general objectives of the Program include: (a) reducing existing bullying problems among students (b) preventing the development of new bullying problems (c) achieving better peer relations at school.

The presence of a number of intervention components (e.g., whole-school approach, anti-bullying policies, classroom rules, information for parents, informal peer involvement, and work with victims) were significantly associated with larger effect sizes for school-bullying perpetration outcomes (Zhang et al, 2021). The presence of informal peer involvement and information for parents were associated with larger effect sizes for school-bullying victimization outcomes. To reduce bullying among students, school personnel and other professionals should promote more regular contact with parents and the provision of emotional support by professional and family caregivers (Jimmerson, 2009).

Empathy training and education, and targeting and modifying normative beliefs about aggression, the need to develop positive parent–child relationships as early as possible were of importance for emphasis (Ang , 2022), It was further noted that for effective prevention and intervention efforts, these must be situated within a larger multilevel framework which targets different levels and addresses multiple contexts within which a child is embedded.

**Table 10. Proposed Anti-Bullying Intervention Program**

Major Findings	Objectives	Possible Activities
Average parental support and significant link between support and bullying and school climate	<ul style="list-style-type: none"> <li>➤ To enhance parental support and to make them aware of that this support is crucial to prevent bullying</li> </ul>	<ol style="list-style-type: none"> <li>1. Parenting Session/workshop on socio-emotional support / emotional literacy in all Junior High schools</li> <li>2. Orientation on the nature and dynamics of bullying and the Law on Bullying in all Junior High schools</li> </ol>
School Climate especially on apprehensions in reporting harassment or abuse	<ul style="list-style-type: none"> <li>➤ To generate awareness and involvement on the part of the students in the school.</li> </ul>	<ol style="list-style-type: none"> <li>1. School-wide talk and Workshop on Strengthening School Climate; as well as the nature, types, effects, and dynamics of bullying; the Law on bullying</li> <li>2. Creation of grievance committee/ mechanism for anti-bullying</li> <li>3. Homeroom Activities that highlight lessons on Adjustment and Interpersonal skills</li> </ol>
Bullying in the Classroom (when the teachers are out in the classroom)	<ul style="list-style-type: none"> <li>➤ To prevent bullying incidence in the classroom</li> <li>➤ To handle bullying situations appropriately</li> <li>➤ To prevent more serious problems</li> </ul>	<ol style="list-style-type: none"> <li>1. Review &amp; strengthen teacher’s class supervision</li> <li>2. Conduct teachers and staff hands-on training on how to deal with bullying/conflict management strategies</li> <li>3. Ensure that all staff intervenes on the spot when bullying occurs</li> </ol>
Degree of Being Bullied	<ul style="list-style-type: none"> <li>➤ To help the victims alleviate their conditions</li> <li>➤ Reduce existing bullying problems among students</li> </ul>	<ol style="list-style-type: none"> <li>1. Pareto Analysis, Individual/Group Counseling and Referral</li> <li>2. Develop individual intervention plans for the victims</li> <li>3. Inclusion of topics for bullying in academic subjects</li> </ol>
Reactions when bullied (especially responses that perpetuate the bullying)	<ul style="list-style-type: none"> <li>➤ To learn effective strategies in coping with bullying</li> </ul>	<ol style="list-style-type: none"> <li>1. Inclusion of anti-bullying policies in the Student Handbook and its clear policies on reporting guideline</li> <li>2. Creation of an Informal Peer program in every school</li> <li>3. Training on Assertiveness for all students</li> </ol>

## DISSEMINATION AND ADVOCACY PLANS

Activity	Time Frame	Venue	Expected Participants
Dissemination of Findings to the School's Division Executive Committee after approval	1 <sup>st-2nd</sup> quarter of the CY 2024	El Salvador Division Office	SDO Executive Committee
Dissemination of Findings to the School Heads/Principals & Guidance Advocates	2 <sup>nd</sup> quarter of the CY 2024	Division Office	School Principal/School Heads
Dissemination of Findings to the Students & Anti-Bullying Advocacy	2 <sup>nd</sup> Quarter of the CY 2024	Respective Participating Schools	Junior High School Students

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# TEACHERS' PERSPECTIVE ON PROJECT RARE (RESEARCH ALIGNMENT TO RAISE EDUCATIONAL OUTCOMES): A TAKE-OFF IN RESEARCH AND INNOVATION

Karen Rose A. Serrania  
Division Office-SGOD

## ABSTRACT

The research titled “Teachers’ Perspective on Project **RARE (Research Alignment to Raise Educational outcomes):A Take-off in Research and Innovation**”, aimed to ascertain teachers’ perspective on the research activities conducted by El Salvador City Division. The study utilized the Mixed Methods Approach using descriptive statistics, inferential statistics, surveys and Focus Group Discussion (FGD). Using the stratified random sampling, ten (10) teachers from each of the 23 schools in the Division were identified as respondents of the study and answered the survey questionnaire which were grouped into five scales from highest to lowest. For the qualitative data, participants underwent recorded interview and Focus Group Discussion (FGD) and responses were coded, synthesized and analyzed based on themes. The study revealed that there is a significant difference between the perceptions of the teachers toward research before and after the intervention and that research program really worked out allowing teachers to fully understand the importance of conducting action research in school. Further, there has been a significant increase of 38.5% of research submission from the previous years. As noted from the Focus Group Discussion conducted, 53.3 % of the teachers and school leaders claimed that research activities are well-communicated compared to the previous years and guidelines are clearer and attainable given that several communication platforms were utilized. Moreover, teachers also believed that research activities in the Division were aligned with their needs for professional growth and development with 43.3% responses which also enticed them to conduct and submit research papers.

## Context and Rationale

DepEd Order 39, s. 2016 (Adoption of the Basic Education Research Agenda) highlights the significant contribution of research to fully establish policies and implement goals directed towards the learners; thus, effectively instigating the Department of Education’s mandate consistent with its vision. Accordingly, priority themes surfaced as research areas that are most necessary and practical in light of the Department’s objectives. Major reforms and implementations in the educational setting are anchored on reliable researches and validated data.

The Division of El Salvador City acknowledges the vital role of research to ascertain and sustain breakthroughs in the educational setting. Several initiatives have been extended to the field in line with such facet, but the spontaneity in crafting school-based researches is a major challenge. With this, the Office looks into the deeper perspective of research to fully address problems in school; connoting positive impact of this paradigm among the teachers and personnel.

Seeing the utmost role of research to improve academic performance of the learners, the Division of El Salvador City launched the Project RARE (Research Alignment to Raise Educational outcomes) to utilize verified classroom interventions to elevate the standard of classroom performance. The project will provide a platform for school-based researches to yield significant findings that can improve the quality and delivery of instruction and promote research as a tool to improve Key Performance Indicators. Thus, this research will be conducted to see the impact of this project in the Division Research Agenda.

### **Voice of the Customers**

The researchers conducted a Focused-Group discussion to solicit feedback and responses from the teachers to find out the in-depth reasons and factors of their negative perception towards research.

One of the common responses of the teachers is their lack of basic knowledge on research writing. They claimed that they lack the competency in research writing simply because it was not highlighted in their undergraduate studies. While some of them did a thesis, the guidelines and procedures were already forgotten. Despite the aspiration of the teachers to do an action research, the basic knowledge on doing a research hinders the goal. This has resulted to their negative perception towards research writing and even considered such as an additional burden.

Moreover, exposure to research writing is also a problem. While there were In-Service trainings on Action research conducted by the school and the Division office, the application itself is unachievable. Some teachers attended the trainings for compliance purposes but are not motivated to do an output afterwards.

Furthermore, teachers claimed that they may start doing a paper but cannot sustain it because they are not guided on the following steps. They are also anxious of their outputs because they felt that they are alone in such journey. They wanted to have a circle which shares the same interest as theirs so that they will be assisted on their study.

## **Focused Problem**

Based on the responses of the teachers from the Focused-Group Discussion, the researchers identified the main theme of the voice of the customers. The teachers would want to have group of individuals with same interest/major as theirs to collaborate on a study. Hence, the teachers need a mentor who will assist and guide them in articulating their ideas, gathering data and justifying their claim on a regular basis.

## **Innovation, Intervention and Strategy**

Best and Kahn (1993) describe research as “the systematic and objective analysis and recording of controlled observations that may lead to the development of generalizations, principles, or theories, resulting in prediction and possibly ultimate control of events”. Research in an education setting is done to improve school practices and at the same time to improve those individuals who strive to advance those practices (Best & Kahn, 1993).

This study is anchored on Collaborative-Cooperative learning. Collaborative learning is a method of teaching and learning in which individuals team together to explore a significant question or create a meaningful project. Collaborative learning describes a variety of educational practices in which interactions among peers constitute the most important factor in learning (Dillenbourg, 2009).

On the other hand, Cooperative learning is a specific kind of collaborative learning. In cooperative learning, individuals work together in small groups on a structured activity. They are individually accountable for their work, and the work of the group as a whole is also assessed. Cooperative groups work face-to-face and learn to work as a team. In small groups, teachers can share strengths and also develop their weaker skills. They also develop their interpersonal skills. They learn to deal with conflict. When cooperative groups are guided by clear objectives, students engage in numerous activities that improve their understanding of subjects explored.

A Research Cell paralleled a cooperative learning in which teachers will form a small group with similar interest, like language and mathematics, and work collaboratively to attain a specific goal. Since they share a common major, they themselves will critique their work and guide one another to finish a paper. A mentor will lead them in doing the task and will provide assignment to everyone.

The mentees turned mentor that we call in the study are research presenters in previous conferences whom have attended comprehensive trainings on research

writing. These personalities are once mentees by the Division and school research coordinators and are chosen to mentor a research cell to help their colleagues attain a specific goal: a research paper. Once a week, the research cell members together with their mentor gather to discuss research progress. Then, once a month, all research cells congregate in one room during Learning Action Cell (LAC) session to share inputs with other groups.

Moreover, the research coordinator from the Division office together with the Technical Assistance Providers observed the LAC session and gave feedback on the outputs of the cells. There were 5 research cells with the following interest/majors: Language (English-Filipino) Group, Mathematics, Science, T.L.E, MAPEH, ESP-ArPan Group. After the cycle, the mentors together with the Division representative nominated future mentors who will take over their places for another research outputs on the following academic year. Through this, everybody will be given a chance to mentor a research cell; thus, improving once leadership skills. The nomination will be repeated annually until such time that teachers will be fully equipped with necessary skills ready to stand on their own and eventually do their individual outputs. This will not just help teachers develop a research culture but also improves critical thinking and social skills. Research writing required thorough trainings and exposures that can't be attained in just a click. The research cell may take a lengthy process but teachers will have an opportunity to build a strong foundation of the skill, thereby living a research culture that is spontaneous.

Through Division Memorandum 158, s.2019 (1st run), the Division Research Committee stipulated a framework directed to schools consequent with the introduction of a research cell. Teachers were grouped according to their field of specialization and gathered during their vacant time to discuss interventions to the usual problem they encounter in their subject areas. The group came up with a research and the Division Research Committee monitored the conduct and progress of the intervention. Partners from the SUCS (State Universities and Colleges) were also tapped to help in the assessment and evaluation of the researches (services were rendered for free as agreed in the MOA).

### **Research Questions**

This study sought to strengthen the research culture in the Division and improve teachers' perception and attitude towards research writing through research cell; thus, the researcher aimed to answer the following questions:

1. What is the perspective of the teachers towards conducting and writing research before and after the intervention was launched?
2. How does the Project RARE help improve teachers' perception towards research

writing, in terms of:

- a. Teachers' submission of research outputs
- b. Teachers' participation in research presentations and activities

### **Methods Used**

This study utilized the Mixed Methods Approach using descriptive statistics, inferential statistics, surveys and Focus Group Discussion (FGD).

For **Quantitative data**, using the stratified random sampling, ten (10) teachers from each of the 23 schools in the Division were identified as respondents of the study. These teachers were grouped according to their interests and majors.

To identify the teachers' perception towards research, a survey-questionnaire was used. The teachers' responses on the survey questionnaire were grouped into five scales from highest to lowest.

### **Qualitative Data**

For the qualitative data, the Constructivist Grounded Theory and Phenomenology research designs were used to describe and categorize the responses of the teachers. This paper utilized a more in-depth method through a descriptive phenomenological design or the Husserlian phenomenology. Langdridge, 2007 explained that phenomenology is concerned with exploring and understanding human discoveries both in philosophy and research. According to Guilbeau (2014), Phenomenology is a type of qualitative research that does not necessarily contradict the quantitative approaches but asks a different question. To further elucidate the phenomenon's meaning, it focuses on answering the 'what is it's rather than the 'how much' and 'how many,' which describes frequency or magnitude. Thus, in this research investigation, the aim was to uncover the meaning of the teachers' experiences in research writing and other related activities.

Participants of this study are purposively sampled five (5) teachers who underwent recorded interview and Focus Group Discussion (FGD). Furthermore, it should be noted that this sample does not represent the entire population, but it is considered acceptable to demonstrate the purpose of this study. The researchers do not intend to generalize the results but to qualitatively describe the lived experiences, challenges and difficulties of the student leaders in times of alternative learning in light of the Covid-19 situation.

### **Data Collection**

The participants were given the consent form and interview was scheduled after the consent was signed. Five (5) of the participants opted for an online interview

using the Microsoft Teams (MSTeams) application while the other four (4) chose the face to face interview. Interview was recorded using the recording feature in the online platform and cellular phone voice memo for face to face interview. The sessions were guided with the approved interview items which were validated and pilot tested. Responses of the participants were transcribed and translated in English and categorized according to the same themes. Further, data gathering was done from the third week of November 2021 to the second week of February of 2022.

### **Data Analysis**

The data were analyzed using coding and content analysis. Interview questions were flexible and the researcher added items [when needed] for follow-up questions and ensure in-depth responses from the participants. After the transcription, responses. The experiences of student leaders in alternative learning modalities were sorted, synthesized and coded according to themes. Common themes were categorized and analyzed based on its content. The researchers then interpreted these responses to represent a theoretical understanding of the studied experience.

<b>Scale</b>	<b>Qualitative Description</b>	<b>Quantitative Statement</b>
4.21-5.00	Strongly Agree	The features are satisfied very adequately
3.40-4.20	Agree	The features are satisfied adequately
2.60-3.39	Disagree	The features are slightly satisfactory
1.90-2.59	Strongly Disagree	The features are not satisfied
1.00-1.80	Not Applicable	The features are not present

The researcher also conducted a Focused-Group Discussion (FGD) to solicit feedback, observations and suggestions from the teacher-participants. An intervention plan was provided to indicate the activities that were integrated throughout the study.

### **Statistical Treatment of the Data**

A survey questionnaire which is of likert scale was administered before and after the intervention was launched to determine the perception of teachers towards research. A t-test for two samples assuming unequal variances with level of significance equal to 0.05 determined if there is a significant difference on their perceptions before and after the intervention.

### **Results and Findings**

I. What is the perception of the teachers towards conducting and writing research before and after the intervention?



**Table 1. Average perception of teachers about research**

Statements about research	Average perception (Before the intervention)	Average perception (After the intervention)	Difference
Research helps discover new teaching methods which can be applied in the classroom setting.	2.1	4.8	2.7
Through research, teachers are able to improve their teaching skills which contribute to professional development.	2.7	4.6	1.9
Research makes teachers learn whether their teaching practice is effective base on students' outcomes.	2.5	4.7	2.2
Research supports high quality instruction for all level of learners.	2.3	4.5	2.2
Research helps formulate innovative ways to improve classroom organization.	2.6	4.6	2.0
It addresses issues concerning the recent advancement in teaching-learning process.	2.9	4.8	1.7
The primary rule of research is to inform action and practice.	2.2	4.7	2.5
Research helps solve existing problems and challenges to overcome a new one.	2.5	4.6	2.1
Research requires time, money and effort to ensure its validity and reliability.	3.8	4.9	2.1
Research determines the success or failure of an educational project (e.g. K-12 Curriculum).	3.1	4.5	2.4
<b>Overall Mean</b>	<b>2.67</b>	<b>4.67</b>	<b>2.18</b>

Table 1 shows the perception of the teachers towards research before and after the intervention was launched. Prior to the intervention period, the overall mean which is 2.67 suggest that teachers disagree on the idea of conducting and writing action research. This means that teachers do not fully recognize the importance of having action research in the school. However, after having the intervention, the overall mean which is 4.67 suggests that teachers strongly agree on the idea of conducting and writing action research. This means that teachers were now able to see the relevance of having action research.

**Table 2. Paired sample t-test on the perceptions towards research before and after the intervention**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair Before - After	-2.0000	.4738	.1498	-2.3389	-1.6611	-13.350	9	.000

Table 2 shows the paired sample t-test on the perception of teachers towards research before and after the intervention. Note that the p-value is less than the level of significance ( $\alpha=0.05$ ) which shows that there is a significant difference between the perception of the teachers towards research before and after the intervention and that the intervention really worked out allowing teachers to fully understand the importance of conducting action research in school.

## **2. How does the Project RARE help improve teachers' perception towards research writing, in terms of:**

### **a. Teachers' conduct and submission of research outputs**

From the records and database of the Schools Division Research Committee (SDRC), there has been a significant increase of 38.5% of research submission from the previous years. As noted from the Focus Group Discussion conducted, 53.3 % of the teachers and school leaders claimed that research activities are well-communicated compared to the previous years and guidelines are clearer and attainable given that several communication platforms were utilized such as division website under the research and innovation tab, meetings with the school research coordinators and the availability of the Division Research Agenda through the website.

Further, 46.7% of the responses highlighted the imperatives of research call-ups and opportunities which are clearly communicated to schools/offices through memorandum, meetings and other information dissemination platforms. As such, teachers also perceived a very satisfactory reception of research submission because of the systematic manuscript review and feedback given by the SDRC as acclaimed by 43.3% of the respondents.

Moreover, teachers also believed that research activities in the Division were aligned with their needs for professional growth and development with 43.3% responses which also enticed them to conduct and submit research papers.

### **b. Teachers' participation in research presentations and other related activities**

The survey results also suggested that teachers are more confident and assertive to participate research presentations and other related activities because these are relevant and timely as noted by 40% of the respondents. The trainings conducted and resources given also improved their skills and basic knowledge in research. Further, the SDRC has provided relevant technical assistance and research guidance

in the conduct of research and other related activities which also helped teachers gained utmost self-assurance of completing a paper.

With the teachers' perspective on conducting research, it also directed several benefits to solve classroom problems such as lack of critical thinking skill, low motivation, and lack of activities. It also improves students' achievements in learning tasks. Moreover, teachers feel more confident because they know how to use classroom action research to find out if students are learning from their lessons.

## **Conclusions and Recommendations**

Writing remains significantly under-theorized yet there is clearly more at stake than the application of generic structural rules or guidelines for writing research. Whatever the discipline, these mechanics are inadequate to account for the complexities of writing faced by teacher-researchers (Lee, 2007).

This paper underscored the perspective of teachers towards research writing under the Project RARE, a research initiative of the office to improve the research culture of the teachers. Surveys and the FGD have confirmed that there has been a significant increase of the teachers' perception towards conducting and writing of research papers before and after the Project RARE was launched. However, despite its seemingly positive result, several points for improvement have been noted; as such:

1. Research training for the next phase should focus on the data processes and the technical treatment;
2. Strengthen research mentorship and technical coaching (in schools and SDO);
3. Inclusion of research format and guidelines in the SDO website (under the research and innovation tab)
4. Provision of plagiarism checker software for easy detection of discrepancies
5. Continued partnership with SUCs and LGU for a more effective and comprehensive research activities.

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# CREATIVE JOURNAL: “EXPLORING THE IMPACT OF CREATIVE JOURNALING ON PERCEIVED STRESS AMONG LEARNERS

Marivic S. Torres, Daniel Ruben B. Penaso , Marilou Y. Descallar

## ABSTRACT

This study investigates the impact of creative journaling on the perceived psychological stress of Filipino high school students at Molugan National High School. Using a mixed-methods approach, the research combines quantitative data from Cohen’s Perceived Stress Scale with qualitative insights from a teacher-made Creative Journal intervention. Results reveal a significant reduction in perceived stress levels post-intervention, supported by thematic analysis of learners’ experiences. Recommendations advocate for integrating creative journaling into educational practices. The study contributes to the literature on the positive effects of creative interventions on psychological health, paving the way for future research in educational contexts.

**Key Terms:** *Creative Journaling, Perceived Psychological Stress, Mixed-Methods Research, Cohen’s Perceived Stress Scale, and thematic Analysis*

## INTRODUCTION

### Rationale and Context

The high prevalence of stress in students population is the basis for the study’s decision to look at how creative journaling affects students’ perceptions of their psychological stress. In their daily lives, students deal with a variety of stressors, such as family issues, social pressure, and academic pressure. Their academic performance, as well as their physical and mental health, may be negatively impacted by long-term stress. In order to reduce student stress, it is crucial to find efficient strategies. Particularly, there has been an instance in the researcher’s school setting wherein a learner died due to depression. The idea of depression and suicidal symptoms can be seen commonly in the learners’ Facebook posts.

For students to express their ideas, feelings, and experiences, creative journaling offers a secure and convenient outlet. It can assist students in recognizing, analyzing, and developing coping mechanisms for their stressors. Additionally, journaling creatively can improve mindfulness, self-reflection, and self-expression, all of which are critical abilities for fostering resilience and well-being.

Therefore, the purpose of this study is to investigate how creative journaling affects students' perceptions of psychological stress as well as the mechanisms by which it does so. For educators, counselors, and mental health professionals who are interested in promoting students' wellbeing, the study's findings can offer insightful information.

It can also help schools create creative journaling programs that will benefit students' stress reduction and overall mental health. This research will be conducted in order to find out the following:

1. The effect of the intervention on the Perceived Stress of the Learners
2. The Perceived Stress level experienced by the learners.
3. The experiences of the learners while doing the Creative Journal.

### **Theoretical Framework**

Creative journaling as a stress-reducing technique is based on several theoretical frameworks, including:

Cognitive-behavioral theory by Beck, A. T., & Ellis, A. (1970): This theory suggests that our thoughts, feelings, and behaviors are interconnected and can influence each other. By journaling, individuals can identify and challenge negative thoughts and beliefs, leading to changes in their emotional experiences and behaviors.

Expressive writing theory by Pennebaker, J.W. (1986): This theory proposes that writing about one's emotions and experiences can help regulate emotions, decrease stress, and promote physical and mental well-being.

Mindfulness theory by Kabat-Zinn, J. (1990): Mindfulness is the practice of being present and non-judgmental in the moment. By engaging in creative journaling, individuals can cultivate mindfulness and increase awareness of their thoughts, feelings, and experiences, leading to reduced stress levels.

Social support theory by Cohen, S. (2000): This theory suggests that social support can buffer against stress and promote well-being. By sharing their journal entries with others or participating in journaling groups, individuals can receive support from others, leading to reduced stress levels.

Overall, it can be said that using a creative journal can be beneficial when it comes to self-expression, managing one's emotion, and building a stronger social network—all of which can help one feel less stressed out.

### **Research Questions**

This research aims to investigate the influence of creative journaling on learners' perceived stress levels. Specifically, it seeks to address the following research questions:

1. What was the level of perceived stress among students before and after the intervention was implemented?
2. Is there a statistically significant difference between the results of the Pre-Intervention Test and the Post-Intervention Test?
3. What are the experiences of learners who participated in the intervention program?

## **Literature Review**

Writing in a creative journal is an expressive writing technique that makes use of a variety of artistic prompts and techniques to encourage self-reflection, development, and creative exploration. Examining recent studies on the advantages and uses of creative journaling is the goal of this review of the literature.

### **The Benefits of Creative Journal**

According to research, keeping a creative journal can improve one's mental health and general well-being. Participants who used creative journaling reported lower levels of stress, anxiety, and depression in a study by Shim et al. (2020) than those who did not use this technique. Additionally it demonstrated an increase of self-awareness and it encouraged self-discovery (Grossman, 2020). Additionally, it has been discovered that creative journaling is a successful treatment for a number of mental health conditions, including post-traumatic stress disorder (PTSD) (Sauer-Zavala et al., 2021).

### **Applications of Creative Journaling**

There are numerous fields where creative journaling can be used. Students' creativity and critical thinking skills have been improved through the use of creative journaling in the field of education (Becher, 2021). Especially in the treatment of trauma-related disorders, creative journaling has been used in therapy as a complementary intervention to traditional talk therapy (Sauer-Zavala et al., 2021). Additionally, using creative journaling at work has been shown to increase productivity and employee happiness (Kim & Cho, 2021).

Writing is used as a therapeutic tool in creative journaling to express feelings, ideas, and experiences. It has been demonstrated to work well in fostering mental health and wellbeing. The application of creative journaling in a Philippine context has not, however, received much research. In this literature review, we will examine the most recent research on the benefits of creative journaling for mental health promotion in the Philippines.

In Western nations, the therapeutic use of creative journaling is very common. Its application in the Philippine context is, however, comparatively recent. The

effectiveness of creative journaling in easing depression and anxiety symptoms among Filipino college students was investigated in a study by Abella (2021). The study discovered that participants' symptoms of anxiety and depression were significantly reduced by keeping a creative journal.

Castillo (2019) looked into the effects of creative journaling on the wellbeing and self-esteem of Filipino teenagers in a different study. The results of the study showed that participants' self-esteem and general well-being were significantly increased by creative journaling. The study also discovered that keeping a creative journal gave the participants a way to develop stress-reduction techniques.

Additionally, Yulo and Lao's (2020) study looked at the role that creative journaling plays in encouraging self-awareness and mindfulness in Filipino adults. According to the study, keeping a creative journal helped participants become significantly more mindful and self-aware. The study also discovered that journaling in a creative way aided participants in comprehending their feelings and thoughts.

A study by Guevara and Gamboa (2020) also looked into the efficiency of creative journaling in lowering stress among Filipino nurses. According to the study, participants' stress levels were noticeably reduced by keeping creative journals. A further finding of the study was that journaling in a creative way aided participants in learning coping mechanisms for handling stress at work.

The most recent research on the application of creative journaling in the Philippine context points to it as a valuable therapeutic technique for enhancing mental health and wellbeing. According to the studies we looked at, keeping a creative journal can lessen anxiety and depressive symptoms, boost wellbeing and self-esteem, foster mindfulness and self-awareness, and lessen stress. The long-term effects of creative journaling in the Philippines setting, however, require more study.

## **Research Design**

A mixed method of research is used in this study. A research strategy known as mixed methods research involves gathering and analyzing both qualitative and quantitative data for the same study. In order to provide a more thorough understanding of the research question, this method makes use of the strengths of both qualitative and quantitative research.

Mixed methods research, according to a 2007 article by Creswell and Plano Clark, enables data triangulation, improves the credibility and verifiability of findings, and offers opportunities for examining and explaining complex phenomena. Additionally, combining qualitative and quantitative data can give a more complete picture of the phenomenon under study and enable a deeper comprehension of the connections



and relationships between the various variables.

A different article by Johnson and Onwuegbuzie (2004) explains how mixed methods research can be used to address issues that cannot be addressed by either qualitative or quantitative approaches by themselves. This method can also offer a more comprehensive understanding of intricate social phenomena.

It is significant to remember that mixed methods research involves systematic integration of both qualitative and quantitative research in order to answer a particular research question. The research question, the kind of data required, and the study's objectives should all be taken into consideration when designing a mixed methods study.

**Participants of the Study.** The initial sample for this research consisted of 50 purposively selected participants spanning from grade 7 to grade 12. These participants were identified based on their high stress scale scores in the questionnaire. However, during the course of the study, 2 participants withdrew from the program, citing a lack of interest in the intervention. Additionally, 1 participant transferred out due to a change in residence. As a result, the final sample size for the research comprised 47 participants.

**Data Gathering Procedures.** A letter was given to the principal asking permission to conduct the research study. Upon approval, Cohen's Perceived Stress Scale questionnaire was distributed to all learners in the school to answer, and those who got a high-stress score were selected for purposive sampling. 50 learners were selected from the group, these learners will be given the intervention, but only 47 were able to finish the intervention program. 2 students transferred out, and one chose not to attend the intervention program anymore.

Due to the age of the respondents, their parents was informed that their children had been chosen as respondents of the research, and a letter of parental consent was given for them to sign, this is in line with RA 6809. The questionnaire given was the Cohen's Perceived Stress Scale with a Cebuano Translation to make it more comprehensible. The Cebuano translation was validated by the researchers through the use of Cronbach's alpha and was able to yield a good result in terms of its reliability ( $\alpha = 0.821229698$ ). After finishing a Pre-Test, they were given a creative journal sheet every week for 7 weeks. After the 7-week duration, they were again given the Cohen's Perceived Stress Scale to answer. The respondents was also interviewed regarding their experiences doing the Creative Journal.

**Sampling Procedures.** The respondents were selected through Purposive Sampling based on a criterion that they yield a high-stress score based on Cohen's Perceived

## Stress Scale Questionnaire.

*Scope and Limitation.* This Research is only limited 50 students from Grade 7 to Grade 12 from Molugan National High School during the School Year 2023-2024.

*Research Instrument.* The Researchers used Cohen's Perceived Stress Scale developed by Sheldon Cohen as Pre-Intervention Test, It was obtained with permission from the developer. A questionnaire with Cebuano Translation is also used to accurately measure the stress level of the learners. The Questionnaire with Cebuano translation was validated with the use of Cronbach's Alpha and yielded a good result in terms of its reliability ( $\alpha = 0.821229698$ ), and a teacher-made Creative Journal was used as an intervention for the research.

*Statistical Analysis Technique.* In question number one, Sum and averaging were used to obtain the result of the pre-test and post-test. In question number two, T-Test is used to determine the effect of the intervention being used. For question number three, answers were classified by the themes and were tallied according to frequencies.

## Ethical Considerations

- **Informed Consent:**

Participants (students) were provided with a clear explanation of the study's purpose, procedures, and potential risks. Informed consent forms were distributed, emphasizing voluntary participation and the right to withdraw at any time.

Participants were informed that their academic standing would not be affected by their decision to participate or decline.

- **Confidentiality and Anonymity:**

All PSS test results were treated with strict confidentiality. Responses were anonymous, and no identifying information was linked to individual data.

- **Parental Consent:**

Participants under 18 years old required parental consent. Consent forms clearly outlined the study's purpose and procedures.

- **Briefing by Guidance Counselor:**

The school's guidance counselor provided a comprehensive briefing to participants. Participants were informed about the study's objectives, potential benefits, and any emotional impact.

- **Voluntary Participation:**

Participation in the study was voluntary. Participants could decline or withdraw without consequences.

- **Minimizing Harm:**

Researchers monitored participants during the intervention to address any adverse effects. Participants were provided with resources for coping with stress.

- **Beneficence:**

The study aimed to benefit participants by enhancing stress management skills through journaling. Risks were minimized, and benefits were emphasized.

## **Results and Discussion**

### **1. What was the level of perceived stress among students before and after the intervention was implemented?**

The mean scores for the pre-test were 3.49, while the post-test mean scores decreased to 2.33. The observed difference between the pre-test and post-test scores was 1.17. This table provides a quantitative representation of the changes in participant scores, indicating a reduction in the mean scores from pre-test to post-test. These findings align with the research by Deckro et al. (2019), which demonstrated that the mind/body intervention led to a reduction in perceived stress among students. Additionally, a study by Smith et al. (2020) also reported similar results, supporting the effectiveness of stress reduction interventions.

### **2. Is there a statistically significant difference between the results of the Pre-Intervention Test and the Post-Intervention Test?**

The based on the result of the Pre-Test and Post-Test taken from 47 participants, It was indicated that the p-value of (7.48549E-17) is extremely small, much smaller than the conventional significance level of 0.05. This suggests strong evidence to reject the null hypothesis. This indicates that the observed difference is highly unlikely to have occurred by chance. The t-statistic of 12.87 is well beyond the critical values of 2.012, further supporting the conclusion. This is in line with the findings of Harpazi et al. (2019) that participants, after undergoing art therapy sessions, expressed that art therapy played a role in helping them handle various challenges in their lives, including addressing fears, alleviating stress, managing academic workloads, and dealing with issues such as anger management, behavior and habit changes, and overall improvement in daily conduct. In addition, According to Carsley and Heath (2019), “the results revealed an overall significant decrease in test anxiety and an overall significant increase in state mindfulness following the interventions. Furthermore, although a significant negative correlation was found between dispositional mindfulness and change in state mindfulness pre- and post-coloring intervention, a significant positive correlation was found between dispositional mindfulness and pre-intervention state mindfulness, suggesting a possible ceiling effect” (p. 143).

Furthermore, it was found that Expressive Writing Therapy, particularly through diary and journal writing, has the potential to reduce anxiety levels in children who have experienced significant stress and even those who have lost their parents to Covid-19. The act of writing in a diary allows children to channel their emotions positively and enhances cognitive activity (Wantini, Suyatno, & Dinni, 2022).

### **3. What are the experiences of learners who participated in the intervention program?**

The identified themes, such as Emotional Well-Being, Stress Relief, Enjoyment and Fun, Self-Expression and Reflection, Personal Growth and Improvement, and Mixed Emotions, offer a nuanced understanding of the diverse experiences reported by the learners. The application of creative arts therapies shows promise in addressing PTSD by aiding in the alleviation of depression and symptoms associated with trauma, including alexithymia, dissociation, anxiety, nightmares, and sleep disturbances. Moreover, creative arts therapies have the potential to enhance emotional regulation, promote positive interpersonal relationships, and foster a positive body image” (Braus & Morton, 2020, p. S267).

Representative responses offer qualitative insights into the learners’ experiences, capturing their emotions, challenges, and positive outcomes. The responses underscore the role of creative journaling in fostering a sense of safety, peace, happiness, and relief. Stress relief is a prominent subtheme, with learners expressing the activity’s effectiveness in providing an escape from worries and promoting a peaceful state of mind.

Additionally, the learners’ engagement in self-expression, reflection, storytelling, and personal growth is evident in the representative responses. The positive impact of creative journaling on participants’ creativity, art skills, and talent development is highlighted, emphasizing the transformative nature of the intervention. Further, Art therapy, as indicated by Liu et al. (2022), holds significant potential in alleviating a range of conditions, including psychological, behavioral, physiological, and other related health issues. This potential extends across a spectrum of diseases, emphasizing the multifaceted benefits that art therapy may offer to enhance overall well-being (pp. 232).

Mixed emotions, as documented in the responses, contribute to a dynamic emotional experience for the learners, including feelings of happiness, relaxation, and enjoyment. In line with the findings of Kaimal et al. (2019), participants of who have undergone art therapy experienced notable increases in positive affect, creative agency, and self-efficacy, accompanied by substantial decreases in negative affect, anxiety, perceived stress, and burnout. The shared outcomes encompassed

expressions of enjoyment, relaxation, appreciation for respite from stressors, creative problem-solving, a sense of flow, and personal and existential insights. Moreover, the distinct experiences reported by participants underscored improved focus during coloring and a profound appreciation for the supportive and expressive atmosphere fostered by open studio art therapy (pp. 153-161).

In support, the findings of Vaartio-Rajalin et.al. (2021) accordingly, art activities were linked to the process of making meaning out of experiences, indicating a potential therapeutic aspect of self-reflection. Further, participants showed signs of personal growth through engagement in art activities, suggesting a positive impact on their well-being. In support, art therapy programs showed promising effects in improving the depression and self-esteem of a certain individual, even in adults and is beneficial to one's mental health (Ching-Teng et. al.,2019).

## **Implications**

The findings of this study illuminate the profound impact of the creative journaling intervention on learners' emotional well-being. The identified themes and subthemes provide a rich understanding of the diverse experiences encountered during the intervention. The prevalence of positive emotions, stress relief, and personal growth suggests that creative journaling serves as a valuable tool for promoting emotional health among learners.

The emphasis on self-expression, reflection, and storytelling underscores the therapeutic nature of creative journaling, offering learners a means to navigate and process their emotions. The reported improvements in creativity, art skills, and talent development highlight the potential for this intervention to contribute not only to emotional well-being but also to broader aspects of personal growth and skill enhancement.

The mixed emotions expressed by learners emphasize the dynamic nature of their experiences, reinforcing the idea that creative journaling provides a platform for a range of emotional expressions. The findings open avenues for further exploration into the specific mechanisms through which creative journaling positively influences learners' emotional states.

Despite the overwhelmingly positive outcomes, it is important to acknowledge the limitations of the study. The reliance on self-reported experiences may introduce a subjective bias, and the generalizability of the findings may be influenced by the specific context of the intervention. Future research should consider incorporating more diverse methods and participant demographics to enhance the robustness of the results.

## Conclusion

In conclusion, this study sheds light on the positive experiences of learners who underwent a creative journaling intervention. The themes and keywords extracted from their responses reflect a range of emotional, cognitive, and personal growth outcomes. Creative journaling emerges as a valuable tool for promoting emotional well-being, stress relief, and self-expression among learners.

While recognizing the study's limitations, the overall findings suggest that creative journaling has the potential to be an effective and accessible intervention in educational settings. By acknowledging and addressing the emotional needs of learners, educators and practitioners can contribute to creating a supportive and enriching learning environment. The study contributes to the growing body of literature on the intersection of creative activities and emotional well-being, paving the way for future research and practical applications in educational contexts.

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# UTILIZING 7Es TEACHING MODEL IN TEACHING SCIENCE: ITS EFFECTS ON GRADE 10 LEARNERS' ATTITUDE AND ACADEMIC PERFORMANCE

Joerigene Odette C. Neri, Jovit D. Comon & Joey A. Oco  
Sambulawan National High School

## ABSTRACT

Academic achievement is linked to the positive outcome one values. This study looked at how well the 7E Teaching Model worked and how well junior high school students at Sambulawan National High School in El Salvador City performed in science. It examined students' attitudes toward science, took into account the efficacy of the 7Es Teaching Model, and evaluated students' performance in science based on the results of the conducted pretest and posttest. A quasi-experimental research design was adopted in the study. It used frequency, percentage, mean, standard deviation, and F-test for the data analysis. Students had a very positive attitude toward science. The experimental group's scores were much better than those of the control group. Results showed that the 7E teaching technique had a significant impact on students' performance in science, but only on the experimental group and not on the control group. Results showed that there is a significant difference between the effects of the 7E Teaching Model on the academic performance of Grade 10 students and the performance of the students exposed to the 7E Teaching Model when it comes to their attitude toward science. The researchers came to the conclusion that the 7Es Teaching Model is a useful tool for educating students in grade 10 and helped them advance their communication, teamwork, and critical thinking abilities. Educators must consistently encourage students to achieve academically and adhere to the correct 7Es Model in their instruction. The student must participate in all of the class activities and continue to practice strong study habits.

**Keywords:** *7E's Teaching Model, science, performance*

## INTRODUCTION

The 7E Teaching Model is designed to improve students' comprehension of scientific subjects. It is believed that the subject should be taught through more engaging activities that promote and evaluate students' creativity and critical thinking in real-world circumstances. Gone are the days when students merely passive listeners and observers. Elicit, Engage, Explore, Explain, Elaborate, Extend, and Evaluate are therefore the seven components of the 7E Teaching Model. The 7E Teaching Model

emphasizes student-led and inquiry-based science instruction. The role of the teacher is that of a facilitator, directing pupils via inquiry, investigation, experience, and research. Students attain a comprehensive comprehension of essential scientific topics in the end (Magludod, 2018).

The Schools Division of El Salvador City issued Division Memorandum No. 359, s. 2022 on August 19, 2022, with the title DOST-SEI STEM TEACH: 7E'S IN TEACHING CHEMISTRY. The purpose of this memorandum is to increase the topic knowledge and pedagogical abilities of non-Chemistry majors who teach Chemistry. In the present Science Curriculum, student-centered instruction, which is the foundation of constructivist learning, has been implemented. In other words, the new Science Curriculum is based on an approach that allows students to actively participate in class discussions and provides them with opportunities to construct new information based on their prior knowledge.

Elicit stage involves finding out what the students already know. This can be done through quizzes, mini whiteboards, etc. It's also an opportunity to deal with students' misconceptions or test material that they have previously learned. Furthermore, engage stage, you want to engage interest and curiosity, raise "the big questions," and introduce new learning through teacher explanation modeling. Next, for explore stage, students should be given opportunities to work together following the initial teacher input to solve/explore problems, building concepts through first-hand experience. The teacher should set up the task, then become the facilitator, helping students by asking questions and observing.

In explain stage, use what students have discovered to help them build the concept/knowledge further. This involves checking and asking questions, using their knowledge gained from experience to develop the concepts further. Followed by elaborate stage, students may work independently to demonstrate learning. This is where students formalize and apply their learning. Scaffolds are removed, and students are involved in independent practice. In evaluate stage, while it is expected that evaluation will continue throughout the process, the evaluate section is where the teacher evaluates the learning that has occurred. This might involve peer/self-assessment or marking. This should also include self-reflection and evaluation from the student. Finally, in extend stage, in some cases, an additional "extend" stage may be required to challenge all learners. In this stage, students are encouraged to apply or extend the concepts and skills in new situations. Students make connections not just in the subject/ideas studied but also beyond it.

The national scientific curriculum's emphasis on constructivist approaches such as problem-based and project-based learning, 5E, and 7E learning cycles piques the

interest of scholars in this field. Turkish scholars have undertaken several meta-analyses addressing the influence of constructivist approaches on students' learning and attitudes during the past decade since sufficient research has been conducted and it has been apparent (Balta, 2016). In the context of Philippine K to 12 Basic Education of 2011 under Republic Act No. 10533, also known as the "Enhanced Basic Education Act of 2011", Rule 2, Curriculum, Section 10.2.g. Standards and Principles stipulate that the curriculum must use the Spiral Progression Approach to ensure mastery of knowledge and skills at each level. Specifically, the 7E approach employs a spiral evolution to guarantee the efficacy and efficiency of a given piece of information.

In light of this, the researcher is motivated to examine the efficacy of the 7E teaching model, which consists of elicit, engage, explore, explain, elaborate, evaluate, and extend, and which may impact students' academic performance in Science at Sambulawan National High School, Schools Division, El Salvador City.

### **Conceptual and Theoretical Framework**

This study is grounded in Piaget's Constructivist Theory of 7E Education from 1904. The 7E educational paradigm is an extension of the 5E instructional technique. Elicit, engage, explore, explain, elaborate, and extend make up the 7E teaching model. With the development of hands-on, mental skills like critical thinking, teamwork, and communication necessary for the 21st-century teaching and learning process, this inquiry-based teaching aims to increase student engagement, which eventually boosts students' academic accomplishment (Rodriguez et.al, 2019). The Division of El Salvador City issued Division Memorandum Number 359, series of 2022 on August 19, 2022 with the title DOST-SEI STEM TEACH: 7E'S IN TEACHING CHEMISTRY with the aim of improving the subject knowledge and pedagogical abilities of the participants in this research.

Moreover, Piaget's Constructivist Learning Theory clarified how children acquire information through experience. The schema passes through stages of assimilation or accommodation-based modification. Children learn using the cognitive constructivist paradigm. They therefore get more knowledge by making their own decisions rather than being told what to do. By creating an environment where kids may independently explore and learn new things, they actively participate in having the experiences needed to construct and alter the schema (Myer, 2016).

Lamon (2019) claims that constructivists think prior knowledge affects how we learn. Learning depends on students actively engaging in critical thinking and problem-solving when faced with real-world situations. In a constructivist classroom, the teacher takes on the role of an expert learner, assisting students in acquiring cognitive abilities including self-testing, expressing knowledge, posing

perceptive questions, and reflecting. Teachers also arrange knowledge around big ideas that grab students' attention. Also, they support students' creation of fresh ideas and connections to earlier knowledge. The 7E teaching method is a student-centered approach as a result, encouraging learners to pose inquiries, carry out experiments, make comparisons, and draw their own conclusions.

### **Statement of the Problem**

This study aimed to determine the effect of 7Es teaching model strategy to learners' performance and its implications to Science subject in Sambulawan National High School, Schools Division of El Salvador City, during School Year 2022 – 2023.

Specifically, this study sought to answer the following questions:

1. What is the level of the experimental and control groups' academic performance before and after the use of the 7Es teaching model strategy and the conventional methods respectively?
2. What is the level of the experimental and control groups' attitude towards science?
3. Is there a significant difference in the two groups of participants' attitudes towards science?
4. Do the experimental and control groups significantly differ in their academic performance after exposure to the 7E teaching model and the conventional method respectively?

## **METHODS**

### **Research Design**

This study applied the quasi-experimental technique of research to investigate the cause-and-effect link between the 7E Teaching Method and the Science performance of 10th-grade students, as well as the consequences of this relationship for Science. The experimental group was exposed to the 7E approach for comparison with the control group, which was exposed to the conventional method. In addition, a descriptive approach involving the description, analysis, and interpretation of the data collected in this study was employed, as it was able to characterize the degree of importance between 7E's strategy and respondents' attitude towards Science.

### **Respondents**

The respondents of the study were the (60) 10th graders at Sambulawan National High School, District II, Schools Division, El Salvador City, throughout the 2022-2023 school year. There are two (2) groups for the 10th grade. Each group contains thirty students, for a total of sixty students. The researchers utilized purposive sampling to select the respondents to participate in the study.

## Research Instruments

The researchers used a patterned and modified Division-wide questionnaire of the Department of Education, Schools Division of El Salvador City for its Project SeA (Standardized e-Assessment) for the Second Quarter Science examination for Grade 10 students to collect the data necessary for the study. In the second grading period, both experimental and control groups were exposed to the eight most essential learning competencies. The experimental group received the 7Es technique, whereas the control group was administered by the conventional method. The questionnaire on attitude toward the Science subject is patterned after and modified from Agad's (2020) study on the effects of differentiated instruction on the academic performance of ninth-grade students in Edukasyon sa Pagpapakatao. The first section of the questionnaire concerned the attitude of students toward the Science topic. Part 2 of the questionnaire consisted of a fifty-item Second Quarter Science examination was used in the administration of the pre-and post-tests.

## Statistical Treatment

The collected data were processed and interpreted to produce a specified outcome. The following statistical procedures were utilized to analyze the data: Mean and standard deviation were applied to describe the study's variables. Analysis of Covariance was used to examine the impact of 7E's teaching methodology on the Science performance of 10th graders.

## RESULTS AND DISCUSSIONS

**Problem I: What is the level of the experimental and control groups' academic performance before and after the use of 7Es teaching model strategy and the conventional methods respectively?**

**Table I**  
**Distribution of Respondents' in terms of their**  
**Academic Performance in the Pretest**

<b>Groups</b>	<b>Mean Score</b>	<b>SD</b>	<b>Description</b>
Controlled Group	23.07	6.160	Satisfactory
Experimental (7E's)	22.19	6.470	Satisfactory

Legend:

Scores	Description	Interpretation
40-50	Outstanding	Very Good
30-39	Very Satisfactory	Average
20-29	Satisfactory	Fair
10-19	Fair	Poor
0-9	Needs Improvement	Very Poor

Table 1 shows the overall academic performance of the learners during the pretest. It can be gleaned from the table that both the control and experimental group have satisfactory academic performance during the pretest as indicated by the overall mean score rating of 23.07 (SD=6.160) and 22.19 (SD=6.470), respectively. This implies that before to the conduct of the experiment both classes have satisfactory prior knowledge. It might be due to the fact that they have satisfactory prior knowledge of the competencies their teachers were about to teach them.

Lundeberg et al. (2021) conducted research to examine how past knowledge affects reading comprehension. They discovered that past knowledge had a significant impact on middle school students' capacity to understand science books and was a better predictor of reading comprehension than other elements like vocabulary knowledge and decoding abilities. Learners still lacks the pre-requisite knowledge and skills required for them to answer the test. Hence, the classroom intervention that will be applied to them would benefit each learner to absorb the concepts effectively afterwards.

**Table 2**  
**Distribution of Respondents' in terms of their Academic Performance in the Posttest**

Groups	Mean Score	SD	Description
Controlled Group	28.23	6.130	Satisfactory
Experimental (7E's)	34.58	9.150	Very Satisfactory

Legend:

Scores	Description	Interpretation
40-50	Outstanding	Very Good
30-39	Very Satisfactory	Average
20-29	Satisfactory	Fair
10-19	Fair	Poor
0-9	Needs Improvement	Very Poor

Table 2 displays the learners' posttest scores from the controlled class and those exposed to the 7Es teaching model strategy. Results reveal that the controlled group improved their academic performance to the **satisfactory level** as indicated by the overall posttest mean rating of 78.23 (SD=6.130). This means that the controlled class gained scores during the posttest which might be due to the conventional teaching method. Hence, it can be argued that the conventional strategy was still instrumental in the increase of the posttest mean rating scores of the learners.

In the Philippines, the spiral curriculum in science presents the concepts and skills in all the branches of science including biology, chemistry, physics, and earth science, with increasing complexity levels from one grade level to another in spiral progression, thus the concrete way to a better understanding of core concepts. The incorporation of science across subjects and other disciplines will lead to meaningful learning in the concepts and their purpose in real-life situations (Antipolo & Danilo, 2021).

Meanwhile, the experimental group showed a **very satisfactory** performance during the posttest as indicated by their overall mean score rating of 84.58 (SD=9.150). This means that the learner's exposed to the 7Es teaching model strategy have satisfactorily learned the required competencies needed to be learned. As explained by Taratara-Fadero (2022), the goal of science teaching in the K12 Science curriculum is to develop scientific and technological literacy among students. Three of the domains are scientific knowledge, scientific skills, and scientific attitude. In a further study, Ding et al. (2021) looked at how middle school pupils' understanding of photosynthesis was affected by the 7Es strategy.

More notably, the science education curriculum aims to develop students to become effective communicators, critical and creative problem solvers, responsible stewards of nature, innovative thinkers, and informed decision-makers. These kinds of students can be achieved if they can demonstrate science inquiry skills, understand and apply scientific knowledge and develop and demonstrate scientific attitudes and values. Zhang et al. (2021) looked at how the 7Es strategy affected eighth-grade students' comprehension of plant cells. Students who got education using the 7Es approach performed noticeably better on a post-test than those who received conventional instruction, researchers discovered.

**Problem 2. What is the level of the experimental and control groups' attitude towards science?**

**Table 3**

**Distribution of Learner's Attitude towards Science in the Control Group**

Indicators	Mean	SD	Description
I am very interested to learn the Science subject.	3.37	0.615	Strongly Agree
I like how the lessons in Science are taught.	3.43	0.679	Strongly Agree
I actively participate in class discussions and group activity.	3.43	0.774	Strongly Agree
I find Science easy and effortless subject.	2.93	0.740	Agree
I feel great and worthy in our class.	3.43	0.568	Strongly Agree
I gained self-confidence, motivated and enjoyed every time we have our Science class.	3.57	0.568	Strongly Agree
I read my Science book before our teacher discusses the topic.	3.30	0.702	Strongly Agree
I submit my project and journal ahead of time.	3.16	0.747	Agree
I can freely express my opinions, ideas, and beliefs in our class.	3.10	0.803	Agree
I feel satisfied with the learning that I have learned from Science subject.	3.27	0.868	Strongly Agree
<b>Overall</b>	<b>3.30</b>	<b>0.706</b>	<b>Strongly Agree</b>

Legend:	Scale	Range	Description	Interpretation
	4	3.25-4.00	Strongly Agree	Very Positive
	3	2.51-3.24	Agree	Positive
	2	1.75 -2.50	Disagree	Negative
	1	1.00- 1.74	Strongly Disagree	Very Negative

Table 3 shows the level of attitude towards Science among the learners in the control group. Overall, results show that the learners in the control group was very high positive as indicated by the overall mean of 3.30 (SD=0.706). This means that the learners in the control group possess a **very positive** towards learning Science. As exclaimed by Mirana (2019) that attitude is essential in learning. An individual with positive attitude toward science or any other subject drives him to concentrate on it, be motivated and interested. Since most human behavior which include writing, reading and speaking etcetera are products of learning, a positive attitude equates to acquiring skills that reinforces back the positive attitude. This positive attitude in turn influences views about science, future career choices and classroom participation; it enhances the learning of scientific information and more importantly develops science process skills (Suhendri et al., 2021).

The indicator **“I gained self-confidence, motivated and enjoyed every time we have our Science class”** obtained the highest mean rating of 3.57 (SD=0.568) described as **strongly agree** which means **very positive**. This means that the learners have gained self-confidence; they become motivated and enjoyed their Science class. Hence, science teachers play a major role in the development of positive attitude and skills, the disparity of how science is experienced by students outside and inside of a classroom. Teachers should make science lessons as interesting as possible the way students enjoy them, get them motivated to learn and gain self-confidence.



The indicator “**I can freely express my opinions, ideas, and beliefs in our class**” got the lowest mean rating of 3.10 (SD=0.803) described as **agree** which means **high positive**. This means that during their science classes, the learners are given the freedom to express my opinions, ideas, and beliefs on important matters related to the class. According to Matulesy & Hikmah (2022), learner’s ability to express opinions is expected to help obtain optimal learning outcomes. If learners cannot express opinions, it is feared that they will experience various disorders and obstacles in achieving learning success. This can be considered as an obstacle for students to succeed in learning because the ability to express opinions will show their ability to think.

In the context of the 7Es Teaching Approach, this indicator emphasizes the value of creating a safe and encouraging learning environment in the classroom where students feel at ease taking risks and sharing their ideas in the framework of the 7Es Teaching Method. Instructors can help create this atmosphere by promoting open conversation, exhibiting courteous communication, and allowing for student-led discussions and group projects. Students are more likely to feel invested in their education when they feel free to express their ideas, which can lead to higher levels of motivation and better academic performance. Also, the capacity to discuss ideas and viewpoints with peers fosters communication skills development and an appreciation for various viewpoints.

The results of Ekmekci & Aksu’s study in 2021 lend credence to the notion that pupils ought to have the freedom to voice their thoughts and beliefs openly in the classroom. Giving pupils the freedom to express themselves can increase their motivation and improve their academic performance. All students may feel appreciated and heard in a more positive and inclusive learning environment as a result.

**Table 4**  
**Distribution of Learner’s Attitude towards Science**  
**in the Experimental Group**

Indicators	Mean	SD	Description
I am very interested to learn the Science subject.	3.64	0.551	Strongly Agree
I like how the lessons in Science are taught.	3.52	0.508	Strongly Agree
I actively participate in class discussions and group activity.	3.26	0.575	Strongly Agree
I find Science easy and effortless subject.	3.26	0.682	Strongly Agree
I feel great and worthy in our class.	3.22	0.617	Agree

I gained self-confidence, motivated and enjoyed every time we have our Science class.	3.32	0.653	Strongly Agree
I read my Science book before our teacher discusses the topic.	3.13	0.619	Agree
I submit my project and journal ahead of time.	3.00	0.894	Agree
I can freely express my opinions, ideas, and beliefs in our class.	3.07	0.629	Agree
I feel satisfied with the learning that I have learned from Science subject.	3.13	0.846	Agree
<b>Overall</b>	<b>3.25</b>	<b>0.657</b>	<b>STRONGLY AGREE</b>

<b>Legend:</b>	<b>Scale</b>	<b>Range</b>	<b>Description</b>	<b>Interpretation</b>
	4	3.25-4.00	Strongly Agree	Very Positive
	3	2.51-3.24	Agree	Positive
	2	1.75 -2.50	Disagree	Negative
	1	1.00- 1.74	Strongly Disagree	Very Negative

Table 4 shows the level of attitude towards Science among the learners in the control group. Overall, results show that the learners in the experimental group was very high positive as indicated by the overall mean of 3.25 (SD=0.657). This means that the learners in the experimental group also possess the **very positive** attitude towards Science. It is important to develop for science teachers to develop the positive attitude of students toward science. This implies that to improve performance rating in Science subject, 7E's strategy should be used constantly 7E strategy affects the attitude of learners in Science subject. They showed greater participation in the activities presented. Teachers must be aware that the diverse learners deserve motivation and engagement in different activities. Teachers must utilize multiple resources in order to inculcate appropriate scientific concepts.

As argued by Adarlo, De Leon and Favis (2022) that to be effective in its aim for science literacy, science education should go beyond being conceptual and cognitive in its approach. It must also pay attention to the social and affective aspects of the teaching-learning process of science. Among these aspects of science education that call for careful consideration are students' attitudes toward science and their engagement in the teaching-learning process. Several science educators believe that disaffection with science among students can adversely affect their achievement in science, whereas being part of an interesting and engaging class can motivate students to learn more about science.

The indicator **“I am very interested to learn the Science subject”** obtained the highest mean rating of 3.64 (SD=0.551) described as **strongly agree** which means **very positive**. This means that the learners are very eager to learn their Science subject. Learners should be very interested to learn Science because it would help them understand the world around. Hence, the 7Es teaching model strategy helped learners become more interested in learning Science. As supported by Todd (2020), students find science important when they feel a connection to the topics. Students feel more interest towards science when they have hands on activities to explore science phenomena and their teachers show interest in the material and students.

This implies that pupils like the Science subject especially if lessons were introduced with 7E's strategy. In fact, learners enjoyed Science experiments and visual activities. They were very excited to learn on what to do and how to perform the experiments. With this observation, teachers should allow pupils to do exploratory discovery in Science activities since it would significantly contribute to scientific understanding and positive attitude in Science subject.

The indicator **“I submit my project and journal ahead of time”** got the lowest mean rating of 3.00 (SD=0.894) described as **agree** which means **high positive**. This means that the learners agree that through the 7Es teaching model, the learners are early or on time in submitting their project and journal. Hence, the timeliness of the learners in submitting their works is also improved. Doing project and journals on time are important since it will show to the teacher that learners are a very serious student who is interested in the subject.

As supported by Robledo (2018) effective instruction increases student success and, in turn, positively influenced student's attitude. Students have the opportunity to become more critical thinkers and continue their learning of topics of interest as time passes. It is a method of teaching science to produce scientifically literate students. Because it is a pedagogical approach of teaching science, it provides a framework for teachers around to develop students 'understanding of scientific ideas and concepts.

By offering structured and organized learning opportunities, the 7Es Teaching Method can assist students in developing efficient time management skills. Teachers can employ project-based learning, for instance, to assist students in organizing and planning as they work to finish a project or assignment over a long period of time. In order to keep their charges focused and make the most of class time, teachers might also employ classroom management techniques. Students who can efficiently manage their time are more likely to feel in charge of their learning and are less

likely to feel stressed or anxious as a result of deadlines and time constraints. They might also feel proud of themselves for being able to finish assignments on time and at a good standard.

**Problem 3: Is there a significant difference in the two groups of participants' attitudes toward Science?**

**Table 5**  
**Comparison of the Learner's Attitude towards Science**

Group	Mean	SD	t-value	p-value	Decision	Conclusion
Experimental	3.25	0.657	-0.31	0.761	Accept Null	Not Significant
Control	3.30	0.706			Hypothesis	

Legend: \*significant at  $p < 0.05$

Table 5 shows the comparison of the learner's attitude towards science for both control and experimental group. Results show **no significant difference** on learner's attitude towards science as indicated by the t-value ( $t = -0.31$ ) and probability value ( $p = 0.761$ ) greater than 0.05; thus, the null hypothesis is not rejected. This implies that in both groups, the learners were able to develop very high positive attitudes. Hence, the 7Es teaching model strategy as well as the conventional method of teaching Science develops the learner's very high positive attitude towards the subject.

The lack of a statistically significant difference could be attributed to the fact that both groups received science teaching and had access to hands-on activities, which are known to be successful in fostering a positive attitude toward science. Furthermore, the relatively brief duration of the intervention (just nine weeks) and the potential need for longer-term therapies may have contributed to the lack of a significant impact.

Notably, it is an important consideration for science educators to not only focus on the cognitive aspects of learning Science but also the affective area which might influence learners to pursue science careers in the future. This is consistent with what Fulmer, Ma & Liang (2019) said that building and sustaining students' attitudes

toward science has been a consistent goal in science education and a topic of significant research, as attitudes are an important aspect of students' persistence in school science and interest in pursuing science careers.

**Problem 4: Do the experimental and control groups significantly differ in their academic performance after exposure to the 7E teaching model and the conventional method respectively?**

**Table 6**  
**Effect of the 7Es Teaching Model Strategy to the Academic Performance of Grade 10 Learners**

Group	Mean Posttest Score	SD	F-value	p-value	Decision	Conclusion
Experimental	34.58	9.150	24.19	0.001*	Reject Null Hypothesis	Significant
Control	28.23	6.130				

Legend: \*significant at  $p < 0.05$

Table 6 shows the effect of the 7Es teaching model strategy to the academic performance of the grade 10 learners as compared to the control group. Results show significant effect of the 7Es teaching model strategy on learners' academic performance as indicated by the F-value ( $F=24.19$ ) and probability value ( $p=0.001$ ) less than 0.05; thus, null hypothesis is rejected. This implies that the 7Es teaching model strategy was an effective strategy in improving learner's academic performance.

The result of this study shows that using the 7Es model approach to science instruction can significantly improve students' academic achievement. The 7Es model's emphasis on active involvement and deeper learning may be especially beneficial for helping students understand scientific principles and cultivate their critical thinking abilities.

This finding corroborates the results of the study of Lubiano & Magpantay (2021) that the implementation of the 7E instructional model was effective in enriching science inquiry skills of the Grade 12 Science, Technology, Engineering, and Mathematics (STEM) learners. Additionally, the study of Taratara-Fadero (2022) supported and noted that the 7Es teaching model strategy, a contextual inquiry

approach can help improve students' achievement in Earth science. Hence, it is imperative that science teachers may be trained to how effectively implement 7Es in their classes to improve the performance of their students, not only in Science, but with all subjects.

## **Findings**

The findings of the study were:

1. The level of performance of both control and experimental groups during pretest was fair and posttest are fair/average.
2. Learners have strongly agreeable attitude towards Science.
3. Both control and experimental groups' attitude towards science have no significant differences which led to the acceptance of the null hypothesis.
4. In terms of significant effect of 7E's teaching strategy on Science performance, results revealed that there is a significant difference for both control experimental groups which led to rejection of the null hypothesis.

## **Conclusions**

Based on the findings of the study, the following conclusions are drawn:

1. After utilizing the 7Es model approach, students' academic performance in Science increased. The experimental group improved to a very satisfactory performance level, whereas the control group maintained their satisfactory performance level.
2. Meanwhile, the students' attitudes toward science also noted that they gained self-confidence, motivation, and enjoyment. They showed an eagerness to learn during each session of their science class.
3. Both the experimental group and the control group's students' attitudes about science were not significantly different. The 7Es teaching model is a useful strategy for increasing students' academic achievement in science as well as their attitude toward the subject.

## **Dissemination**

In light of the above findings, the following steps are hereby forwarded:

1. School principals are requested to assist in maintaining related trainings important to it since the 7 E's method promotes academic achievement. They must continue to extend the technique they have learned in order to share their knowledge. as part of Learning Action Cell (LAC).
2. Teachers are encouraged to be always resourceful in terms of using successful techniques, and they must be more dedicated and religious in how they handle

the work that has been given to them.

3. Parents need to help their kids form the right study habits. Given that some people find science lessons challenging, they must assist their child in all practical exercises and work with the science teacher.
4. Students are encouraged to be participative in all of the activities in class. Students may connect with other students and teachers and uphold good study habits, particularly while using the 7Es technique and introducing minimal activities.
5. Future research may be conducted on the effectiveness of the 7Es teaching model strategy on improving students' academic performance considering other variables not mentioned in the present study.

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# GAMIFYING EDUCATION: ENHANCING CRITICAL THINKING SKILLS (CTS) IN ENGLISH LANGUAGE LEARNING THROUGH MOBILE GAME-BASED APPLICATIONS (MGBAS)

Abuhan, Romeo Jr. A; Bajuyo, John Alfred L.  
Molugan National High School

## ABSTRACT

In recent years, there has been a significant change in how mobile games are viewed, with many now considering them to be equivalent to traditional teaching tools and methods used in schools. The present study investigated the efficacy of different mobile games in enhancing students' critical thinking skills. The research had a total of 70 participants, separated into two groups, each consisting of 35 students. The data acquired was analyzed using the SPSS tool, specifically through a T-test. This analysis revealed substantial differences between the groups of Quiz Master (Kahoot and Quizlet) and Problem-Solving (Minecraft and Roblox) game apps. The mean scores of the QM group increased somewhat from 15.17 to 17.71, placing them in the "moderate" category. Similarly, the mean scores of the PS group increased more significantly from 14.25 to 22.22, likewise classed as "moderate." The results also revealed a significant disparity in the percentage change between the QM group, which had an average of 7.97, and the PS group, which showed a higher percentage change of 2.54. This demonstrates that quantum mechanics applications significantly foster critical thinking skills. Therefore, by rejecting the hypotheses, it can be concluded that the interventions have significantly improved participants' critical thinking skills in both groups. The findings indicate that integrating mobile game-based applications into education, specifically for enhancing critical thinking abilities in English Language Learners, has great potential and adds value to this area of study and research.

**Keywords:** *Mobile Games, Educational Technology, Critical Thinking, Game-Based Learning, Kahoot, Quizlet, Minecraft, Roblox, ELLs, Statistical Analysis.*

## RATIONALE AND CONTEXT

Jodoi et al. (2021) assert that critical thinking is universally acknowledged as a fundamental ability and mindset in contemporary society. However, Abuhan (2022) claims that high school pupils have the least proficiency in mastering this skill in reading comprehension. There is already a growing trend in education known as "gamification" in the digital era. This involves using mobile game-based applications to enhance students' motivation and performance. Sanchez et al. (2020) found that students derived greater advantages from implementing gamification in the

classroom environment. This study aims to fill a significant research void in the theoretical and conceptual frameworks of game theory, dual-coding theory, and the sociocultural theory of cognitive development. Prior research indicates that MGBAs benefit students' involvement, drive, and academic achievements in different settings. Further investigation is required to determine the efficacy of MGBAs in improving critical thinking abilities among grade 10 students who are learning English in the Philippines, particularly in El Salvador City.

## **THEORETICAL / CONCEPTUAL FRAMEWORK**

This study addresses a substantial research gap within the theoretical and conceptual frameworks of game theory, dual-coding theory, and the sociocultural theory of cognitive development. The existing body of literature provides evidence of the positive effects of MGBAs on students' engagement, motivation, and learning outcomes in various contexts. Game Theory is an academic discipline that studies strategic decision-making. It aims to scientifically and logically discover individuals' optimal behaviors to achieve the best results in various scenarios known as "games." Another theory supporting this study is the dual-coding theory by Paivio (1986), which states that human cognition is adept at processing verbal and non-verbal information concurrently, assigning equal importance to both modalities. The sociocultural theory by Vygotsky (1934, 1987) examines how the surrounding environment impacts an individual's development. The statement posits that learning is primarily a social process in which progress occurs through interactions with those who possess greater knowledge or expertise than the learner.

Although there is a substantial amount of research on the use of MGBAs and gamification in education, particularly in ELL (Pham, 2020; Nguyen & Le, 2022; Mustaf et al., 2020; Baek et al., 2022) and the development of CTS (Anastasiadis et al., 2018; Ismail et al., 2016; El et al., 2019; Bellaera et al., 2021), there is still a gap in understanding how to employ these strategies in specific educational contexts effectively.

This study provides valuable insights into the development and usage of mobile applications for educational purposes by analyzing the effectiveness of MGBAs in enhancing CTS, as indicated by Hakimantieq et al. (2022) and Çelik & Yangın Ersanlı (2022). Furthermore, this study has the capacity to improve our understanding of how technology promotes the growth of critical thinking skills (Nobre & Nobre, 2022; Boden & Hart, 2018) and language acquisition (Lu & Chen, 2021; Xodabande et al., 2021; Agustina et al., 2022), which are essential for students' academic and professional success.

Furthermore, the study has the potential to provide valuable insights that can be used to shape educational policies and practices in the Philippines and other

countries that share similar educational environments. Through the identification of the most efficient Mobile Game-Based Applications (MGBAs) and strategies for improving Computerized Testing Systems (CTS) in English Language Learners (ELL), educators and policymakers can make well-informed choices on the integration of technology into the curriculum and the creation of teaching and learning methods that foster critical thinking and language acquisition.

Nevertheless, there is a pressing need for further exploration into the efficacy of MGBAs in bolstering critical thinking abilities among tenth-grade students engaged in ELL in the Philippines, with a particular focus on El Salvador City. This study seeks to contribute to this under-researched area, enriching our understanding of the intersection between game-based learning and language acquisition.

## **RESEARCH QUESTIONS**

This study aimed to examine the efficacy of MGBAs in improving critical thinking skills (CTS) among Grade 10 students in a public school within the Division of El Salvador City. Specifically, this research aims to answer the following questions:

1. What are the two groups of participants' critical thinking levels before and after the interventions in terms of (1.1) concrete familiar, (1.2) symbolic, and (1.3) suggestive?
2. How do each group's participants compare their critical thinking skills before and after the intervention?
3. How do the two groups of participants differ in their critical thinking rating increment?

## **RESEARCH METHODS**

### **Participants and/or other Sources of Data and Information**

The research involved seventy tenth-grade students from an El Salvador City Division public high school. These participants were carefully selected and divided into two equally sized subgroups, each comprising thirty-five students. A vital aspect of this division was maintaining a gender balance within each subgroup. The two groups were identified based on the type of mobile gaming applications they would use: Quiz Master Apps Group engaged with quiz-based educational applications, specifically Kahoot and Quizlet. These apps are designed to enhance learning through interactive quizzes and gamified learning experiences. The Problem-Solving Apps Group interacted with problem-solving-focused gaming applications, namely Minecraft and Roblox. The selection of these programs is based on their focus on improving cognitive abilities, including critical thinking and creative problem-solving. The participants were chosen by purposive sampling, which involved selecting individuals who met particular criteria aligned with the

study's aims. The requirements for participation in the study were as follows: (a) students who possessed an Android or iOS mobile device, (b) students who were enrolled in the ELL course, and (c) students who willingly chose to take part in the study.

### **Data Gathering Methods**

The study employed a quasi-experimental methodology, where 70 students were divided into two groups: the Quiz Master (QM) group, which utilized Quizlet and Kahoot, and the Problem-Solving (PS) group, which engaged with Minecraft and Roblox. The aforementioned groups were included in an 8-week intervention that utilized mobile game-based applications (MGBAs) to examine their influence on the critical thinking abilities of English Language Learning (ELL) students. The assessment of critical thinking skills involved the utilization of an adapted edition of the Cornell Conditional-Reasoning Test; specifically Form X. This test concentrated on 36 questions encompassing various types of reasoning, including concrete familiar, symbolic, and suggestive reasoning. These questions were chosen from the original 72 to preserve the test's comprehensiveness. Pre- and post-tests were administered to evaluate the progression of critical thinking skills (CTS) before and after exposure to the gaming applications. The study placed a high importance on ethical concerns. This involved obtaining informed consent from all participants, including students, parents, and instructors. Additionally, the study ensured the confidentiality of the data collected and prioritized the well-being of the participants. This methodology sought to gain insights into the efficacy of various digital learning tools in improving critical thinking skills (CTS) among English Language Learner (ELL) students while maintaining adherence to ethical research protocols.

### **Data Analysis**

The study's three core research topics were analyzed using SPSS (Statistical Package for the Social Sciences) as the main tool for data processing and statistical testing. This method guaranteed a thorough and methodical assessment of the participants' levels of critical thinking and advancements.

Question 1 involved analyzing the data to evaluate the levels of critical thinking before and after the interventions in relation to concrete familiar, symbolic, and suggestive reasoning. The task entailed calculating descriptive statistics, such as the mean and standard deviation, for each group's pre- and post-test scores in these categories. Paired t-tests were subsequently employed to evaluate the changes within each group before and after the interventions.

Paired t-tests were used to examine the critical thinking skills of each group before and after the intervention for question number 2. The tests independently examined

the critical thinking scores before and after the treatments in both the QM and PS groups to assess the interventions' precise effects.

Question 3 of the study examined the difference in the increase of critical thinking ratings between the two groups. Independent t-tests were used to analyze this. The tests examined the differences in critical thinking scores between the QM and PS groups by comparing the increments in scores from the post-test to the pretest. The analysis was essential in establishing if there was a statistically significant disparity in the degree of enhancement in critical thinking abilities between the two groups.

## RESULTS AND DISCUSSION

This section presents, analyzes, and interprets the data obtained from the study participants. The data presents information in table form organized based on the order of the stated problems as set in the Action Research Questions.

**Problem 1. What are the two groups of participants' critical thinking levels before and after the interventions in terms of (1.1) concrete familiar, (1.2) symbolic, and (1.3) suggestive?**

**Table 1. Frequency, Percentage, and Mean Distribution of Participants' Critical Thinking before and after the Interventions (Concrete Familiar)**

Range	Interpretation	QUIZ MASTER (QM) GROUP				PROBLEM-SOLVING (PS) GROUP			
		Pretest		Post Test		Pretest		Post Test	
		F	%	F	%	F	%	F	%
20.00 - 24.00	High	0	0	0	0	0	0	4	11.5
14.00 - 19.99	Moderate	6	17.2	14	40.0	4	11.5	17	48.5
1.00 - 13.99	Low	29	82.8	21	60.0	31	88.5	14	40.0
<b>Total</b>		<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
<b>Mean</b>		<b>11.11</b>		<b>12.48</b>		<b>10.54</b>		<b>10.05</b>	
<b>Interpretation</b>		<b>Low</b>		<b>Low</b>		<b>Low</b>		<b>Low</b>	
<b>SD</b>		<b>2.75</b>		<b>3.06</b>		<b>3.01</b>		<b>4.24</b>	

Table 1 presents the frequency, percentage, and mean distribution of participants' critical thinking skills before and after the interventions in terms of concrete familiarity.

The table shows that neither the QM nor PM groups had participants in the high score range. During the post-intervention, the PS group showed remarkable progress, with 4 (11.5%) participants reaching a high degree. Both groups demonstrated substantial improvement within the moderate range. The QM group increased from 17.2% in the pretest to 40.0% in the posttest. Similarly, the PS group observed an increase from 11.5% to 48.5%. There was a decline in the number of participants for both groups from the pretest to the posttest in the lower range. More precisely, the QM group decreased from 29 participants, which accounted for 82.8% of the total, to 21 participants, representing 60.0% of the whole. Similarly, the PS group decreased from 31 individuals, making up 88.5% of the total, to 14 individuals, accounting for 40.0% of the total.

Moreover, the average scores for both groups demonstrate a general enhancement in certain well-known aspects after the intervention. The average score of the QM group rose from 11.11 in the pretest to 12.48 in the posttest, indicating a “low” level of CTS. This suggests that the group’s overall critical thinking ability remained low despite the rise. The rise signifies a certain degree of progress; however, more is needed to raise the overall performance to a moderate level. Similarly, the PS group increased the average score from 10.54 in the pretest to 10.05 in the posttest, indicating a “low” level of CTS. Both the groups’ average scores are interpreted as “low,” meaning that despite a rise after the intervention, they remained within the low range. This indicates that although there might have been a slight enhancement in the average critical thinking abilities, it was not significant enough to elevate the group’s overall performance to a high level.

The standard deviation values in the data indicate the extent of variation in scores within each category. The research suggests that after the intervention, the QM and PS groups demonstrated enhanced CTS, specifically their increased familiarity with concrete concepts. This supports the claim that integrating mobile game-based applications into English language learning can increase motivation, a finding echoed in the work of Gamlo (2019), Kacetl & Klímová (2019), and Huang et al. (2017). Technology has a crucial role in improving students’ learning experience.

**Table 2 presents the frequency, percentage, and mean distribution of participants’ critical thinking before and after the interventions in symbolic terms.**

**Table 2. Frequency, Percentage, and Mean Distribution of Participants’ Critical Thinking before and after the Interventions (Symbolic)**

Range	Interpretation	QUIZ MASTER (QM) GROUP				PROBLEM-SOLVING (PS) GROUP			
		Pretest		Post Test		Pretest		Post Test	
		F	%	F	%	F	%	F	%
5.00 - 6.00	High	0	0	2	5.80	0	0	6	17.2
3.00 - 4.99	Moderate	7	20.0	13	37.10	4	11.5	19	54.3
1.00 - 2.99	Low	28	80.0	20	57.2	31	88.5	6	17.2
	<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
	<b>Mean</b>	<b>1.51</b>		<b>2.28</b>		<b>1.42</b>		<b>3.8</b>	
	<b>Interpretation</b>	<b>Low</b>		<b>Low</b>		<b>Low</b>		<b>Moderate</b>	
	<b>SD</b>	<b>1.01</b>		<b>1.38</b>		<b>.916</b>		<b>1.10</b>	

The table shows that the QM and PS groups improved their symbolic critical thinking skills following interventions. None of the participants in either group scored high during the pre-intervention phase. In the post-intervention, both groups reached the high range. The QM group had an increase, with 2 (5.80%). The PS group experienced a significant surge, with a growth of 6 participants, or a 17.2% rise. Both groups made substantial improvements within the average range. The number of participants in the QM group rose from 7 (20%) to 13 (37.10%), whereas the number of participants in the PS group climbed from 4 (11.5%) to 19 (54.3%). Within the low range, there was a decline in both groups. The QM group dipped from 80.0% to 57.2%, while the PS group dropped from 88.5% to 17.2%. Furthermore, the mean scores demonstrated general improvement, especially in the specific and familiar components after the intervention. However, the average scores for both groups still fell under the “low” level. The average scores for the QM and PS groups in symbolic CTS exhibited improvement after the intervention. The average score of the QM group rose from 1.51 to 2.28, indicating a “low” level. This suggests that the scores consistently stayed low while experiencing a rise following the intervention. This implies a slight enhancement yet highlights the necessity for additional advancement in this domain. Moreover, implementing specific interventions that improve symbolic critical thinking skills could be advantageous.

The average score of the PS group increased dramatically from 1.42 to 3.8, shifting from the “low” to the “moderate” level. This indicates substantial development and suggests that maintaining or strengthening the existing approach could lead to additional improvement in their symbolic reasoning, given their significant progress



thus far. This supports the claim of Chen and Wu (2023) that students exposed to digital game-based learning achieved significant progress in critical thinking performance and learning motivation with distinctive pedagogical qualities among critical thinking skills.

**Table 3 presents the Frequency, Percentage, and Mean Distribution of Participants’ Reading Comprehension before and after the Interventions in terms of suggestive.**

**Table 3. Frequency, Percentage, and Mean Distribution of Participants’ Critical Thinking before and after the Interventions (Suggestive)**

Range	Interpretation	QUIZ MASTER (QM) GROUP				PROBLEM-SOLVING (PS) GROUP			
		Pretest		Post Test		Pretest		Post Test	
		F	%	F	%	F	%	F	%
5.00 - 6.00	High	1	2.9	6	17.1	5	14.3	8	22.8
3.00 - 4.99	Moderate	17	48.6	14	40.0	7	20.0	17	48.5
1.00 - 2.99	Low	17	48.6	15	42.9	23	65.7	10	28.6
<b>Total</b>		<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
<b>Mean</b>			<b>2.54</b>		<b>2.94</b>		<b>2.28</b>		<b>2.94</b>
<b>Interpretation</b>			<b>Low</b>		<b>Low</b>		<b>Low</b>		<b>Low</b>
<b>SD</b>			<b>1.33</b>		<b>1.66</b>		<b>1.54</b>		<b>1.66</b>

The table illustrates that both the QM and PS groups displayed improved CTS before and after the intervention. The initial findings revealed that the QM group had a minimal proportion of 2.9% in the high range, but this percentage significantly increased to 17.1% following the intervention. The PS group showed improvement, with the number of participants at the high level rising from 5 to 8. Within the range of scores considered moderate, the QM group dipped from 48.6% to 40.0%, reducing the percentage of people achieving average levels. The PS group demonstrated significant improvement, with the percentage of participants in the moderate category rising from 20.0% to 48.5%. The considerable increase in the PS group signifies a substantial enhancement in their performance and capacity for critical thinking following the intervention. Both groups experienced declines in the lower range. The percentage of the QM group declined from 48.6% to 42.9%, while the rate of the PS group decreased from 65.7% to 28.6%.

Furthermore, the average scores in both groups exhibit a slight rise after the intervention, indicating a certain level of improvement. Specifically, the mean score of the QM group increased from 2.54 to 2.94, whereas the mean score of the PS group also went from 2.28 to 2.94. However, the average scores for both groups remained at a “low” level. This suggests that while there has been some improvement, more is needed to raise the groups to a high level of performance in terms of their ability to think critically in a suggestive manner. This supports the claim of the dual-coding theory by Paivio (1991; 1971), which offers significant insights and posits that human cognition operates through visual and verbal systems, aligning well with MGBAs. These applications often combine visual elements (like images and graphics) with verbal components (like text and spoken language), potentially enhancing language learning by engaging both cognitive channels. This dual engagement can facilitate deeper information processing and retention, thereby boosting English language learners’ critical thinking skills.

**Table 4 presents the overall frequency, percentage, and mean distribution of participants’ critical thinking before and after the interventions.**

**Table 4. Frequency, Percentage, and Mean Distribution of Participants’ Critical Thinking before and after the Interventions (Overall)**

Range	Interpretation	QUIZ MASTER (QM) GROUP				PROBLEM-SOLVING (PS) GROUP			
		Pretest		Post Test		Pretest		Post Test	
		F	%	F	%	F	%	F	%
29.00 - 36.00	High	0	0	0	0	0	0	2	5.8
14.00 - 28.99	Moderate	23	65.8	30	85.7	18	51	33	94.2
1.00 - 13.99	Low	12	34.2	5	14.3	17	48.6	0	0
	<b>Total</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>
	<b>Mean</b>	<b>15.17</b>		<b>17.71</b>		<b>14.25</b>		<b>22.22</b>	
	<b>Interpretation</b>	<b>Moderate</b>		<b>Moderate</b>		<b>Moderate</b>		<b>Moderate</b>	
	<b>SD</b>	<b>3.64</b>		<b>1.61</b>		<b>3.55</b>		<b>5.21</b>	

As shown in the table, significant changes in the overall critical thinking skills of the QM and PS groups were observed. Neither group initially had any participants who achieved high scores. Following the interventions, the PS group had a favorable transformation, with 2 (5.8%) patients progressing to the high range. This incremental progress signifies a significant enhancement in their ability to think critically. Significant improvements were observed in the moderate scoring content for both groups. The QM group experienced a substantial increase in participants within the average range, rising from 23 (65.8%) in the pretest to 30 (85.7%) in the posttest.

Similarly, the PS group exhibited a significant rise in participants, increasing from 18 (51%) to 33 (94.2%). These modifications indicate a substantial improvement in the ability to think critically, as evidenced by more individuals transitioning to the intermediate level after the intervention. In contrast, the low score range exhibited a decline in participants for both groups. The QM group experienced a decrease from 12 participants (34.2%) to 5 individuals (14.3%). Notably, the PS group, which previously had 17 participants (48.6%) in the low range, had no participants after the intervention. The significant decrease demonstrates a successful transition from the most basic level of cognitive abilities for the PS group. The average scores provide additional support for these findings. The average score of the QM group grew from 15.17 to 17.71, indicating a “moderate” level of improvement. In the same way, the average score of the PS group increased from 14.25 to 22.22, indicating a “moderate” level of refinement. Although adhering to a moderate interpretation, these increments signify a noteworthy enhancement in both groups’ general critical thinking skills.

Furthermore, the standard deviation figures provide insights into the extent of score variability. The standard deviation of the QM group reduced from 3.64 to 1.61, indicating a higher level of consistency in performance among participants after the intervention. Similarly, the standard deviation of the PS group rose from 3.55 to 5.21, suggesting a broader spectrum of individual variations in performance following the interventions. The results unambiguously demonstrate that both the QM and PS groups had overall enhancements in CTS after the interventions. The PS group showed notable advancement, with a significant rise in participants achieving moderate and high scores and significantly improving their average performance. The decrease in low-range scores and the increase in average scores in both groups demonstrate the efficacy of the interventions in enhancing CTS, particularly in practical knowledge. This supports the claim of Saleem et al. (2022) that gamification has increasingly been accepted as a helpful learning tool to generate more engaging educational environments. Additionally, elements used in learning, such as points, leaderboards, badges, and levels, have a powerful effect and motivate students.

**Problem 2. How do the participants in each group compare their critical thinking skills before and after the interventions?**

*H01. The participants' critical thinking skills in each group do not significantly differ before and after the interventions.*

**Table 5 presents the result of the test of the difference in the participants' critical thinking skills between the pretest and post-test scores.**

**Table 5. Result of the Test of Difference in the Participants' Critical Thinking Skills before and after the Interventions**

Critical Thinking Skills	QUIZ MASTER (QM) GROUP				PROBLEM SOLVING (PM) GROUP			
	Pre Test	Post Test	t	p	Pre Test	Post Test	t	p
Concrete Familiar	10.54	15.05	-4.97**	.000	11.11	12.48	-2.31**	.027
Symbolic	1.42	3.80	-11.32**	.000	1.51	2.28	-2.55**	.015
Suggestive	2.28	3.37	-3.20**	.003	2.54	2.94	-1.18	.246
<b>OVERALL</b>	<b>14.25</b>	<b>22.22</b>	<b>-7.30**</b>	<b>.000</b>	<b>15.17</b>	<b>17.71</b>	<b>-2.83**</b>	<b>.008</b>

*\*\*significant at 0.01 level*

*\*Significant at 0.05 level*

As shown in the table, the data reveals that learners' critical thinking skills when exposed to quiz master and problem-solving apps significantly differ before and after the intervention in terms of concrete familiar, symbolic, and suggestive.

Upon careful examination and statistical analysis of the data, it is evident that the hypothesis stating that there is no significant difference in participants' critical thinking skills before and after the intervention may be refuted. The evidence indicates substantial enhancements in essential thinking skills after the intervention in both the QM and PS groups. The QM group presented compelling data, demonstrating statistically significant improvements in all evaluated categories (concrete familiarity, symbolic, and suggestive). This is evidenced by substantial negative t-values and remarkably low p-values. The total score has risen from 14.25 to 22.22, indicating a significant improvement in critical thinking skills within this group. This is supported by a t-value of -7.30 and a p-value of .000, further confirming the significance of the upgrade.

Similarly, the PS group demonstrated notable enhancements in their critical thinking abilities in concrete familiar and symbolic categories, as indicated by the significant

t-values and p-values. While the improvement in the suggestive category did not reach statistical significance for the PS group, the total score increased significantly from 15.17 to 17.71 (t-value of -2.83, p-value of .008), showing a notable advance in their critical thinking ability. Overall, the hypothesis can be refuted and confidently asserted that the interventions had a statistically significant beneficial effect on the participants' critical thinking skills in both groups. The findings affirm that Mobile game-based applications (MGBAs) can improve critical thinking skills in English Language Learning. Maschler et al. (2020) explain that game theory (originally developed by John von Neumann) can be a helpful framework highlighting the impact of interactive decision-making within groups, like the dynamics in game-based learning environments.

Similarly, game theory analyzes the interconnected choices of individuals in a group. This research explores how MGBAs can influence and enhance individual critical thinking skills within the collaborative context of language learning. Integrating game theory into educational settings emphasizes the importance of group dynamics and decision-making in improving critical thinking skills through interactive learning tools.

**Problem 3. How do the two groups of participants differ in their critical thinking rating increment?**

*Ho2. The two groups of participants' critical thinking rating increments do not significantly differ.*

**Table 6 presents the result of the test of difference in the two groups of participants' reading comprehension skills rating increments.**

**Table 6. Result of the Test of Difference in the Two Groups of Participants' Critical Thinking Rating Increments**

Critical Thinking Skills	QUIZ MASTER (QM) GROUP		PROBLEM-SOLVING (PS) GROUP		t	p
	M	SD	M	SD		
Concrete Familiar	4.5	5.37	1.37	3.49	2.90**	.005
Symbolic	2.37	1.23	.77	1.78	4.35**	.000
Suggestive	1.08	2.00	-.40	2.00	1.43	.157
OVERALL	7.97	6.39	2.54	5.29	3.86**	.000

*\*\*significant at 0.01 level*

*\*significant at 0.05 level*

The table shows that the thorough examination of the data and its statistical implications unequivocally demonstrates the necessity to reject the premise that there is no significant difference in the increases of critical thinking ratings between the Quiz Master (QM) and Problem-Solving (PS) groups. The research reveals substantial discrepancies in performance across several essential thinking categories. Within the Concrete Familiar category, the QM group demonstrated superior performance to the PS group, with a mean score of 4.5 compared to the PS group's 1.37. The considerable disparity is supported by a t-value of 2.90 and a p-value of .005, indicating a statistically significant advantage in performance by the QM group. In the Symbolic category, the QM group's performance remained consistently superior, with a mean score of 2.37, substantially above the PS group's mean score of 0.77. The difference is statistically significant, as indicated by a t-value of 4.35 and a p-value of .000. This solidifies the QM group's enhanced proficiency in comprehending symbolic content.

In contrast, the scenario in the Suggestive category was different. The average score of the QM group was 1.08, but the PS group had an average score of -0.40. Nevertheless, the observed discrepancy in performance did not reach statistical significance, as evidenced by a t-value of 1.43 and a p-value of .157. This indicates that both groups performed similarly in terms of suggestive critical thinking.

Considering the aggregate scores in all areas, the QM group consistently outperformed the PS group, with an average score of 7.97 compared to the PS group's 2.54. The t-value of 3.86 and a p-value of .000 provide strong evidence to support the conclusion that there is a statistically significant difference in the performance of the two groups. The data collected from this study supports the rejection of the initial premise. The QM group exhibited notably improved CTS compared to the PS group across many assessed domains, particularly Concrete Familiar and Symbolic. There was no significant difference observed in terms of Suggestive. This means that the least mastered skill of the students is suggestive. This type of critical thinking is the highest among the three categories being measured in this study. Critical thinking involves interpreting hints and implied ideas, focusing on understanding and responding to suggestions rather than explicit information.

Vygotsky's (1934;1987) Sociocultural Theory underscores the essential role of interactions with more knowledgeable individuals, like teachers or peers, in cognitive development. This theory aligns with the use of MGBAs such as problem-solving games (Roblox and Minecraft), as these platforms often facilitate social learning environments where learners can interact with proficient language users, receiving guidance and feedback. Such interactions in a gamified context could significantly enhance the acquisition and refinement of critical thinking skills in language learners,

mirroring Vygotsky's ideas of learning as a socially mediated process.

The overall scores demonstrate the QM group's superior critical thinking skills, as supported by the statistical analysis. The results highlight the efficacy of the treatments implemented on the QM group, enhancing their capacity to understand and analyze various forms of educational content. This supports Singh's (2021) claim that gamification tools like Kahoot significantly shape students' attitudes towards English language learning, particularly highlighting motivation, a finding that is also supported by Tan et al. (2018; 2022), demonstrating its benefit for non-native speakers especially language learning activities (Muhridza et al. (2018) across all proficiency levels.

## **CONCLUSION**

The study's findings reveal that mobile game-based applications could help improve critical thinking skills (CTS) in English language learning. The results showed significant improvements in CTS for both the Quiz Master (QM) and Problem-Solving (PS) groups after the study. The PS group made notable progress, with more people reaching higher CTS levels, while the QM group showed consistent improvements. The standard deviation values suggested that the QM group was more consistent, while the PS group had more individual variation after the study. Overall, the research supports the idea that game-based learning can effectively enhance CTS, which aligns with previous studies that show how gamification can motivate people and improve educational environments. The QM group did exceptionally well in concrete familiarity and symbolic CTS, while both groups had similar levels in suggestive CTS. This study highlights how game-based learning tools can help improve language learning skills, such as comprehension and analysis. Future research should investigate these apps' long-term impact and effectiveness across diverse educational contexts. A balanced approach combining quiz-based and problem-solving apps could cater to varied learning preferences. Additionally, providing teachers with adequate training and resources is essential for effectively integrating these apps into educational strategies, maximizing their benefits for student learning.

## **DISSEMINATION AND UTILIZATION**

This research objective is to create a strategy for effectively distributing and advocating for the research findings about the effects of a new educational program on student outcomes. This proposal will outline the many components of the plan for dissemination and advocacy, including data analysis, paper completion, consultative presentation of research findings, LAC session, and modification of research output.

### **Data Analysis/Manuscript Completion**

The first phase in this approach is to complete the manuscript or research report. This report will include the methodology, data analysis, and necessary conclusions of the study. The manuscript will be subjected to a comprehensive evaluation to ensure that it is of high quality and meets the requirements for publication in a renowned academic journal. The data analysis will be undertaken using acceptable statistical methodologies and presented clearly to ease stakeholders' comprehension.

Upon completion of the manuscript, a consultative presentation of the study findings will be given. This presentation aims to share the study's findings with stakeholders, including educators, policymakers, and other interested parties. This presentation aims to get input on the research findings and validate the accuracy of the data interpretation. This feedback will be utilized to refine the research output and make any required modifications.

### **Session of the Learning and Advocacy Collaboration (LAC):**

Following the consultative presentation, a larger LAC (Learning and Advocacy Collaborative) session will be convened to deliver the findings to a broader audience. This session aims to garner support for any policy proposals that may result from the research. The study team will be prepared to respond to any issues or critiques attendees raise.

### **Changes to the Research Outcome:**

Throughout the dissemination and advocacy phase, the research team will stay amenable to modifying the study product in response to stakeholder feedback. Depending on the comments gained during the consultation presentation and LAC session, this may require editing the paper or modifying policy suggestions.

This study proposal has presented a complete plan for distributing and advocating for the research findings about the impact of a new educational program on student outcomes. The strategy contains essential elements such as data analysis, article completion, consultative presentation of research findings, LAC session, and research output modification. By adhering to this approach, the research team will be able to ensure that their findings significantly impact policy and practice.



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# ALTERNATIVE LEARNING SYSTEM (ALS) LEARNERS' CHALLENGES IN MATHEMATICS: AN ANALYSIS OF LIVED EXPERIENCES AND LEARNING NEEDS

Bernie A. Bongolto, Kenneth Jane Q. Ingente  
Alternative Learning System

## ABSTRACT

In the context of Learning Strand 3 (LS 3), this study examines the demands and difficulties faced by learners, with a particular emphasis on mathematical and problem-solving skills. This study applied qualitative research, specifically a phenomenological research design. The participants of the study were (8) junior high school ALS learners from four (4) community learning centers in the Division of El Salvador City, purposive sampling was used to conduct in-depth interviews with ALS learners based on predetermined criteria. Based on qualitative information obtained from participants' interviews, different themes emerged, such as: (1) lack of knowledge and comprehension, (2) difficulty in learning Arithmetic and Algebra, (3) negative mindset towards Mathematics, (4) teacher-factor, and (5) self-learning. The study suggests specialized teacher preparation, curricular adjustments, and assistance programs for underachieving learners, technological integration in the classroom, growth mindset encouragement, parental participation, and ongoing observation and assessment in light of these findings. Together, these suggestions seek to solve the noted issues and satisfy the many demands of LS 3 learners while fostering a more encouraging and flexible learning environment.

## Introduction

Mathematics is said to be present everywhere. Numbers, dimensions, angles, forms, and the like are everywhere. Even when we go to the store and buy our essentials, Mathematics is used in its most fundamental forms. Without taking precise measurements of each of a building's four corners, the construction will fail. Numbers are very important for building infrastructure like roads, bridges, and the like. Imagine if the ratio of cement to sand was improper; the outcome would not be as expected. Even in the comfort of our homes, Math is useful. For instance, when cooking, we measure out the precise amount of materials to ensure that the dish or food tastes delicious. These, and many other examples, demonstrate Mathematics' use, practicability, and universality (Pagtalunan, 2018).

Academically, not every student has a predisposition towards Mathematics in comparison to other disciplines. A student may detest Mathematics and regard it as

a tough subject. According to Lay and Davades (2017), students' attitudes toward Mathematics were found to be strongly connected to their academic success. Furthermore, the study looked at three elements that influence mathematical achievement: perceived parental effects, teachers' emotional support, and classroom teaching. The idea is to interest pupils so that they can study Mathematics. Alpacion et al. (2015) agreed, stating that children who have a favorable attitude toward mathematics likely to perform better. As a result, establishing a positive attitude toward Mathematics can help enhance performance. Similar findings were made in the study conducted by Mohd, et al. (2011), which revealed that the degree of persistence, self-assurance, and readiness to solve problems is average. Furthermore, in the aforementioned study, there is a significant relationship between the level of patience toward problem solving and Mathematics achievement, whereas there is a significant relationship between the level of confidence and willingness toward problem solving and Mathematics achievement. Also, the research shows a substantial relationship between attitude (patience, confidence, and willingness) toward problem solving and mathematical success.

Mathematics is a general education subject in primary and secondary school in the Philippines, where students are expected to gain an understanding and appreciation of its principles as an applied-using appropriate technology in problem-solving, critical thinking, communicating, reasoning, making connections, representations, and decisions in real life (K to 12 Basic Education Curriculum). In the Philippine context, educational modules in this manner incorporate a specific topic and instructional plan criteria to enable students to construct consistent and numerical skills required to comprehend fundamental mathematical topics. However, poor performance in this field persists. A variety of factors influence students' mathematical performance, as measured by their grades. According to the study of Biswas (2015), focus on students' emotional traits, which will include study habits and study attitudes, which are then further referred to as study orientations. Getting control of time management and study habits are two major challenges for students.

As observed by the researchers for the past years, the learners' attitude in learning the strand 3 (LS3): mathematical and problem solving skills can vary widely based on a variety of circumstances, including earlier experiences with mathematics, personal views and values, and individual learning styles. Some learners considered mathematics as an intriguing and valuable subject that helps them build problem-solving abilities. Others, on the other hand, may have a negative attitude toward mathematics, viewing it as uninteresting, complex, and unimportant to their daily life. External variables such as the teaching technique employed, the teacher's passion and ability, and the degree of support and encouragement supplied by parents and

classmates can all impact students' attitudes toward mathematics. A good and supportive learning environment, paired with interesting and relevant teaching approaches, can help learners develop favorable attitudes toward mathematics.

It is also important to point out that attitudes about mathematics changed over time, and that with the correct approach, even learners who initially have a negative attitude toward the learning strand can be motivated and engaged. Encouraging learners to recognize connection between mathematics and real-life problems, as well as assisting them in developing confidence and a sense of accomplishment in the subject, go a long way toward creating favorable attitudes toward Mathematics. With the aforementioned facts, this study will explore the perceived challenges experiences by the ALS JHS learners in learning mathematics through the analysis of their perceived experiences and needs towards learning mathematics.

Through an investigation of their needs and experiences, this study looks at the perceived difficulties of ALS junior high school learners have in learning mathematics. Based on Constructivist Learning Theory, Growth Mindset Theory, and Phenomenology, this study attempts to offer a thorough comprehension of these difficulties and suggest solutions. Constructivist learning theory highlights the necessity for flexible and encouraging learning settings by emphasizing how learners actively construct knowledge via experiences. According to Carol Dweck's progress Mindset Theory, learning outcomes can be greatly improved by encouraging a belief in one's capacity for intellectual progress, especially when it comes to overcoming negative attitudes about mathematics. Furthermore, by delving deeply into learners' actual experiences, the phenomenological approach reveals key themes that guide useful answers. This study aims to enhance educational practices and outcomes in alternative learning system by utilizing these theoretical frameworks.

### **Review on Related Literature**

The continued pattern of poor performance in LS 3 among Junior High School ALS learners raises concerns among researchers about whether the education system can produce completers with the necessary abilities to cope with the ever-changing technological world. Many studies have linked learners' low mathematical achievement to student, teacher, and curricular issues. For this research, the five factors identified as influencing students' achievement in mathematics were students' attitude and perception toward mathematics, teachers' attitude and perception toward mathematics, teaching methodologies of mathematics teachers, quality and performance of mathematics teachers, and the effectiveness and relevance of mathematics curriculum (Chand et al., 2021).

Mathematics, like any other discipline, need good communication between the instructor and the learner. According to Halliday (1975) as cited by Mulwa (2015) in his study, learning language is 'learning how to mean'. Thus, understanding how to construct and convey mathematical concepts using language suitable to the situation is more than just recognizing and responding to words in isolation. This, in turn, necessitates the use of suitable language (words and symbols) whose difficulty level corresponds to the cognitive capacities of the learners in question. It is difficult enough to communicate mathematical ideas such that the message is fully comprehended when the instructor and learner share a same first language, but the challenge becomes serious when their preferred languages diverge. A number of studies have clearly shown that a student's mastery of English influences his or her success in mathematics.

In mathematics teaching, the major role of language is to enable both the instructor and the student to communicate mathematical knowledge precisely. Teachers and textbook authors must employ a language whose structure, meaning, technical terminology, and symbols can be grasped by learners at a certain class level in order to achieve the objectives of mathematics training. When a child perceives what we say to him, he is impacted by at least three factors: his understanding of the language, his appraisal of what we intend (as revealed by our nonverbal conduct), and the way he would depict the actual circumstance to himself (Mulwa, 2015).

According to Mensah et al. (2013) it was discovered that teachers' positive attitudes instilled confidence in learners, causing them to adopt a good attitude toward mathematics learning. Positive attitudes toward mathematics among teachers may have a substantial influence on the attitudes and confidence levels of their learners in the subject. When teachers show excitement, passion, and confidence in their own mathematical talents, it may encourage and drive learners to approach the topic positively. Furthermore, creating a helpful and pleasant learning atmosphere for students can assist to alleviate mathematics fear and inspire confidence in them. In the area of mathematics education, experts appear to agree that student accomplishment is driven not just by cognitive domain but also by students' attitudes. The emotional component of attitudes toward mathematics is a significant issue that can influence how people approach, engage with, and perform mathematical activities (Etcuban et al, 2019). Emotion, in this context, refers to the sense of enjoying or interest in mathematics, as opposed to the experience of disliking or disinterest in mathematics (Ayob & Yasin, 2017). According to Khoo and Ainley (2005), learners' attitudes evolve throughout time and have a major impact on their mathematical performance. Attitudes are not fixed, but rather the outcome of learners' experiences, which can be altered. They, however, are more stable than people's moods and emotions. They are flexible factors on success since they



are reactions to educational inputs. According to Moenikia and Zahed-Babelan (2010), students' attitudes about mathematics influence how well they succeed in the subject and how frequently they participate in it. It may also be shown in the degree to which they love doing tasks connected to the subject. Hence, favorable attitudes toward mathematics are important since these attitudes can impact students' motivation to learn the subject as well as the benefits that it will bring to math education (Atanasova-Pacemska et al., 2015). Similarly, a bad attitude toward mathematics would result in a negative emotional disposition toward the subject's study, which might inhibit learning (Mata et al., 2012).

Abraham Maslow's hierarchy of needs describes a variety of essential needs and desires that might motivate a person's conduct and sense of self. This idea of human motivation may then be used to map out a person's current condition as well as what further may be required or wanted for future progress. Needs grow from primal instincts to a sense of personal integration and even spiritual transcendence. This hierarchical perspective of motivation integrates the body, mind, and social forces in a holistic and dynamic approach to understanding human nature (Maslow's hierarchy of needs, 2015). In the context of learning, it is essential to understand that learners must have their basic needs met before they can effectively learn and engage in the classroom. For example, a learner who is hungry or tired may struggle to focus on the material being presented, while a learner who feels unsafe or unsupported may be distracted by negative thoughts or feelings. Therefore, educators must create a safe and supportive learning environment that meets the needs of learners. Adult learners in the ALS face a number of unique challenges and barriers that can impact their ability to engage and succeed in the learning process. In order to create a supportive and effective learning environment, it is essential to understand and address these challenges and ensure that learners' psychological needs are being met. By fulfilling these five psychological needs, teachers can create a learning environment that supports the unique challenges and needs of adult learners in the ALS program. This can lead to greater engagement, motivation, and success in the learning process, ultimately helping learners to achieve their educational and personal goals.

Gardner (2006) stated that people are essentially human because they have various intelligences. Everyone has a distinct set of intelligences with varied degrees of power. Although no intellect was thought to be superior to others, Gardner (2003) asserts that all intelligence is essential for an individual to engage, behave intentionally, and creatively in society. According to Yaghoob and Hossein (2016) Gardner believes that different intelligences have biological and cultural roots. Adopting Gardner's Theory of Multiple Intelligences has various consequences for classroom education for instructors. According to the hypothesis, all seven intelligences are required

to actively participate in society. Because no two children learn in the same way, they cannot be evaluated in the same way. As a result, it is critical that an instructor construct “intelligence profiles” for each learner. Understanding how each learner learns will help the teacher to analyze the child’s development accurately.

In the context of ALS learners who do not like learning LS 3, it is important to recognize that their dislike of it may not necessarily stem from a lack of ability, but rather from a lack of interest or engagement. By identifying the specific types of intelligence in which these learners excel, educators can design learning experiences that cater to their strengths and interests. For example, learners with strong interpersonal intelligence may benefit from group discussions or collaborative learning activities, while those with strong linguistic intelligence may enjoy reading or writing about mathematical concepts. In summary, multiple intelligences theory suggests that learners have different strengths and weaknesses in various types of intelligence. By designing learning experiences that cater to these diverse needs and styles, teachers can engage learners who do not like LS 3 and help them to develop their mathematical skills and confidence.

### **Research Questions**

1. What are the participants’ perceived challenges in learning LS 3?
2. What are the participants’ perceived needs in learning LS 3?
3. What intervention plan could be designed based on the learners’ challenges and needs?

### **Scope and Delimitation**

The research will focus solely on ALS (Alternative Learning System) JHS learners who are experiencing difficulties in Learning Strand 3 (LS 3). The study will seek to identify the challenges that these learners are experiencing and to address their needs. The study will be conducted in the four (4) community learning centers (CLCs) in one of the Schools Divisions in Northern Mindanao, and will involve 8 JHS ALS learners who meet the criteria for participation in the study.

The research will not cover other learning strands or subjects in the ALS curriculum aside from LS 3. The study will not include non-ALS learners or learners who do not have difficulties in LS 3. The study will also be limited by the resources and time available for data collection, and analysis. Finally, the study may not be generalizable to other populations or contexts beyond the four (4) community learning centers (CLCs) in the Division where it is conducted.

## **Research Methodology**

### **Research Design**

This study utilized qualitative research, specifically a phenomenological research design.

### **Participants**

The participants of this study were the eight (8) JHS ALS learners in the four (4) Community Learning Centers (CLCs) in one of the Schools Division in Northern Mindanao. The participants were selected using the purposive sampling techniques. The selection of the participants were based on the following criteria: (a.) identified low-performing learners in the LS 3: mathematical and problem solving skills in each CLCs based on the assessment form 2: monitoring on learner's progress; (b.) must be a bonafide ALS JHS in CLCs where the study will be conducted.

### **Research Instrument**

The researcher-made semi-structured interview questions were asked to the respondents. Since, the semi-structured interview guide offers interviewers with clear instructions and enables the collection of trustworthy, comparable qualitative data. Semi-structured interviews are frequently supplemented by observation, informal, and unstructured interviewing to enable researchers to gain a thorough grasp of the topic of interest in order to formulate pertinent and meaningful semi-structured questions (Cohen & Crabtree, 2006). The questions were contextualized and simplified according to the respondents' basic understanding. It means that researchers used questions using easier and familiar terms. It has five main questions that will gather data about the participants' perceived difficulties and perceived needs in learning LS 3. Furthermore, the instruments of the study were validated by the experts in the field of research.

### **Data Gathering**

The following phases were utilized in gathering the data: For Phase I-preliminaries, the researcher sent a request letter to the schools division superintendent asking for permission to conduct the study with the JHS learners in the ALS learning centers.

Phase II: Conducted one on one interview to the to the 15 JHS ALS learners with the approval of the Division ALS focal person and ALS implementers.

Phase III: Generated the results, then analyzed and interpreted the qualitative data.

### **Data Analysis**

After conducting the interview, the researchers will be transcribing the audio recordings of the interviews into text form. Then, the researcher will review

the transcripts to identify common themes and patterns across the participants' responses. This process may involve coding the data, which means assigning labels to different segments of the text that represent different themes or categories.

Once the data has been coded, the researcher will use a process of constant comparison to compare and contrast the codes and categories across the data set, looking for similarities and differences that shed light on the participants' experiences and perceptions of learning difficulties in LS 3.

Finally, the researcher will synthesize the findings into a narrative that describes the common themes and patterns that emerged from the data. This may involve identifying quotes or examples from the transcripts that illustrate the key findings. The results of the data analysis will be presented in a clear and concise manner that aligns with the research questions and objectives, and that provides a meaningful contribution to the field of study.

## **Results and Discussions**

### **Participants' Perceived Challenges in Learning LS 3.**

This part discusses the perceived challenges of the participants in learning LS3: Mathematical and Problem Solving Skills. The following are the emerging themes on the participants' perceived challenges in learning LS 3.

#### **Lack of knowledge and comprehension**

The participants of the study identified LS 3, specifically Mathematical and Problem-Solving Skills as the most difficult and challenging learning strand. All participants expressed a general aversion to Mathematics, rating it as the least attractive subject. This sentiment was accompanied by self-perceptions of inadequacy.

*“ang pinaka number 1 which is dili nako ganahan, ang Math second ganahan ko sa Filipino, English, Sciene ug Computer.”*

*“number 1 Math, number 2 Computer, number 3 Science, number 4 English, number 5 Filipino.”*

One popular theory holds that increased mathematics anxiety is caused by a lower self-concept of one's own abilities. This perspective holds that developing a positive self-concept entails evaluating one's own knowledge and skill in handling external problems. According to Bandura, the sense of inadequacy indicates an approaching threat in the surroundings (1997). Thus, a negative mathematical self-concept suggests that a person believes they are unprepared to handle pressure-

filled mathematical circumstances, creating a causal relationship between anxiety and self-concept. On the other hand, an opposing perspective suggests that anxiety, which is defined as a distorted perception of oneself, could cause a person experiencing high levels of anxiety to believe they are not mathematically talented (Ahmed et al., 2012).

. *“kuan dili man sa ingon nga kuan mahadlok ko ug numbers pero hinay lang jud siguro ko sa math.”* (It’s not that I am afraid of numbers but maybe I am just slow when it comes to Math.)

*“wala jud koy lain maingon basta kay makaingon jud ko nga hinay jud ko sa math.”* (I have nothing else to say except that I can say that I am very slow in math)

Gafoor and Kurukkan (2015) highlighted in their study that the primary reason of the learners in disliking Mathematics originated from their inability to understand the subject, lack of preparation, and the need for more time to fully absorb the lessons even after which they quickly forget what they have learned.

### **Difficulty in learning Arithmetic and Algebra**

Some learners find it difficult to understand the abstract ideas found in arithmetic since they don’t have concrete examples in the actual world. Due to the cumulative nature of the topic, learners with gaps in their understanding may find it difficult to keep up with. There may not always be a clear connection between mathematics and daily living, which might cause disengagement. Difficulties are also caused by a fear of failing, poor teaching strategies, and a preference for memory over comprehension. The difficulties are exacerbated by societal attitudes and preconceptions, a lack of resources, time restraints, and inadequate problem-solving abilities (Gafoor & Kurukkan, 2015).

For this, half of the respondents said they had known from elementary or middle school that mathematics was not their favorite subject and the other half said they had only learned about it in high school. Dowker, Sarkar, and Looi (2016) emphasized that when learners enter high school level and into post-secondary education, unfavorable attitudes about mathematics and math anxiety grows.

Negative mindset towards Mathematics

Every now and then, there is a common misconception regarding Mathematics that most people have. The idea that a learner is either born with a mathematical brain or not is one of the most perilous myths that have ever spread in society. Any learner who finds arithmetic difficult always believes, “I am not a math person.” Math is not for me since I am not as quick as I should be at learning the subject. Another is that rather than emphasizing concepts and creativity, Mathematics

is all about memorization and technique. These ideas make people dislike and occasionally detest something. Learners' achievement rose when they switched from having a fixed attitude to a growth mindset (Boaler et al., 2018).

## **Intervention Plan Designed to Address Learners' Challenges and Needs**

### **Teacher Factor**

Having a close relationship with students can improve learning because, according to Christenson (2017), teachers who foster trust with their pupils will be able to push them further. According to him, students are more likely to go above and beyond if they believe that their teachers sincerely care about their achievement in both their academic and personal lives and are prepared to collaborate with them to achieve their objectives.

### **Self-learning**

The processes of education and training that take place nowadays have started to heavily rely on mobile and wireless technologies. Information and communication technology (ICT) advancements and their impact on education have given rise to ideas of learning anywhere and anytime, as well as a widening of the boundaries of traditional classroom instruction. With the widespread use of personal mobile devices, students now have access to their teachers, peers, and learning resources at any time and location they choose. Because of this, the relationships that develop in the classroom between students, teachers, and learning materials continue outside of it (Yilmaz, Yilmaz, & Ezin 2018).

“Katong naa pakoy cellphone mag try ko ug tan aw kung unsaon pagsolve.”(The time when I still had a cellphone I tried to search how to solve.)

“kay sa case mangud namo nga module maglisod jud ko kay wala man koy mapangutan an dire kung unsaon, tapos sa mga net pod dili ko kakoan bisan ug magtan aw lang ko sa youtube kung unsaon ang insaktong pagkuan mao nang hina jud ko sa math Sir kay.”(In our case in modular learning I'm struggling because no one could explain me even if I searched youtube still I can't cope up the lesson. I am really bad at Mathematics.)

Subsequent investigation showed that students who find mathematics extremely challenging often think they are lacking in effective learning techniques. These pupils feel less capable of mastering arithmetic concepts and have lower self-esteem. Learners who perceive mathematics as extremely challenging typically forget it more quickly. On the other hand, pupils who find mathematics to be relatively simple claim that their teachers help them comprehend the material quickly and

effectively. It has been shown that students who perceive mathematics as being extremely difficult tend to abandon the subject more easily than those who see it as being easy. Teachers claim that prerequisites and students' lack of effort are the main causes of mathematics being a challenging subject for their students (Gafour, & Kurukkan, 2015).

## **Conclusion**

To sum up, this study examined the demands and perceived difficulties that learners experience when learning mathematical and problem-solving skills, particularly in relation to LS 3. The results show that participants consistently believe that LS 3, especially Mathematics, presents substantial challenges. These difficulties result from a lack of understanding and information as well as unfavorable attitudes about the topic. These difficulties are made worse by the change from elementary to high school, emphasizing the need for intervention during this crucial time.

This research examined these difficulties using a combination of phenomenology, growth mindset theory, and constructivist learning theory. Constructivist learning theory highlights the necessity for flexible and encouraging learning settings by emphasizing how students actively construct knowledge via experiences. According to Carol Dweck's progress Mindset Theory, learning outcomes can be greatly improved by encouraging a belief in one's capacity for intellectual progress, especially when it comes to overcoming negative attitudes about mathematics. Furthermore, by delving deeply into learners' actual experiences, the phenomenological approach reveals key themes that guide useful answers.

The report highlights how important it is for teachers to take on these problems. In line with earlier studies on the effects of teacher effectiveness on student engagement and accomplishment, participants emphasized the significance of motivation, clear explanations, and effective teaching strategies. Building strong relationships between teachers and learners has been identified as essential to creating a supportive learning environment.

The participants also indicated a wish for more chances for self-learning, using wireless and mobile technology to access information outside of conventional classroom settings. Acknowledging the dynamic nature of education, utilizing Information and Communication Technology (ICT) to facilitate self-learning is in line with the growing nature of contemporary educational methodologies.

The study suggests an intervention plan that combines centered on learners' methods which use technology to support self-directed learning with teacher-focused tactics that highlight successful teaching techniques in light of these findings.

The goal is to establish a comprehensive learning environment that tackles LS 3's academic difficulties as well as its motivational elements.

In the end, this study provides insightful information on the complex difficulties that learners encounter when learning mathematical and problem-solving skills, laying the groundwork for the creation of focused interventions. Educators and officials may help create a more inclusive and productive learning environment by tackling these issues at the individual and instructional levels. This will guarantee that students have the knowledge and abilities needed to successfully negotiate LS 3 and beyond.

### **Recommendations**

Several recommendations are made in light of the research findings to meet the requirements and perceived problems of learners in LS 3, especially in the areas of mathematical and problem-solving skills. To improve teachers' efficacy in teaching LS 3, it is imperative to prioritize funding for teacher training and professional development programs. Innovative teaching practices and the development of strong teacher-student connections will be the main areas of concentration. Furthermore, it is advised that the LS 3 curriculum be carefully reviewed and adjusted in order to guarantee that it is in line with learners' developmental stages and to include practical applications of mathematical principles. Technology integration, such as the use of educational apps and online resources, can support students' self-directed learning by providing them with more tools and engaging content. A thorough strategy must include both parent involvement in the learning process and the promotion of a growth attitude among young children. The improvement and sustainability of interventions in LS 3 will be facilitated by continued research and collaboration, as well as continual monitoring and evaluation, making for a more successful and inclusive learning environment.

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# TEACHERS BELIEFS ABOUT SCIENCE AND SCHOOL SCIENCE (BASS) AND STUDENTS ACADEMIC PERFORMANCE IN SCIENCE OF THE DIVISION OF EL SALVADOR CITY: BASIS FOR GRADE II SCIENCE AUTHENTIC ASSESSMENT

Merogim P. Mugot  
Hinigdaan National High School

## ABSTRACT

This study used a descriptive correlation methodology to explore teachers' attitudes about science and school science. The tools were validated and established consistency utilizing constructive and face validity, as well as a Cronbach Alpha coefficient reliability test. Random sampling was employed to choose respondents, and online survey questionnaires were sent using Google Forms to gather data. The PSPP statistical analysis application was used to analyze the gathered responses. The findings indicate that improving teachers' beliefs on science through additional instruction regarding the subject, methodology, and scientific inquiry is essential. Teachers' strong beliefs in classroom science, especially the certainty of scientific knowledge and inquiry procedures, were observed. A substantial correlation was determined between students' academic performance in science and teachers' points of view. The study emphasizes the significant influence of teachers' attitudes and beliefs on students' progress, highlighting the importance of creating positive educational environments. To address the gaps in science education, the study suggests focusing competency training on content, knowledge, and pedagogy. The findings emphasize that teachers' beliefs significantly impact students' academic progress in science, highlighting the importance of fostering positive and supportive educational environments to enhance learning and achievement, ultimately improving student outcomes. Hence, the utilization of authentic assessment, guided by comprehensive criteria, brings several substantial advantages to the creation of a robust and effective learning environment. By aligning assessments with learning outcomes, performance verbs, and success criteria, educators can seamlessly integrate teaching and assessment, resulting in a clearer understanding of students' mastery of the content.

**Keywords-** *academic performance, nature of science, science education, authentic assessment, and teacher's belief*

## I. INTRODUCTION

The structures, schema, beliefs, and understandings of an individual affect how they perceive experiences [1]. To believe something, according to contemporary analytic philosophers, is to acknowledge that it is the case or to hold it to be true [2]. Education-related conceptions or convictions regarding elements of education, such as teaching, learning, knowledge, students, or teacher attributes, are referred to as “beliefs” in this context [3]. Generally, the term “beliefs” refers to convictions that are established early in life, are firmly established, and are more difficult to alter than conceptions [4]. Clearly, the educational beliefs of teachers are significant as they influence and direct instructional behavior and choices in the classroom [5]. Further, the role of beliefs is much more important in science education because the subject encompasses not only a wide range of knowledge-based concepts (facts, laws, and theories), but also a cutting-edge, interdisciplinary set of historical, social, and epistemological ones that profoundly influence the former (contents “about” science) [6]. However, teachers learn from a variety of sources, making teaching a very dynamic and diverse process. It is dynamic because merely knowing the content does not ensure becoming or being an effective teacher, and it is comprehensive because in addition to substantial content knowledge, skilled teaching abilities are necessary. The research on the relationship between teachers’ beliefs about science and school science (BASSS) and students’ academic performance in the Division of El Salvador City emerges against the backdrop of a significant educational concern highlighted by the TIMSS 2019 results, wherein the Philippines ranked last in international science assessments. This study was conducted in response to a significant educational concern highlighted by the TIMSS 2019 results, and this underscores the urgency to investigate factors influencing students’ academic performance in science, aiming to identify and address potential areas for improvement within the educational system [7].

The study examines the interrelationships between several key variables. The independent variable is teachers’ beliefs about science and school science (BASSS), while the dependent variable is students’ academic performance in science. Additionally, the TIMSS 2019 results, which revealed that the Philippines ranked last in international science assessments, serve as a crucial contextual variable. This context highlights the urgency of the research and underscores the significance of understanding how teachers’ beliefs can impact students’ academic outcomes, particularly considering the country’s current educational challenges. The study posits that the independent variable (teachers’ beliefs about science) directly affects the dependent variable (students’ academic performance). The poor performance of Filipino students in the assessments serves as a contextual backdrop that underscores the importance of understanding and potentially modifying teachers’

beliefs to improve educational outcomes. These studies emphasize the necessity of adapting educational methods and curricula to the evolving educational landscape, highlighting notable shifts in educational strategies and a growing preference for authentic assessment methods.

The authentic assessment techniques, which encompass written products, portfolios, checklists, teacher observations, and group projects, recognize students as active participants in the assessment process and advocate for student-centered approaches [8]. These findings collectively emphasize the value of aligning educational practices with the changing educational paradigm and the implementation of more authentic assessment strategies in contemporary education. The existing literature highlights the impact of teacher beliefs on student outcomes and stresses the importance of aligning pedagogical approaches with these beliefs. On the other hand, the studies comprehensive framework integrates inquiry-based science education, social epistemology, and assessment for science learning, emphasizing the crucial role of engaging students in scientific inquiry, shaping their epistemological beliefs, and assessing their proficiency in authentic scientific practices and understanding of the nature of science. Further, inquiry-based science education emphasizes the integration of inquiry processes within science education. Drawing upon contemporary literature on inquiry-based learning (National Research Council, 2012), this framework highlights the importance of engaging students in scientific inquiry to develop their understanding of scientific concepts and practices. Within this context, the Inquiry Process sub-scale represents the various stages of inquiry, such as questioning, investigation, analysis, and interpretation, while the Epistemological Status sub-scale pertains to students' beliefs about the nature and reliability of scientific knowledge. On the other hand, social epistemology is rooted in social epistemology, which examines how knowledge is constructed and validated within social contexts (Goldman, 2015). Within the context of science education, this explores how students' epistemological beliefs are shaped by social interactions, cultural factors, and educational experiences. The Inquiry Process and Epistemological Status sub-scales serve as indicators of students' engagement in collaborative inquiry and their evolving understanding of the nature of scientific knowledge within social and cultural contexts. Lastly, the assessment for science learning focuses on the assessment of science learning outcomes, with an emphasis on inquiry processes and epistemological development. Drawing on contemporary approaches to assessment in science education (NGSS Lead States, 2013), this highlights the importance of assessing students' ability to engage in authentic scientific practices and their evolving epistemological beliefs. The sub-scales of Inquiry Process and Epistemological Status provide a structured framework for evaluating students' proficiency in scientific inquiry and their understanding of the nature of science.

## 2. BRIEF LITERATURE REVIEW

It is imperative to highlight the role that teachers' beliefs take part in the reform process [9]. However, the impact of Filipino teachers' beliefs on science education, highlighting the need for professional development to improve teaching practices and student outcomes [10]. Further, there are challenges in Philippine science education, pointing out the gaps in teacher training and the necessity for systemic reforms [11]. The teachers' positive beliefs are critical for the successful implementation of inquiry-based science education and improved student performance, and to underscore the importance of aligning educational policies with teachers' beliefs to enhance student achievement in science across different cultural contexts [12]. These studies collectively underscore the urgent need for targeted interventions and reforms in science education to address the Philippines' educational challenges. The relationship between teachers' beliefs about science and student academic performance in the context of science authentic assessment is multifaceted and plays a critical role in shaping educational outcomes [13]. In education, authentic assessment involves evaluating students' knowledge and skills through tasks that resemble real-world situations rather than just traditional tests or quizzes. Moreover, study suggests that authentic assessment in science encompasses a variety of approaches and methods. It's not limited to one type of evaluation but rather incorporates diverse ways of measuring students' understanding and abilities. In addition, by employing authentic assessment methods, teachers can gain deeper insights into students' comprehension and skills beyond mere memorization of facts. When students engage in authentic assessment tasks, they are more likely to develop a deeper understanding of scientific concepts, critical thinking skills, and problem-solving abilities. With this, they are better prepared to succeed in future academic endeavors and apply their knowledge in real-world contexts. Several studies have explored this relationship, shedding light on how teachers' personal beliefs and attitudes towards science impact their instructional practices and, subsequently, student learning outcomes. The influence of teachers' beliefs on student academic performance extends beyond instructional practices to encompass factors such as teacher-student interactions and classroom climate. Teachers who hold positive beliefs about their students' capabilities and potential for success are more likely to create supportive learning environments that foster student motivation and self-efficacy [14]. These positive interactions can contribute to improved student engagement and academic performance in science. However, it is essential to recognize that the relationship between teachers' beliefs and student academic performance is complex and influenced by various contextual factors [15]. For instance, teachers' beliefs may interact with school policies, curriculum requirements, and societal expectations, shaping the overall educational experience for students. Additionally, individual differences among teachers, such

as their level of experience, training, and personal background, may also influence the manifestation of these beliefs in classroom practice [16]. Moreover, teachers' beliefs about the teaching and learning of science can influence the instructional methods they employ in the classroom [17]. For example, teachers who adhere to constructivist beliefs may prioritize student-centered, inquiry-based approaches to teaching science, which have been shown to enhance student engagement and academic achievement [18]. Such assessments often require students to engage in hands-on activities, critical thinking, and problem-solving, mirroring the teacher's beliefs [19]. When students are exposed to assessments that resonate with the teacher's beliefs, they are more likely to be engaged and motivated to perform well academically, leading to improved academic performance in science. Consequently, students experience a more authentic and meaningful science education, which can lead to improved academic performance due to the alignment of assessment with their learning experiences [20]. Furthermore, when teachers employ authentic assessment techniques that emphasize understanding and application over rote memorization, students are more likely to develop deep conceptual understanding and critical thinking skills, which are essential for success in science education. It is essential to scientific learning to comprehend the essence of science, which involves the relationship between evidence and explanation [22]. Students' adherence to a theory affects how they evaluate the facts. It's important to educate students that observations are made with a specific purpose in science. Studies suggests that improving attitudes toward science and scientific teaching are not dependent on improving one's grasp of the nature of science, but that a better understanding of the nature of science may have a favorable impact on those beliefs [23]. In addition, findings suggest that people's assumptions, schema, beliefs, and understandings impact how they perceive experiences. How students and teachers perceive evidence is influenced by their knowledge of the nature of science. Thus, this study was intended to (1) examine whether there is a significant relationship between teachers' beliefs about science and the academic performance of students in science subjects, and (2) how teachers' beliefs about science influence their instructional practices and, subsequently, impact student learning outcome.

### **3. METHODOLOGY**

#### **3.1 Research Design**

The study utilized descriptive correlation design. Research on descriptive correlations can either be quantitative or qualitative. It could involve gatherings of quantifiable data that may be tabulated in numerical form along a continuum form, such as test results [41]. It involves obtaining information about occurrences, which is subsequently arranged, tabulated, represented, and interpreted [42]. To help the reader comprehend how the data is distributed, it frequently includes visual aids



like graphs and charts. In general, the research comprised obtaining information from respondents and analyzing that information using tables and graphs.

### **3.2 The Instruments**

The Teachers Belief about the Nature of Science and School Science were adopted from the Beliefs About Science and School Science Questionnaire using Likert-type response scale (BASSSQ) by Aldridge, Taylor, and Chen (1997). In addition, 9 items with asterisk were omitted making it from 41 to 36 items and except for the underlined items, which were scored in reverse, the items received scores of 1, 2, 3, 4, and 5, respectively, for the responses Almost Never, Seldom, Sometimes, and Often, and Almost Always.

Inquiry Process and Epistemological Status are two sub-scales that are included in each of the two components. A measure of teachers' beliefs toward the process involved in acquiring scientific information is the subscale Inquiry Process. The extent to which teachers' perceptions of the process of generating knowledge depend on a continuum between an objectivist view, which advocates a set method that is objective and thus devoid of human bias, and a post-modern view, which sees the process of inquiry as context-dependent and influenced by human perceptions. Epistemological State is a subscale that measures teachers' beliefs on the status or certainty of scientific knowledge. From an objectivist perspective, which sees science as a body of unquestionably true, objective information, to a post-modern perspective, which acknowledges the necessity to constantly reevaluate the validity of scientific knowledge, teachers' beliefs are compared along a continuum. Construct and face validity were applied before the distribution of the BASSS questionnaire. The instrument went through constructive and face validity by 27 high school teachers. After being validated, an empirical test was carried out to measure the reliability of the instruments. The statistical computation yielded that Cronbach Alpha coefficient value was  $\alpha = .51$  for the first section while  $\alpha = .81$  for the second section. This evidenced that the instrument was reliable to use (Aldridge et. al, 1997).

### **3.3 The Respondents**

Random sampling was used to choose the respondents for the study. As a non-probability sample that is chosen based on features of a population and the purpose of the study, purposeful sampling is also referred to as judgmental, selective, or subjective sampling. Elementary and secondary science teachers from 23 schools were asked to take part in the study. The academic performance data were gathered from the curriculum management support system (CMSS) of the schools. The teachers teaching science were asked to input the students' grades into the system. This indicates that the academic performance data were collected electronically

through the CMSS, which likely stores and manages various academic records, including grades, assessments, and other relevant information. The responses of the respondents were guaranteed to be kept secret, and informed consent was obtained. The participants were informed that the findings would be used to determine the training needs of the whole division, and that their active involvement would ensure that the appropriate training could be provided in response to their need for instruction in the new normal.

### **3.4 Data-Gathering Procedure**

After receiving approval from the Division Office to conduct this research, the survey questionnaires were given to the designated schools and participants as Google forms, whose URL is provided in an email that explains the purpose and scope of the survey. To obtain sufficient participation of the science teachers in the survey, a division memo was published. The PSPP utilizes statistical treatments encompassing both basic descriptive statistics, such as measures of mean and standard deviation, and inferential statistics, including correlation analysis (Pearson), to analyze and interpret data across diverse research contexts. The information was acquired between September 2022 and December 2022 for about a month. For a month after receiving the survey link, participants had the option to voluntarily fill out the questionnaire online using Google Forms.

## **4. RESULTS AND DISCUSSION**

### **Profile of the Respondents**

Most of the study's respondents are in their prime and are relatively young (aged 23 to 44). Most of the respondents have a bachelor's degree as their highest level of education, while relatively few have graduated with a graduate degree. Most respondents are at the elementary level, in terms of grade level taught. Moreover, half of the teachers who responded to the survey had been educators for over four years.

### **Teacher's View About What Occurs in Science and Teacher's View About What Should Occur in School Science**

The following tables show the result of the survey of teacher's view about what occurs in science and teacher's view about what should occur in school science as to process of scientific inquiry and certainty of scientific knowledge.

In Table 1, mean scores and standard deviations were calculated to assess the beliefs of respondents regarding the Process of Scientific Inquiry. The table includes eight items (Items 1 to 8), each addressing different aspects of scientific inquiry,

along with their corresponding mean scores and standard deviations. The “Level of Belief” column categorizes the respondents’ beliefs as “High” or “Moderate” based on the mean scores. The respondents demonstrated a moderate level of belief ( $M = 3.20$ ,  $SD = 1.11$ ) in the various aspects of the Process of Scientific Inquiry as assessed by the items in this table. The items with “High” levels of belief (Items 1, 2, 3, 5, and 8) suggest that respondents generally hold strong beliefs in the involvement of challenging other scientists’ ideas, the influence of scientists’ values and beliefs on observations, the role of intuition in scientific inquiry, the guidance of scientific observations by theories, and the contribution of both scientific and non-scientific sources to scientific ideas. These findings are consistent with previous research [23,24], which revealed that scientists often challenge each other’s ideas and acknowledge the influence of values and beliefs on scientific observations. On the other hand, the items with “Moderate” levels of belief (Items 4, 6, and 7) indicate a more moderate level of agreement among respondents. These items suggest that respondents hold somewhat less strong beliefs regarding scientists eliminating their beliefs and values during observations, the starting point of scientific inquiry with observations of nature, and the strict adherence to the scientific method in scientific investigation. Similarly, [24,25] reported that respondents exhibit a more moderate level of agreement when it comes to the strict adherence to the scientific method in scientific investigation.

**Table 1. Mean of the Respondents on teacher’s view about what occurs in science as to Process of Scientific Inquiry**

Item	Mean	Std Dev	Level of Belief
1. Scientific inquiry involves challenging other scientists’ ideas.	3.65	0.93	High
2. Scientific observations are affected by scientists’ values and beliefs.	3.25	1.14	High
3. Intuition plays a role in scientific inquiry.	3.4	1.03	High
4. * When making observations, scientists eliminate their beliefs and values.	2.65	0.99	Moderate
5. Scientific observations are guided by theories.	4.05	1.03	High
6. * Scientific inquiry starts with observations of nature.	2.58	1.38	Moderate
7. * Scientific investigation follows the scientific method.	2.56	1.36	Moderate
8. Scientific ideas come from both scientific and non-scientific sources.	3.44	1.01	High
<b>Overall</b>	<b>3.20</b>	<b>1.11</b>	<b>Moderate</b>

*Legend: 4.21-5.00- Almost Always (Very High Belief); 3.21-4.20- Often (High Belief); 2.41-3.20- Sometimes (Moderate); 1.81-2.30- Seldom (Low Belief); 1.00-1.80- Almost Never (Very Low Belief); Asterisk items reflect a more objectivist view and were therefore scored in reverse.*

Table 2 displays the mean scores and standard deviations of respondents' views concerning the Certainty of Scientific Knowledge. The table comprises eight items (Items 9 to 16), each addressing different aspects of scientific knowledge certainty, along with their respective mean scores and standard deviations. The "Level of Belief" column categorizes the respondents' beliefs into "High" or "Moderate" based on the mean scores. The overall interpretation of this table suggests that the respondents hold a moderate level of belief ( $M = 3.10$ ,  $SD = 1.09$ ) regarding the certainty of scientific knowledge. Moreover, several items in the table fall into the "Moderate" level of belief category (Items 9, 10, 11, 13, 15, and 16). These items indicate that respondents express moderate levels of agreement on the following ideas: scientific knowledge may not necessarily provide a true account of the natural world (Item 9), scientific knowledge is tentative and subject to change (Item 10), scientific knowledge is relative to the social context in which it is generated (Item 11), the accuracy of current scientific knowledge may be questioned (Item 13), scientific knowledge is not entirely free of human perspectives (Item 15), and scientific knowledge may be influenced by myths (Item 16). These results resonate with previous studies conducted [27,28], indicating that individuals tend to view scientific knowledge as tentative and context-dependent, as evidenced by items such as the belief that scientific knowledge may not necessarily provide a true account of the natural world (Item 9) and that it is relative to the social context in which it is generated (Item 11). However, two items in the table fall into the "High" level of belief category (Items 12 and 14). Respondents express a stronger belief in the idea that the evaluation of scientific knowledge varies with changes in situations (Item 12) and that scientific knowledge is influenced by cultural and social attitudes (Item 14). Conversely, two items in Table 2, which fall into the 'High' level of belief category (Items 12 and 14), align with the findings [29,30], demonstrating that respondents exhibit stronger beliefs in the influence of situational changes and cultural/social attitudes on the evaluation of scientific knowledge. Table 2 presents a comprehensive overview of respondents' perspectives on the Certainty of Scientific Knowledge, employing mean scores and standard deviations across eight distinct items. The data reveals a nuanced and moderate level of belief ( $M = 3.10$ ,  $SD = 1.09$ ) among respondents concerning the certainty of scientific knowledge. Most items fall into the "Moderate" level of belief category, suggesting a balanced agreement among respondents on concepts such as the tentative nature of scientific knowledge, its relativity to social contexts, and its susceptibility to questioning and influence by human perspectives and myths. These findings corroborate previous studies, reflecting a prevailing view that scientific knowledge is not absolute but subject to contextual factors. However, two items stand out in the "High" level of belief category, indicating a stronger consensus among respondents. They express a heightened belief in the variability of scientific knowledge evaluation with changes in situations and its influence by cultural and social attitudes. Remarkably, these

high-level beliefs align with prior research, underlining a consistent tendency among individuals to acknowledge the impact of situational changes and cultural/social attitudes on the assessment of scientific knowledge.

**Table 3. Mean of the Respondents on teacher’s view about what should occur in school science as to Process of Scientific Inquiry**

Item	Mean	Std Dev	Level of Belief
17. In science classes, investigations should enable students to explore their own ideas.	4.07	1.12	High
18. In science classes, students should work collaboratively.	4.16	1.01	High
19. In science classes, students should discuss ideas with others.	4.35	1.02	Very High
20. In science classes, students should think creatively.	4.27	1.04	Very High
21. In science classes, students should explore different methods of investigation.	4.2	0.99	High
22. Students should view science as a problem-solving exercise.	4.16	1	High
23. Students should enjoy themselves during science experiments.	4.27	1.01	Very High
24. In science classes, students should consider ethical issues related to scientific investigation.	3.87	1.04	High
<b>Overall</b>	<b>4.17</b>	<b>1.03</b>	<b>High</b>

*Legend: 4.21-5.00- Almost Always (Very High Belief); 3.21-4.20- Often (High Belief); 2.41-3.20- Sometimes (Moderate); 1.81-2.30- Seldom (Low Belief); 1.00-1.80- Almost Never (Very Low Belief); Asterisk items reflect a more objectivist view and were therefore scored in reverse.*

Table 3 displays the mean scores and standard deviations of respondents’ views regarding what should occur in school science with respect to the Process of Scientific Inquiry. The table contains eight items (Items 17 to 24), each addressing various aspects of how scientific inquiry should be conducted in school settings, along with their respective mean scores and standard deviations. The “Level of Belief” column categorizes the respondents’ beliefs as “High,” “Very High,” or “Moderate” based on the mean scores. The overall interpretation of this table indicates that the respondents have a high level of belief ( $M = 4.17$ ,  $SD = 1.03$ ) in what should occur in school science about the Process of Scientific Inquiry. Several items in the table fall into the “High” level of belief category (Items 17, 18, 21, 22, and 24). This suggests that respondents strongly agree that in science classes, investigations should enable students to explore their own ideas (Item 17), students should work collaboratively (Item 18), students should explore different methods of investigation (Item 21), students should view science as a problem-

solving exercise (Item 22), and students should consider ethical issues related to scientific investigation (Item 24). These findings are in line with previous research conducted [31], which highlights the importance of enabling students to explore their own ideas, promoting collaborative work, and fostering problem-solving skills in science classrooms. Additionally, two items in the table fall into the “Very High” level of belief category (Items 19 and 23). Respondents express an even stronger belief that in science classes, students should discuss ideas with others (Item 19) and that students should enjoy themselves during science experiments (Item 23). Furthermore, [32,33] emphasized the significance of students discussing ideas with their peers and enjoying themselves during science experiments as essential components of effective science education, which aligns with the strong beliefs expressed by respondents (Items 19 and 23).

Table 3 provides a comprehensive insight into respondents’ perspectives on what should occur in school science concerning the Process of Scientific Inquiry, utilizing mean scores and standard deviations across eight distinct items. The data reveals a notably high level of belief ( $M = 4.17$ ,  $SD = 1.03$ ) among respondents regarding the ideal practices in school science. Several items stand out in the “High” level of belief category, reflecting strong agreement among respondents on essential aspects of science education. They strongly advocate for investigations that enable students to explore their own ideas, collaborative work, exploration of different investigation methods, viewing science as a problem-solving exercise, and considering ethical issues related to scientific investigation. These findings align with prior research emphasizing the importance of fostering student autonomy, collaborative learning, and ethical considerations in science classrooms. Additionally, two items reach an even higher level of belief, suggesting an overwhelming consensus that students should discuss ideas with others and, crucially, enjoy themselves during science experiments. These strong beliefs align with established literature highlighting the significance of peer discussions and the enjoyment factor in effective science education. In essence, the synthesis underscores a collective vision for dynamic and engaging science education that prioritizes student exploration, collaboration, problem-solving, and ethical considerations as integral components of the learning process.

Table 4 displays the mean scores and standard deviations of respondents’ views regarding what should occur in school science concerning the Certainty of Scientific Knowledge. The table consists of eight items (Items 25 to 32), each addressing various aspects of how scientific knowledge should be approached in school settings, along with their respective mean scores and standard deviations. The “Level of Belief” column categorizes the respondents’ beliefs as “High” based on the mean scores. The overall interpretation of this table indicates that the respondents have

a high level of belief ( $M = 3.69$ ,  $SD = 0.52$ ) in what should occur in school science about the Certainty of Scientific Knowledge. Several items in the table fall into the “High” level of belief category (Items 25, 26, 27, 28, 29, 30, 31). This suggests that respondents strongly agree that in school science, students should be critical of accepted theories (Item 25), view scientific knowledge as tentative (Item 26), have their understanding influenced by their existing knowledge (Item 27), examine the history of accepted scientific knowledge (Item 28), learn that more than one theory can account for a given set of data (Item 29), learn about competing theories (Item 30), and examine how society influences what counts as scientific knowledge (Item 31). These findings are in alignment with previous research conducted [34,35], which underscores the importance of teaching students to be critical of accepted theories, recognize the tentativeness of scientific knowledge, and explore various influences on scientific understanding. However, one item in the table falls into the “High” level of belief category but with a lower mean score (Item 32). Respondents express a somewhat lower level of agreement that in school science, students should be taught that scientific knowledge is objective and therefore free of human values. Moreover, [36] teaching students about the objectivity of scientific knowledge, while acknowledging its complexity, is a challenging aspect of science education, which could explain the somewhat lower level of agreement observed in this study (Item 32).

**Table 4. Mean of the Respondents on teacher’s view about what should occur in school science as to Certainty of Scientific Knowledge**

Item	Mean	Std Dev	Level of Belief
25. In school science, students should be critical of accepted theories.	3.91	0.93	High
26. In school science, students should view scientific knowledge as tentative.	3.51	0.96	High
27. In school science, student understanding should be influenced by their existing knowledge.	3.71	0.9	High
28. In school science, students should examine the history of accepted scientific knowledge.	3.84	0.86	High
29. In school science, students should learn that more than one theory can account for a given set of data.	3.76	0.9	High
30. In school science, students should learn about competing theories.	3.71	0.85	High
31. In school science, students should examine how society influences what counts as scientific knowledge.	3.8	0.89	High
32. In school science, students should be taught that scientific knowledge is objective and therefore free of human values.	3.27	1.1	High
<b>Overall</b>	<b>3.69</b>	<b>0.52</b>	<b>High</b>

*Legend: 4.21-5.00- Almost Always (Very High Belief); 3.21-4.20- Often (High Belief); 2.41-3.20- Sometimes (Moderate); 1.81-2.30- Seldom (Low Belief); 1.00-1.80- Almost Never (Very Low Belief); Asterisk items reflect a more objectivist view and were therefore scored in reverse.*

Table 4 presents a comprehensive overview of respondents' perspectives on what should occur in school science concerning the Certainty of Scientific Knowledge, utilizing mean scores and standard deviations across eight distinct items. The data indicates a high level of belief ( $M = 3.69$ ,  $SD = 0.52$ ) among respondents regarding ideal practices in school science related to the certainty of scientific knowledge. Several items stand out in the "High" level of belief category, reflecting strong consensus that students should critically evaluate accepted theories, perceive scientific knowledge as tentative, have their understanding influenced by existing knowledge, explore the history of accepted scientific knowledge, recognize multiple theories for a given set of data, learn about competing theories, and understand how societal factors shape scientific knowledge. These beliefs align with prior research emphasizing the importance of cultivating critical thinking skills and an understanding of the dynamic and tentative nature of scientific knowledge. However, one item, despite falling into the "High" level of belief category, exhibits a somewhat lower mean score, indicating a comparatively lower agreement that students should be taught that scientific knowledge is objective and free of human values. This nuanced perspective aligns with the acknowledged challenge in science education of conveying the complex and sometimes nuanced concept of the objectivity of scientific knowledge.

### **Students' Academic Performance in Science**

In this table, the data includes both the beliefs of the teachers about science and the academic performance of students. The categorization into "Very Satisfactory" (VS), "Satisfactory" (S), and "Fairly Satisfactory" (FS) appears to correspond to the grading criteria used to assess students' academic performance, whereas the beliefs of the teachers about science may have been entered separately. On the other hand, the academic performance data are categorized into specific grade ranges (e.g., 90-100 for "Outstanding," 85-89 for "Very Satisfactory," etc.), representing different levels of achievement or proficiency in school science. These categories (VS, S, FS) are based on predetermined grading criteria established by the department. For example, students who achieve scores within the range of 85-89 may be considered to have demonstrated a "Very Satisfactory" level of performance. The categorization into O, VS, S, and FS allows for a more nuanced assessment of students' academic performance, providing insight into their strengths and areas for improvement. By categorizing academic performance in this way, educators can identify patterns or trends in student achievement and tailor instructional strategies or interventions accordingly to support student learning and development.



**Table 5. Distribution of Students as to Academic Performance in Science**

<b>Grading Scale</b>	<b>f</b>	<b>%</b>	<b>Interpretation</b>
90.00-100.00	341	22.69	Outstanding
85.00-89.00	470	31.27	Very Satisfactory
80.00-84.00	413	27.48	Satisfactory
75.00-79.00	279	18.56	Fairly Satisfactory
Below 75.00	0	0	Did not meet expectations
<b>Total</b>	<b>1,503</b>	<b>100</b>	

*Legend: 90-100- Outstanding (O); 85-89- Very Satisfactory (VS); 80-84- Satisfactory (S); 75-79- Fairly Satisfactory (FS); Below 75- Did not meet expectations (DNME)*

Table 5 presents the distribution of students based on their Academic Performance in Science, using a specified Grading Scale. The table provides a breakdown of the number of students (*f*) and the corresponding percentage (%) within each performance category, along with an Interpretation for each range of scores. According to the data in Table 5, the following interpretations can be made: (a) In the range of scores between 90.00 and 100.00, 341 students (22.69%) achieved an “Outstanding” level of performance in science; (b) In the range of scores between 85.00 and 89.00, 470 students (31.27%) achieved a “Very Satisfactory” level of performance; (c) In the range of scores between 80.00 and 84.00, 413 students (27.48%) achieved a “Satisfactory” level of performance; (d) In the range of scores between 75.00 and 79.00, 279 students (18.56%) achieved a “Fairly Satisfactory” level of performance; (e) Notably, no students scored below 75.00, indicating that none of the students fell below the minimum expectations set for academic performance in science. With this, educational assessments, like the one depicted in Table 5, are essential tools for evaluating students’ progress and guiding educational interventions. They help educators and policymakers gauge the effectiveness of teaching methods, curriculum design, and learning outcomes. Moreover, these assessments contribute to fostering a culture of accountability and continuous improvement within educational institutions. The absence of students scoring below 75.00 in this dataset is noteworthy, indicating that all students met or exceeded the minimum expectations set for academic performance in science. This achievement reflects positively on the educational practices and support systems in place, reinforcing the importance of maintaining high standards in science education.

## Correlation of Variables

### Correlation between Teacher's Belief About Science and School science & Students' Academic Performance

To calculate the Pearson correlation between teachers' beliefs about science and school science and students' academic performance using PSPP, the process involves data entry into PSPP, organizing it by variables such as teachers' beliefs about science, school science, and students' academic performance, followed by variable selection and specification for Pearson correlation analysis within PSPP. Then, execute the Pearson correlation analysis in PSPP, which will compute the correlation coefficient ( $r$ ) between the selected variables and review the output generated by PSPP, which will include the Pearson correlation coefficient and associated statistical significance ( $p$ -value).

**Table 6 reveals the relationship between teacher's belief about science and school science & students' academic performance.**

Variables					Students' Academic Performance			
	O r value	O P value	VS r value	VS P value	S r value	S P value	FS r value	FS P value
Teacher's Belief About Science and School science	0.154	0.029	0.273	.00009	0.607	.00001	0.265	.00001

Legend: \*\*value is significant at  $p < .01$ ; \*r value is significant at  $p < .05$   
 90-100- Outstanding (O); 85-89- Very Satisfactory (VS); 80-84- Satisfactory (S); 75-79- Fairly Satisfactory (FS); Below 75- Did not meet expectations (DNME);

Table 6 provides insight into the correlation between teacher's beliefs about science and school science with students' academic performance. The table includes correlation coefficients ( $r$  values) and associated  $p$ -values for three categories of academic performance: Very Satisfactory (VS), Satisfactory (S), and Fairly Satisfactory (FS). The correlation coefficients and  $p$ -values for each category are as follows: (a) For Very Satisfactory (VS) academic performance: The correlation ( $r$  value) between teacher's belief about science and school science is 0.273, and the  $p$ -value is very low, less than 0.0001 ( $P < 0.0001$ ). This indicates a statistically significant positive correlation between teacher's belief about science and students' very satisfactory academic performance. (b) For Satisfactory (S) academic performance: The correlation ( $r$  value) between teacher's belief about science and school

science is 0.154, and the p-value is 0.029 ( $P = 0.029$ ). This suggests a statistically significant positive correlation between teacher's belief about science and students' satisfactory academic performance, although the correlation is weaker compared to the VS category. (c) For Fairly Satisfactory (FS) academic performance: The correlation ( $r$  value) between teacher's belief about science and school science is 0.265, and the p-value is very low, less than 0.0001 ( $P < 0.0001$ ). This indicates a statistically significant positive correlation between teacher's belief about science and students' fairly satisfactory academic performance. On the other hand, for the correlation between teacher's beliefs and "Very Satisfactory" (VS) academic performance: These findings align with previous research [37], which also reported a statistically significant positive correlation between teacher beliefs about science and students' very satisfactory academic performance. For the correlation between teacher's beliefs and "Satisfactory" (S) academic performance: Similarly, [38] found evidence of a statistically significant positive correlation between teacher beliefs about science and students' satisfactory academic performance, although the correlation was somewhat weaker compared to the "Very Satisfactory" category. For the correlation between teacher's beliefs and "Fairly Satisfactory" (FS) academic performance: the results observed in this study are consistent with the [39], who reported a statistically significant positive correlation between teacher beliefs about science and students' fairly satisfactory academic performance."

## **AUTHENTIC ASSESSMENT**

The findings from Table 6 underscore the critical need for authentic assessment in grade eleven science education. The table illuminates a robust correlation between teacher beliefs about science and students' academic performance across three distinct categories: Very Satisfactory (VS), Satisfactory (S), and Fairly Satisfactory (FS). The correlation coefficients ( $r$  values) reveal the strength of these relationships, and the associated p-values establish the statistical significance. Notably, a substantial positive correlation is identified between teacher's belief about science and students' Very Satisfactory academic performance (VS), supported by a low p-value ( $P < 0.0001$ ). This implies that students' achievement in the highest performance category is significantly influenced by the alignment between teacher beliefs and school science. Furthermore, the data illustrates a similar positive correlation for both Satisfactory (S) and Fairly Satisfactory (FS) academic performances, albeit with varying strengths. Even in cases where the correlation is weaker, as seen in the Satisfactory category ( $r = 0.154$ ,  $p = 0.029$ ), the significance persists, indicating that teacher beliefs still play a crucial role in shaping students' academic outcomes. Given these findings, it is imperative to implement authentic assessment methodologies in grade eleven science education. Authentic assessment not only gauges students' understanding and application of scientific concepts but also provides educators with

insights into the alignment of their beliefs with the subject matter. This knowledge can inform instructional strategies, curriculum development, and professional development initiatives, ultimately fostering an educational environment conducive to higher levels of academic achievement.

The validation process for the authentic assessment checklist for grade eleven science involved a thorough and meticulous review of qualitative questions among 27 high school teachers. This scrutiny encompassed multiple stages, including the examination of semi-structured or open-ended questions through collaboration with Subject Matter Experts (SMEs) which include DepEd Science Teacher, Education Program Supervisor (Science) and Teacher graduate in PhD Chemistry. The SMEs played a crucial role in evaluating the clarity, relevance, and appropriateness of the questions. Additionally, their insights were sought for assessing the language translation accuracy and the effectiveness of voice-to-text transcription, ensuring that the assessment instruments maintain linguistic precision and accessibility. The validation process extended to the coding and interpretation of responses, where the SMEs engaged in comprehensive reviews to ensure the reliability and consistency of the analysis. This multi-faceted approach to validation, involving SME input at each key juncture, enhances the credibility and effectiveness of the authentic assessment checklist for grade eleven science, ensuring its alignment with educational objectives and the nuances of the subject matter. The utilization of authentic assessment based on the comprehensive criteria provided offers significant advantages in shaping a robust and effective learning environment [40]. By ensuring that assessments align with learning outcomes, performance verbs, and criteria for successful achievement, educators can create a seamless integration between what is taught and what is assessed, fostering a clearer understanding of students' mastery of content. The incorporation of open-ended problems, requiring students to engage in various levels of thinking and create novel solutions, not only challenges their cognitive abilities but also promotes critical thinking and problem-solving skills essential in real-world scenarios. Furthermore, the sustained inquiry over an extended period not only deepens understanding but also mirrors the continuous nature of learning and problem-solving in professional settings. Integrating assessments as an integral part of the learning process, rather than an afterthought, emphasizes their importance and encourages students to invest in their own learning. Offering flexibility in communication and demonstration methods, accommodating diverse learning styles, and providing multiple entry points and opportunities for feedback ensure inclusivity, promoting a learner-centric approach that caters to individual preferences and needs. Involving external experts and audience members extends the assessment's impact beyond the classroom, bridging the gap between academic learning and real-world application, ultimately preparing students for success in their future endeavors.

## Grade 11 Science Authentic Assessment Checklist

Table 7 presents a Grade 11 Science Authentic Assessment Checklist, where each criterion is evaluated based on whether it is evident or not in the assessment. The purpose is to assess the alignment of the assessment with learning outcomes, the use of higher-order thinking skills, the inclusion of opportunities for feedback and improvement, student engagement and choice, as well as the involvement of external experts and audience members. The table also prompts suggestions for improving the assessment by adding missing characteristics to enhance its effectiveness in evaluating students' understanding and skills.

**Table 7: Grade 11 Science Authentic Assessment Checklist**  
**Instruction: Evaluate an assessment based on the characteristics listed add ideas on how the assessment could be improved.**

Evident/Not Evident	Criterion in the assessment	Record what is missing in the assessment and how this characteristic could be added to improve it
	Does the assessment align with the learning outcomes from the content of the lesson?	
	Does the assessment align with the performance verb (s) within each outcome, and offer students the criteria for successful achievement of the outcomes?	
	Does the assessment require students to use all levels of thinking to solve open-ended problems	
	Does the assessment require students to perform the following: create a new solution? create a new way of organizing or representing analyzed and/or synthesized data? create a new product, performance, or service?	
	Does the assessment include sustained inquiry over a lengthy period?	
	Does the assessment represent an essential part of the learning as opposed to being an add on at the end of learning "if there is time left"?	
	Does the assessment require students to solve problem as though they are professionals in the field of discipline?	
	Does the assessment include multiple opportunities for feedback and the time needed to use this feedback to improve?	
	Does the assessment allow room for student's interests and preference for learning, such as allowing students choice in how they wanted to communicate and demonstrate their learning?	
	Does the assessment offer multiple entry points so all students can participate in the learning via available scaffolding or support as needed?	
	Does the assessment offer multiple opportunities and attempts to demonstrate learning along the way?	
	Does the assessment involve experts and audience members from outside the classroom?	

*Adapted from Grant Wiggins: Wiggins G. (2021, July 8). 27 Characteristics of Authentic Assessment. TeachThought. Retrieved June 11, 2022, from <https://www.teachthought.com/pedagogy/27-characteristics-of-authentic-assessment/>.*

## **CONCLUSION & RECOMMENDATION**

Encourage professional development and training programs for teachers that focus on fostering positive beliefs about science and school science, as these beliefs have a significant impact on student performance.

Promote the adoption of authentic assessment methods in the classroom to align assessments with learning outcomes, encourage critical thinking, and integrate sustained inquiry, all of which have been positively correlated with student achievement.

Emphasize the importance of considering assessments as integral components of the learning process and advocate for flexibility, inclusivity, and external perspectives in assessment design to create a more dynamic and impactful educational environment that better prepares students for academic and real-world success.

### **Implications**

The correlation between teachers' beliefs about science and school science with students' academic performance underscores the pivotal role of teacher beliefs in shaping student outcomes. The statistically significant positive correlations highlight the potential for teacher beliefs to influence a spectrum of student achievements. These findings align with prior research and emphasize the importance of considering teacher beliefs as a critical factor in educational success. Furthermore, the proposed utilization of authentic assessment, as outlined in the second part, provides a practical avenue to capitalize on these correlations. Aligning assessments with learning outcomes, fostering critical thinking through open-ended problems, and integrating sustained inquiry aligns with the identified positive correlations, potentially enhancing students' academic performance. By recognizing assessments as integral components of the learning process and incorporating flexibility, inclusivity, and external perspectives, educators can create a more dynamic and impactful educational environment, ultimately preparing students for success in both academic and real-world contexts.

### **Acknowledgment**

To everyone who assisted in completing this research project with the title "Teachers Beliefs About Science and School Science (BASSS) and Students Academic Performance in Science of the Division of El Salvador City: Basis for Grade I | Science Authentic Assessment", I would like to offer my profound gratitude and admiration. First and foremost, I want to express my sincere gratitude to my supervisor, Dr. Olga C. Alonsabe, former Schools Division Superintendent, Dr. Randolph B. Tortola, Schools Division Superintendent, Dr. Rolly B. Labis, SGOD Chief, Dr. Ninian A. Alcasid, CTD Chief, and Rebecca B. Namoc, School Principal I, for all their help,

advice, and support during the study process. Their perceptive suggestions, helpful criticism, and encouragement played a crucial role in determining the focus and quality of our investigation.

Additionally, I would like to express my appreciation to my supportive wife Jean Krishna A. Mugot and to the research participants whose willingness to contribute their time, experiences, and viewpoints has substantially enhanced the study's findings. I really appreciate their cooperation and invaluable efforts. I am appreciative of the SGOD personnel and management for providing the facilities and resources required for the successful completion of this study. Their help has been crucial in gaining access to pertinent information, books, and study resources. Furthermore, I would like to acknowledge the support and encouragement received from my colleagues and friends. Their insightful discussions, intellectual contributions, and moral support have been immensely valuable throughout the research journey. Lastly, I would like to express my heartfelt gratitude to my family for their unwavering support, understanding, and patience throughout this endeavor. Their love and encouragement have been the driving force behind my perseverance and determination. To all those who have directly or indirectly contributed to this research, I offer my sincerest thanks. Your support, guidance, and contributions have been vital to the successful completion of this study.

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