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Understanding the Stressors Experienced by RSU Students during the Pandemic and their Coping Strategies: A Mixed-Method Inquiry

Virgilio Fadera, Lucy F. Moscoso and Myra F. Fadriquelan

ABSTRACT

Using the convergent parallel mixed methods design, this study sought to identify the academic stressors experienced by Romblon State University education students during the COVID-19 pandemic and the coping strategies they employed to deal with the stressors. Four hundred seventy (470) students (96 males, 374 females) participated in the study. The inquiry focused on six stress-causing factors: relationship with teachers, relationship with classmates, technology-related factors, financial factors, psychological factors, and cognitive factors. Of these, technology-related factors were found to have caused the greatest amount of stress among the respondents, stating that they were "Stressed" by these factors. The remaining five stress-inducing factors were described by the respondents as having "Slightly Stressed" them. Qualitatively, four coping strategies emerged which were employed by the participants in dealing with stress, namely: spiritual strategies, connective strategies, cognitive-affective strategies, and divertive strategies, or the SCCAD coping framework. Recommendations were made to include the four coping strategies in any intervention program the Romblon State University may initiate in the future for the purpose of enhancing students' capability in managing stress more effectively.

Keywords: *academic stress, convergent parallel mixed method, coping strategies, SCCAD coping framework*

INTRODUCTION

The pandemic has caused tremendous upset to all human institutions, activities, and endeavors, making the educational sector one of the most adversely affected in its wake. Schools had to hurriedly find new instructional delivery modes as traditional face-to-face teaching and learning have become too risky for both teachers and students. The sudden shift in pedagogical approaches and the effects it had on learning caused a significant impact on student's emotional well-being, as evidenced by the myriad of complaints and expressions of exasperation about the voluminous modules and other learning materials they have to contend with (Douwes, et al., 2023; Córdova, et al., 2023; Latorre-Cosculluela, et al., 2022).

It can only be surmised that the sudden shift in learning modalities and perspectives has caused students significant stress. Stress is generally understood as the reaction of our body and mind to anything that upsets our internal balance and is considered an aspect of various human emotions such as frustration, worry, anger, anxiety, sadness, fear, and despair (Shahmohammadi, 2011). Every person experiences stress at one point or another. In the case of students, certain situations related to schooling can cause stress, specifically academic stress. Academic stress arises from an educational setting or context (Struthers et al., 2000), such as entering a new college or university, taking examinations, and dealing with friends (Shahmohammadi, 2011). As pointed out by Shadi et al. (2017), findings from different studies have reported that students experience tremendous stress during their schooling.

Arguably, reducing academic stress can significantly enhance students' academic performance. As pointed out by Pariat et al. (2014), very high levels of stress can impede academic accomplishments, especially if stress is perceived negatively. It follows, therefore, that less stress will most likely result in enhanced scholastic achievements.

The online learning modality during the pandemic affected the students' attitudes toward schooling to the

extent that some of our own students have decided to quit. Others were frustrated that they were learning less than they felt they should and could, resulting in further anxiety.

Students entering university are generally faced with academic stress due to the exposure to a new educational setting and social environment (Elias et al., 2011). This stress-inducing nature of college life and education has been enormously intensified during the COVID-19 pandemic, where students (and teachers alike) had to shift paradigms and employ modes of class interactions that have never been done before, at least to a pervasive extent.

Very few studies have been done to determine the exact effect of the closure of schools due to the pandemic on academic performance. However, in a study by Mahdy (2020) involving 1,392 participants, primarily veterinary students and researchers, it was reported that the lockdown brought about by the COVID pandemic affected the academic performance of a large majority (96.70%) of the study participants.

Relatedly, in their review of international literature on the effect of the COVID pandemic, Alvarado et al. (2021) pointed out that current reports suggest that the lockdown of schools has engendered a negative effect on the scholastic performance of study cohorts compared to the previous ones.

Abiding by the logic that stressors can lead to decreased academic performance, it, therefore, follows that identifying the stressors experienced by our students as well as their coping strategies, and understanding their lived experiences with these stressors and using them to strategize and devise programs or activities that will reduce their anxieties can pave the way for enhanced academic performance.

The transitional character of tertiary education and university life makes college students prone to stressors. As Hamaideh (2011) stated, high-stress levels are generally thought to cause adverse effects on the health of students as well as on their academic performance.

Additionally, in a study conducted by Yusoff et al. (2011), it was revealed that the top ten stressors, as experienced and reported by the medical students involved in the study, were examinations, an enormous amount of information to be processed, insufficient time for review, getting poor grades, the need to perform well, inadequate skills in medical practice, inability to follow reading schedules, tremendous workload, difficulties in comprehending lessons, and inability to answer questions.

However, the negative effects of stress on academic performance can be moderated or minimized through appropriate coping strategies. "Coping" generally refers to how a person deals with stress to control harmful, threatening, or challenging situations (Park & Adler, 2003 in Shahmohammadi, 2011).

Appropriate coping strategies can alleviate the effects of stress on academic performance. For instance, a study conducted by Pariat et al. (2014) reported that students coped very effectively with academic stress through positive coping mechanisms such as prayers and meditation, as well as getting enough sleep. Interestingly, they reported in the same study that listening tos music and watching television, as well as using negative coping strategies such as drugs, smoking, and alcohol, were negatively correlated with academic stress (Pariat et al., 2014).

To synthesize, stress is a part of university life, and it causes adverse effects on physical and mental health and, consequently, academic performance. However, appropriate coping strategies, especially positive ones, can mitigate these adverse effects. Expectedly, more effective coping abilities will lead to less stress, resulting in enhanced well-being and, ultimately, better academic performance.

Identifying the stressors experienced by our students and the coping strategies they employ, as well as gaining a thorough understanding of their lived experiences concerning stressors, can provide valuable data for strategizing and policy-making purposes to improve not only the scholastic performance of our students but their overall well-being in general.

The primary objective of this inquiry is to identify the academic stressors experienced by Romblon State University students during the COVID-19 pandemic and their coping strategies as instruction was disrupted and as the University shifted from face-to-face classes to online and blended modalities. Specifically, this study sought to (1) identify the different kinds of stressors experienced by RSU students during the pandemic, particularly in connection with their studies; (2) determine the different types of coping strategies or mechanisms used by students to manage and deal with stressors they experienced, and; (3) gain a deeper understanding of the lived experiences of the students as they grappled with the different kinds of stressors they have encountered or experienced.

Significance

Although college education settings have always been generally considered a stressful milieu by students, further inquiry into the adverse effects of stress on learning needs to be undertaken if such harmful effects are to be minimized, if not eliminated. As Veena and Shastri (2016) warned, excessive stress can engender physical and mental health problems and may even result in diminished self-esteem and unsatisfactory academic performance. For their part, Yusoff et al. (2011) revealed that the top ten stressors, especially those experienced by medical students, were associated with academic concerns, including tests and examinations, an enormous amount of lessons to be

learned, and insufficient time for studying, among others.

Many studies have investigated the relationship between stress and school achievement among college students, and it has been established that stress definitely affects their academic performance (Elias et al., 2011). By identifying the academic stressors experienced by RSU students and their coping strategies and understanding their lived experiences, teachers will be better equipped to plan and implement instructional strategies designed to minimize academic stress among students. Failure to cope with academic stressors may result in unsatisfactory scholastic performance (Dwyer & Cummings, 2001, cited in Elias et al., 2011). Therefore, stress must be managed appropriately to prevent it from interfering with effective and meaningful learning and the student's mental health and general well-being.

Theoretical Framework

This study was framed by Lazarus and Folkman's transactional theory of stress and coping, in which they argued that people's constant assessment of their environment results in certain emotions, and when external stimuli are seen as threatening, that is, they are perceived as stressful, coping tendencies are triggered to manage emotions or directly address the stressful experience (Lazarus & Folkman, 1986, cited in Biggs et al., 2017).

Summarizing several studies by Folkman and Lazarus from various years, Biggs et al. (2017) pointed out that a change in the relationship between individuals and their environment usually occurs due to their effort to cope with stress. The coping process may produce favorable results, generating positive emotions. However, if the coping efforts fail and the results are unfavorable, the attendant emotions will be distressed, and the whole stressful situation will remain unresolved.

Specifically, Lazarus and Folkman (1986, in Biggs et al., 2017) identified two types of coping strategies: problem-focused and emotion-focused. In problem-focused coping, the intent is to handle the source or cause of stress directly, while in emotion-focused coping, the aim is to manage emotions engendered by stressful events.

College students frequently experience significant academic stress due to demanding school requirements, frequent assessments, and the pressure to stand out (Freire et al., 2020; Lazarus & Folkman,1986; Biggs et al., 2017). To manage this stress, students utilize various coping mechanisms, which, as already stated, Lazarus and Folkman (1986, in Biggs et al., 2017) categorized into two approaches: problem-focused coping and emotion-focused coping.

Problem-focused coping involves directly addressing the stressor through active measures, planning, and minimizing distractions (Esia-donkoh, et al., 2011). This might involve students prioritizing tasks, developing detailed schedules, and reducing distractions to improve workload management. Two common problem-focused coping strategies are active coping and restraint coping (Esia-donkoh et al., 2011). These strategies aim to alter the stressful situation and are linked to positive academic results (Freire et al., 2020; Carver et al., 1989).

In contrast, emotion-focused coping focuses on regulating emotional responses to stress rather than directly tackling the source (Carver, et al, 1989). This can involve positive reappraisal and growth mindset, acceptance of the situation, and seeking social support for emotional well-being (Esia-donkoh et al., 2011). Examples include students reframing challenges as opportunities for growth, accepting the reality of their situation, or seeking comfort and understanding from loved ones (Esia-donkoh et al., 2011; Carver et al., 1989). While emotion-focused coping does not directly change the stressor, it helps students manage their emotional reactions and maintain well-being amidst academic pressure (Freire et al., 2020; Carver et al, 1989).

Utilizing problem-focused and emotion-focused coping strategies is crucial for students' academic success and overall mental health (Freire et al., 2020; Carver et al, 1989). Encouraging students to develop a flexible range of coping mechanisms and seek support when needed can equip them to navigate the challenges of university life more effectively (Freire, et al., 2020; Lazarus & Folkman, 1984).

METHODOLOGY

The mixed method of inquiry was used in this study. Creswell (2014) defines mixed methods research as "an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks" (p. 32). Specifically, the convergent parallel mixed methods design (Creswell, 2014) was used in this investigation, and adhering to the said design protocols, quantitative and qualitative data were gathered simultaneously, subjecting them to separate analysis afterward to determine whether the results corroborated or contradicted each other. According to Wisdom and Creswell (2013), comparing findings from quantitative and qualitative data sources and utilizing the two kinds of data to validate each other provides a robust framework from which conclusions may be drawn.

Romblon State University is located in Odiongan, Romblon, Philippines. It is a state university with a vision to become a research-based academic institution

committed to excellence and service in nurturing a globally competitive workforce towards sustainable development. The university has established campuses in different islands within the province to cater to the local community's and neighboring provinces' needs, providing quality education without students needing to travel to major cities.

Education students (N=470; 96 males, 374 females) from all year levels in the nine campuses of the Romblon State University, namely RSU Main Campus, San Andres Campus, Calatrava Campus, San Agustin Campus, Sta. Maria Campus, Sta. Fe Campus, Romblon Campus, San Fernando Campus, and Cajidiocan Campus participated in this study. With regard to the selection of the participants, complete enumeration was the researchers' intent. However, only 470 students responded to the Google Forms used for data gathering. All 470 participants answered the research instrument's quantitative and qualitative parts.

A two-part researcher-made questionnaire was used in this study. The first part included six categories of questions about the factors that may cause stress among students: relationships with teachers, relationships with classmates, technology-related factors, financial factors, psychological factors, and cognitive factors. This part of the instrument aims to determine the factors that caused the highest stress levels among the participants. The second part of the instrument contained five open-ended questions designed to generate the qualitative data needed to provide further insights into the quantitative findings and pave the way for a deeper understanding of the participants' experiences during the pandemic.

The instrument was subjected to validation by experts and field-tested by thirty (30) students who were not part of the target research participants to determine the instrument's reliability. Thirty-one (31) statements were divided into six (6) categories, comprising the study instrument's first part. The statements in the questionnaire were in the form of Likert items, meaning they were mutually exclusive individual statements, as opposed to the Likert scale, which is "a series or battery of a minimum of four or more mutually inclusive Likert items that are combined into a single composite score/variable during the data analysis process" (Boone & Boone, 2012; Joshi et al., 2015, cited in Subedi, 2016, p. 6). Subedi (2016) further stated that Likert items create an ordinal type of data and that individual analysis of every item is vital in this kind of Likert data. For their part, Gadermann et al. (2012) asserted that Likert-type questions generate ordinal data, not continuous or interval data, and therefore call for using ordinal alpha for reliability testing instead of Cronbach's alpha. They stressed that ordinal alpha had demonstrated greater accuracy in determining reliability for ordinal responses than other measures (Gadermann et al., 2012). Further,

Sullivan and Artino (2013) observed that experts had preferred using the median in measuring the central tendency of Likert scale data, hence the researchers' decision to use it in estimating the reliability of the research instrument.

The six categories of Likert items produced the following standard alpha values: Relationship with Teachers = 0.81 (robust); Relationship with Classmates = 0.82 (robust); Technology-Related Factors = 0.91 (strong); Financial Factors = 0.66 (adequate); Psychological Factors = 0.81 (robust); and Cognitive Factors = 0.85 (reliable). The interpretations of the ordinal alpha values for each of the six categories of Likert items used in the study questionnaire were based on Taber's (2018) descriptions of Cronbach's alpha values. Ordinal alpha values and traditional Cronbach's alpha have the same interpretations (Hellström et al., 2019).

Having established the reliability of the research instrument, the researchers obtained permission from the dean of the College of Education from the Main Campus and the directors from the external campuses to send the instrument to target respondents via an online platform, specifically Google Forms. The potential respondents were expressly notified in the instrument that answering it and sending their answers to the link would constitute giving their informed consent to participate in the study.

With regard to the qualitative data, the original plan was for the researchers to conduct face-to-face focus group discussions (FGDs) with the research participants from each campus to facilitate data gathering. This would have allowed the researchers to probe deeper into the participants' experiences through follow-up questions during semi-structured interviews. However, a sudden, alarming increase in COVID cases in early January of 2023 rendered it too risky to travel around the province to gather data, hence the decision to conduct the data gathering through online modalities.

Once all the data were gathered, quantitative data were separated from qualitative data as they required different analysis methods. Quantitative data were subjected to statistical processing, specifically the computation of the median for each statement about the stress-causing factors under each category using SPSS (Statistical Package for Social Sciences).

On the other hand, the qualitative data were subjected to open coding, axial coding, and selective coding (Yin, 2011). During open coding, the significant statements were identified and labeled, paving the way for axial coding and generating concepts' various themes and sub-categories. Finally, the themes were grouped and integrated into categories through selective coding, forming the framework of coping strategies discussed in the subsequent section. Significant statements from the corpus of qualitative data were added to the discussion

of the tables to give flesh and blood to the quantitative data, this being a mixed-method study.

RESULTS AND DISCUSSION

Quantitative Results

Statistical analysis of the quantitative data yielded the values and descriptions for each statement below under the various categories of stress-causing factors.

As table 1 shows, under the relationship with teachers, the respondents indicated that they were slightly stressed with Item No. 1 (Establishing personal, intellectual, and emotional connection with teachers), Item No. 4 (Getting enough consideration from teachers in case of delays in submission of course requirements), and Item No. 5 (Coping with demands and meeting expectations from teachers), signified by the median score of two (2).

Overall, the relationship with teachers caused moderate stress to the students. One of the causes of stress is the perceived lack of consideration on the teacher's part, especially in late submissions. As two respondents wrote:

"When it comes to deadlines, they did not question some of students' reason why they passed the modules late. I know I am a student and I know too my responsibilities but, they need to understand every student's situation if it is valid or not." [Male, 22, Third Year]

"Some teachers can't understand the situation of the students. And they don't give enough consideration when it comes to our modules. They give [us] a lot of activities and sometimes we can't understand it, that's why we ask about the topic but instead of answering our question the teacher reasons that it is our job to understand our module." [Female, 20, Second Year]

The words of one participant are direct:

"Relationship with teachers becomes stressful to me because some teachers are not considerate and they have so high standards." [Female, 21, Second Year]

Also, getting the teacher's attention to ask for assistance posed problems for some students. As shared by two participants:

"Sometimes when we have questions about modules or something else they don't e-mail or answer us back, in fact they just send us 'Like' emoji." [Female, 20, Third Year]

"I have difficulty in reaching out [to] my teacher because I'm always afraid that they [would] ignore me or they [would] become angry. And I had an experience about that so I really don't want that to happen again." [Female, 19, Second Year]

Table 1 also shows that all the statements pertaining to their relationship with classmates caused the respondents to feel slightly stressed, as seen in their median score of two (2).

With regard to relationships with classmates, one of the most common complaints from the participants is the lack of cooperation from their classmates, as represented by the following responses:

"They don't cooperate sometimes." [Female, 22, Fourth Year]

"They are difficult to approach." [Female, 21, Third Year]

"We are not complete to do the group activities, sometimes the others do not come on time" [Female, 19, First Year]

Concerns regarding communication with classmates also surfaced from the participants' sharing, as shown by the exemplars below:

"Every time there is an announcement, they don't even bother to interact with you." [Female, 20, Third Year]

"Sometimes if I have questions about the other subjects, they didn't answer." [Female, 22, Third Year]

Under technology-related factors, table 1 reveals that the study participants felt stressed with all the tasks identified, signified by the median score of three (3), except for Item No. 5 (Getting access to websites and web pages needed to comply with course requirements) with which they felt slightly stressed, indicated by the slightly lower median score of two (2). Among all the factors that can potentially cause stress to the participants, those related to technology registered the highest scores, signifying that these factors caused the highest level of stress to the students.

The major complaints from the respondents revolve around poor connectivity. The sentiments are represented by this sharing from a participant:

"Getting stable internet connection is so stressful for me, especially during online classes. It is difficult to join in our online class and also to download and upload videos and other learning materials because of poor connection that causes delay of submission of my course requirements." [Female, 26, Fourth Year]

Connectivity problems become even more stressful during examinations, as articulated by one of the respondents:

"It becomes stress[ful] when we are having online examination, midterm and quizzes and the connection isn't stable. It is hard for us to take examinations with poor connection. And you get more stressed when nearing submission - you get stressed the whole day." [Female, 19, Second Year]

As can be gleaned from Table 1, under the financial factors, Item No. 1 (Struggling with connectivity expenses such as "load" for cell phones,

Table 1. Respondents' Level of Stress

Task/Activity	Med	Description
a. Relationship with Teachers		
1. Establishing personal, intellectual, and emotional connection with teachers.	2	Slightly stressed
2. Getting motivation and encouragement from teachers during times of self-doubt.	1	Not stressed at all
3. Getting in touch and approaching teachers for assistance when needed.	1	Not stressed at all
4. Getting enough consideration from teachers in case of delays in submission of course requirements.	2	Slightly stressed
5. Coping with demands and meeting expectations from teachers.	2	Slightly stressed
Overall Median	2	Slightly stressed
b. Relationship with Classmates		
1. Staying connected with classmates personally and academically.	2	Slightly stressed
2. Collaborating with classmates during group activities, group performances, or complying with group requirements.	2	Slightly stressed
3. Exchanging or sharing files, modules, reference books and other learning materials.	2	Slightly stressed
4. Getting updates regarding class activities, requirements and other submissions from classmates.	2	Slightly stressed
5. Getting in touch and approaching classmates for assistance when needed.	2	Slightly stressed
Overall Median	2	Slightly stressed
c. Technology-Related Factors		
1. Getting stable internet signal during online classes.	3	Stressed
2. Getting internet signal fast enough for class requirements, such as for viewing, downloading and uploading videos and other learning materials.	3	Stressed
3. Acquiring computer and other ICT skills needed to comply with requirements for different courses.	3	Stressed
4. Getting gadgets and devices with appropriate hardware and software specifications to meet required storage capacity, speed, and processing power for online classes.	3	Stressed
5. Getting access to websites and web pages needed to comply with course requirements.	2	Slightly stressed
Overall Median	3	Slightly stressed
d. Financial Factors		
1. Struggling with connectivity expenses such as "load" for cell phones, wifi devices and other gadgets.	3	Stressed
2. Coping with expenses for printing, photocopying, binding, etc.	3	Stressed
3. Meeting expenses required for daily subsistence such as food and other personal needs (soap, toothpaste, shampoo, vitamins, medicines, etc.).	2	Slightly stressed
4. Contending with expenses for transportation, board and lodging, and others.	2	Slightly stressed
5. Meeting expenses for leisure and relaxation and for engaging in one's passion.	2	Slightly stressed
Overall Median	2	Slightly stressed
e. Psychological Factors		
1. Sustaining one's motivation to learn and to continue studying.	2	Slightly stressed
2. Keeping focused on one's academic and life goals.	2	Slightly stressed
3. Maintaining one's self confidence, as well as having a positive self-concept and an optimistic outlook in life.	2	Slightly stressed
4. Coping with expectations from parents, siblings, peers and others.	2	Slightly stressed
5. Getting time to engage in one's passion or hobbies to break monotonous academic routines.	2	Slightly stressed
Overall Median	2	Slightly stressed
f. Cognitive Factors		
1. Understanding, absorbing, internalizing skills, information and concepts being taught.	2	Slightly stressed
2. Complying with, and meeting deadlines for submission of, course requirements (term papers, projects, portfolio, etc.)	2	Slightly stressed
3. Taking online examinations (quizzes, mid-term exams, final exams).	2	Slightly stressed
4. Understanding the relevance of what is being learned to the expected skills, knowledge and competencies required for the profession or degree.	2	Slightly stressed
5. Establishing a connection and a sense of continuity among the different topics and lessons taken up in the course	2	Slightly stressed
6. Acquiring a holistic understanding of course content.	2	Slightly stressed
Overall Median	2	Slightly stressed

Wi-Fi devices, and other gadgets) and Item No. 2 (Coping with expenses for printing, photocopying, binding, etc.) under financial factors caused the study participants to feel stressed, as indicated by the median score of three (3). As shown by the higher median for the first two statements, most of the stress related to financial factors also have something to do with technology-related factors. The two factors seem to go together.

One participant shared this experience, thus:
"I am always struggling when it comes to [buying] load and I also experienced that when my teacher required us to submit printed output. I am always struggling with financial expenses. I am stressed with these things because I am embarrassed and guilty when I always depend on my parents." [Female, 20, Third Year]

Another respondent echoed the same feeling:
"It brings stress to me because we don't have enough money to buy laptop and to support weekly load for online class and for downloading files." [Female, 21, Third Year]

Sharing his experiences with regards to financial factors, a respondent wrote:
"I was stressed with this thing because they are badly needed every day to buy things we need like food, load for online class or connecting to the internet to do some task and activity that is given to me. The very stressful thing is even [if] I work hard and have some sidelines, sometimes it is not still enough to cope [with] my financial needs." [Male, 22, Fourth Year]

This response from one of the informants practically summarizes the sentiments expressed by the majority:
"Financial problems lead to stress and it is quite hard to comply with the needed requirements especially school stuffs." [No sex indicated in responses, 22, Fourth Year]

Under psychological factors, a median score of two (2) was registered, signifying that the study participants felt slightly stressed about the individual statements.

The descriptions below from two respondents give us a glimpse of how psychological factors have caused stress and what effects it can have:
"The problem which caused me the greatest stress are psychological factors, like over thinking, because I don't gain advice from my parents because we are from [a] broken family. Sometimes I felt alone and cried at night. I just feel hopeless especially that I'm not relying [for] my expenses on my parents as we're just poor." [Female, 22, Irregular]
"I cannot focus on answering my modules because of the existing family problems. And these existing problems made me think and think that leads to anxiety. It has been stressful for me to resolve and to think of answers for my modules." [Female, 20, Second Year]

Overall, stress caused by psychological factors has adversely affected learning, as can be inferred from a participant's description of the effects of such factors:
"… having anxiety, reduced motivation toward studies, increased pressures to learn independently, and loss of routine." [Female, 23, Fourth Year]

Table 1 also shows that each of the items under cognitive factors registered a median score of two (2), suggesting that the respondents felt slightly stressed with regard to the individual tasks described. It appears that the most common source of stress relative to cognitive factors is the physical absence of a teacher to guide and assist, which eventually resulted in reduced ability to learn, as reflected in the following responses from four participants:
"I am stressed because sometimes I don't understand the topic well and struggle in answering my modules. In my situation, I'm not used to this modular learning because for me it's better that I get guidance from a teacher." [Female, 22, Fourth Year]
"I struggled to absorb all the lessons without the teacher to actually present the topic. If I were to be asked what I have learned, I will say "None." [Male, 22, Fourth Year]
"I can't access some information regarding our lesson or discussions. Due to (pure) self-studying I can't understand some of the lessons in our modules. Unlike before, there is always a teacher to guide and teach us. I learned many things." [Female, 20, First Year]
"It becomes stressful to me if the contents of modules are very hard to understand or new to me, because there is no nearby teacher or people who can explain to me about the topic." [Male, 20, Third Year]

Qualitative Results

From an in-depth analysis of the participants' articulations of their stress coping strategies, the SCCAD (spiritual, connective, cognitive-affective, and divertive strategies) framework emerged through which they handled stress.

Spiritual Strategies

This cluster of strategies refers to the participants' tendency to draw strength from God in their effort to overcome stress. They disclosed that their faith is one of the things that kept them wanting to strive even through the most difficult times during the pandemic. Many of them found comfort and strength from prayers,

which is one of the most used coping strategies among the respondents. This is seen in the following declarations from these participants:

"The best strategy that I have done to overcome my stress is by means of praying – it's a very helpful way to achieve inner peace within my mind and heart." [Female, 20, Third Year]

"First and foremost, nothing will make you at peace; only a sincere prayer together with hard work makes all things impossible possible." [Female, 21, Third Year]

"I overcome stress [and] continue to learn and make the most of the "new normal" situation through prayer and unending faith in God and trust to myself that I can handle this stressful situation." [Female, 20, First Year]

"I always pray to our Almighty God to give me strength everyday so that I could overcome all the hardships that I will encounter." [Female, 22, Third Year]

In addition to prayers, the participants' spiritual strategies also included active participation in church activities. The various activities mentioned by the respondents include attending church on Sunday, prayer meetings, reading the word of God or attending bible study, fellowship, singing and/or listening to worship songs, joining youth camp, and meeting their spiritual leader. Apparently, taking part in church activities or engaging in spiritual pursuits comprises a large part of the respondents' coping mechanisms. The role that participation in church endeavors plays is summarized by the following response from a participant:

"I prefer to engage more in church activities to gain spiritual knowledge that will help me overcome stress and keep my spirit up to face all the challenges and problems caused by the things around us during this time of pandemic." [Female, 26, Fourth Year]

Evidently, the participants' spiritual coping strategies are rooted in their strong faith in God. A study participant's concise description of one of his coping strategies exemplifies his belief in the potency of faith in enabling one to manage stressful experiences:

"One of the most important things I have done to cope with all of these [stress] is to never lose faith in our God Almighty and by always praying for His guidance and protection. [Male, 43, Fourth Year]"

This is reiterated in the responses from two other participants who have also expressed complete belief in the power of faith as an instrument for conquering stress:

"I always surrender my worries to God because I know He's always there for me no matter what. And I always strive to become a strong person so that I can do my best to achieve

my goals and to overcome challenges in life." [Female, 21, Second Year]

"If I had nothing to help me [cope] and [nobody] to be with, I always have my God by my side. He is my strength. He is the reason why I overcome my stressful life when the pandemic started." [Female, 22, Fourth Year]

"I keep on praying and trusting God because I know that He will help and give me strength to overcome the stress and difficulties [I experience] in my studies." [Female, 21, Fourth Year]

Connective Strategies

This set of strategies is characterized by the study participants' yearning to connect or bond with family and loved ones, including friends and classmates, to muster additional strength to manage and overcome stress. Expectedly, the family is one of the study participants' most frequently mentioned sources of motivation, considering that the Filipino family is generally close-knit.

The respondents' desire to connect with family and loved ones to reinforce their will to survive and prevail can be gleaned from the following narratives:

"I talk and bond with my family. I always share my worries about the semester with them – what's going on with my studies. It's my best way to cope with study stress." [Female, 19, First Year]

"[What] I do to overcome stress and continue to learn and make the most of the new normal situation is become active all day. I also stay connected with the people I love and care [about]. I always call and text them, especially my family in Olongapo. I also spend time with the people who make me happy - my baby, family, friends and neighbors." [Female, 24, Fourth Year]

"As a student experiencing stress, it is good to always have a connection or having a talk with family, friends, and other people you are comfortable with." [Female, 23, Fourth Year]

The corpus of data shows that the family has been one of the most reliable sources of motivation for many of the study participants, as evidenced by the following affirmations:

"I manage my stress by staying with my kids because every time I see them it pushes me to strive harder for their future, for our future. Being a mom is not a hindrance to achieve my goals in life. During pandemic I had built a strong relationship with my family which encourages me to fight and keep my pace at all times." [Female, 22, Fourth Year]

"My family gave me motivation and advised me to continue in spite of the challenges that I had experienced. And I am thankful because without

them, maybe I have already stopped studying." [Female, 21, Third Year]

"With the presence of my family, I am still standing and breathing. They are the ones who keep valuing my worth and believing in me that someday I will become who I want to be." [Female, 22, Fourth Year]

One aspect of connective strategies that has also helped the participants overcome stress is the social support they can access through friends, relatives, classmates, and even teachers. This is demonstrated in the following responses:

"The strategies that I used to keep myself from being overwhelmed by stress and still achieve my goals as a student in spite of the pandemic was to gain motivation from my family, relatives, and friends – that no matter how hard the situation is, I need to be strong to achieve [my goals] and overcome the struggle and challenges [I encounter]." [Female, 21, Fourth Year]

"I talk with my family and share my experiences and connect with my classmates and friends." [Female, 21, Fourth Year]

"My parents always taught me to be strong and to be always grateful for big or small things. Also, my teachers always cheer me up that I don't give up and just keep going." [Female, 22, Third Year]

Over and above everything else, however, the family is the pillar of support most of the participants relied on, as expressed in a brief but poignant pronouncement from a participant:

"[I consider] my family as my greatest support system." [Male, 22, Fourth Year]

Cognitive-Affective Strategies

This group of strategies pertains to the self-regulatory coping techniques characterized by the participants' attempt to control the way they perceive their stressful experiences either by thinking about their difficult situation in a self-motivating way or by striving to have conducive feelings about the stressful circumstances surrounding them. These strategies have cognitive and affective dimensions that cannot be separated from one another in a clear, accurate, and defined manner, hence the category label "cognitive-affective."

To cope with academic stress, many of the student respondents adopted a positive outlook towards the stress they encountered. Indeed, positive thinking played a crucial role as they tried to handle stress, as can be gathered from the following statements from a participant:

"I always think that those issues and problems of mine will be given solution if I just think positive and never give up for [I know] these are just a challenge for me as a student and as a person. We just need to think of the possibilities to survive those problems especially that I know we students are always experiencing such difficulties in our studies before achieving our goals." [Female, 19, Second Year]

"I always think positive, pray, and I tell myself, "I can do this! Don't give up!" [Female, 23, Fourth Year]

"As I am facing these struggles and stress, I always keep on believing that after all of these, I know there are good things that will also happen for sure. I know this is happening to me for a good reason." [Female, 23, Fourth Year]

Another approach employed by the participants is keeping themselves motivated. Self-motivation contributed significantly to the participants' attempt to handle stress, as seen in the following words from a respondent:

"Self-motivation is a must. I keep telling myself, "No other person will help you, but yourself". It is a matter of priorities and mindset for me. If you think you can do it, then you can do it. It is just a matter of [having a] positive outlook in life." [Female, 21, Third Year]

For others, the source of motivation is family and loved ones, as shown in the following explanations from three participants as to how they have managed stress:

"By believing in ourselves that no matter the hindrances we meet [we should] just focus on our dreams. Also, my loved ones, parents and peers motivate me." [Female, 22, Fourth Year]

"One of the reasons is that I have a dream that I want to reach someday. Yes, it's hard, it's stressful, but it's for my parents." [Female, 21, Second Year]

"I need to achieve my goals to pay back the sacrifices and the hard work that my parents do to put me through college and give them the life that they want to have." [Female, 19, Second Year]

Still, for some others, the source of motivation is the dream itself, the goal that they have set for themselves, as can be inferred from the following responses:

"I am just motivated to finish school even though there are many obstacles in life because I have to work hard and reach my dream of having a good life." [Female, 27, First Year]

"My dream to become a successful and competent teacher drives me to continue despite the stressful [situation] brought [about] by technology-related factors." [Male, 21, Third Year]

"In spite of the pandemic, I keep myself focused on achieving my goals and ignore all these stressful issues and problems. I just go with the flow of this new normal situation and continue to learn." [Female, 26, Fourth Year]

"Just thinking about why I started and the challenges I've already overcome makes me realize that there is a finish line, and when it arrives, I'll smile and tell myself, "I'm proud of you." [Female, 20, Third Year]

Divertive Strategies

Another group of stress management techniques that emerged from the participants' coping narratives is divertive strategies. This set of strategies refers to the participants' effort to temporarily divert their energy and attention to other activities away from academic tasks. They aim to recharge themselves while their minds are tentatively removed from stress-inducing schoolwork. Undoubtedly, this stratagem has been effective for many of the participants, as expressed in the following responses:

"Taking a break is the only thing that kept my spirits up to avoid physical strain and mental burnout." [Female, 21, Third Year]
"The activities that I do to keep my spirits up include cleaning. I know it is very strange to hear but when I am cleaning, there are a lot of good thoughts that are hitting my mind. Good thoughts that helped me to have hope, clear my mind from over thinking and to continue." [Male, 20, Third Year]

Interestingly, engaging in domestic activities provided a substantial amount of respite from stressful coursework for the informants, as articulated in the following testimonies:

"Since we are modular, I decided to raise ducks and rabbits so that I won't be stressed while studying alone. I also plant vegetables like pepper and tomatoes. Now I'm starting to plant some lettuce so that I will never be overwhelmed with stress. In these things that I do, it also teaches me how to manage my time in doing household chores, [answering] modules and taking care of my pets." [Female, 25, First Year]
"I enjoy raising swine, chickens, and ducks. I also enjoy being a fur mommy to my dogs." [Female, 32, Third Year]
"During the pandemic, I found this crocheting as stress free and relaxing. I've learned a lot through crocheting. I have developed once again my self-confidence and [enhanced my] fighting spirit as I've finished a project. Through crocheting, I can focus, I can think, learn and enjoy." [Female, 23, Fourth Year]
"Taking care of my plants and think positive always." [Female, 34, Second Year]

Furthermore, entertainment in the form of TV shows, movies, videos, and the like also provided a much-needed break to the participants, as can be deduced from the following accounts:

"I sometimes watch encouraging and inspiring videos to build my spirit up and also watch funny videos whenever I feel tired." [Female, 20, Third Year]
"I let myself have some fun sometimes. Instead of focusing so much on answering modules, I give myself a one-day or two-day break. I watch some movies and sometimes I don't answer modules during the break." [Female, 23, Fourth Year]
"The activities that I engaged in to keep my spirits up are spending some time alone, watching movies and K-dramas, hanging out with my friends, and taking a walk." [Female, 22, Fourth Year]
"Watching comedies - I know that it will not help me in answering my modules but I just want to remove my stress, even if it is just temporary." [Female, 20, Third Year]

Likewise, engaging in their hobbies or favorite pastimes provided opportunities for the participants to deviate tentatively from academic chores. In addition to singing, dancing, gardening, and communing with nature, the participants spent a significant amount of time reading, which enabled them to escape the dreariness and monotony of academic work. This is made evident in the following reports from the respondents:

"I engaged myself in reading books, a quick escape [from] reality. I love to read motivational quotes so I can keep going." [Female, 21, Third Year]
"I just read books. I know it is weird but reading books actually helps me to stay focused and not to be stressed. Reading interesting stories makes me happy so when I am stressed with school works and problems in [my] family, I just read books because it makes me calm and I forgot all the problems especially [during] this pandemic. So, to dissipate my stress in this situation I just focused on reading books because my fears, stress, and doubts disappear when I start to read interesting stories." [Female, 21, Fourth Year]
"Reading and watching movies are the activities I engaged in to keep my spirits up." [Female, 21, Third Year]

Finally, engaging in sports or performing other physical activities served as momentary relief from stress for some study participants. In addition to playing basketball or volleyball, other physical activities included doing exercises such as walking, jogging, and biking.

"I always try to be physically fit [by doing some exercise] like walking and jogging in the morning to relieve some stress and to give my mind some peace, because now, I don't want stress to bring me down." [Female, 21, Fourth Year]

"I exercise every morning, sometimes [I go] biking. It helps me to relax. When I have had my exercise, it takes out my stress and I feel the freedom from problems." [Female, 22, Fourth Year]

"To keep my spirits up, I exercise regularly, spending time with my family and friends, getting enough sleep, cooking, reading and watching inspirational movies. I always maintained my daily activities and routines to keep myself active and to avoid stress." [Female, 21, Fourth Year]

"One thing I do is the breathing exercise. It helps me to find peace in a short time and bring back my focus as well as helps me to unleash negativity in mind." [Female, 20, Second Year]

To recapitulate, the quantitative data gathered from the study participants indicate that they were slightly stressed by the identified factors as shown by the grand median of 2, with the description of Slightly Stressed, except for technology-related factors, which registered an overall description of "Stressed." The qualitative data, on the other hand, revealed the coping strategies adopted by the respondents, namely, the spiritual, connective, cognitive-affective, and divertive strategies, or, in short, the SCCAD coping framework.

The quantitative data gathered for this study revealed that technology-related factors triggered the highest stress level among the study participants, as seen in Table 7 in the previous section. The problem lies not in the unavailability of devices but in poor connectivity.

The findings from recent studies corroborate the finding that technology-related factors were a significant source of stress for students during the COVID-19 pandemic. A study by Essel, et al. (2021) revealed that technology-induced stress was prevalent among Ghanaian university students, with poor internet connectivity being a major contributing factor. Similarly, Kulikowski, et al. (2022) found that the sudden shift to online learning and the associated technological challenges caused considerable stress and anxiety among students. These studies underscore that the problem lies not in the unavailability of devices but rather in the poor quality of internet connectivity, which exacerbated students' stress levels during the pandemic.

It should be noted that this study was conducted during the pandemic. Hence, students could not go to locations with stable signals due to restrictions on mobility imposed by the Inter-Agency Task Force (IATF). Against COVID, the government arm is primarily tasked to oversee state efforts to combat the virus locally. Since the pandemic has abated, this may not be a serious problem among RSU students, especially now that the University has provided free Wi-Fi access to all its colleges and campuses. Since this study was conducted to generate data for the University's guidance and health units regarding a potential academic stress management program, whatever aspects of the program intended to address technology-related factors should be recalibrated based on currently existing conditions.

All other categories of stress-causing factors included in the instrument garnered an overall description of "Slightly Stressed," indicating a moderate level of stress among the respondents. This can be attributed to the fact that getting a college degree can really be expected to cause, at the very least, a moderate amount of stress among students. As reported by Shadi et al. (2017), various research has shown that students generally experience enormous amounts of academic stress during their schooling. It is unreasonable, therefore, to expect to see a completely stress-free academic setting.

Additionally, the corpus of qualitative data surfaced the study participants' strategies for coping with academic stress, namely spiritual strategies, connective strategies, cognitive-affective strategies, and divertive strategies (SCCAD).

Spiritual Strategies

As spirituality offers a sense of meaning, purpose, and belonging that can assist in reducing stress and offer comfort and support, religion can be a stress-coping method for many people. Spirituality is an important aspect of life, and many people turn to religion in times of stress to cope (Ellison, 2001). This is particularly true among Filipinos, generally considered religious people, who often manifest unshakeable faith in God even during difficult times, making them resilient against stress (Abad, 2001). Their firm belief in God gives them happiness, believing that God will answer their prayers, guide them, and never abandon them (Abad, 2001).

The participants' use of spiritual strategies, particularly praying, in coping with stress is consistent with findings from previous inquiries, confirming the potency of engaging in spiritual practices and activities to manage stress. For instance, LaBarbera and Hetzel (2016) wrote that most studies focusing on the effect of prayer have reported that praying generally affects one's mental health positively, including one's overall life satisfaction. LaBarbera and Hetzel (2016) reported further that prayer helps alleviate anxiety and depression and can serve as an effective stress-coping strategy (Wachholtz & Sambamthoori, 2013). Even the simple act of repeating holy names can have therapeutic effects (Oman & Driskill, 2003), making contemplative prayers an effective antidote to the pressures of a busy life (Wong, 2005). The correlation between prayer and reduced anxiety was demonstrated by Ferguson et al. (2010). In the academic realm, Belding et al. (2010) found that college students who prayed and engaged in positive self-talk experienced a lower level of stress. Further, Clements and Ermakova (2012) reported that

people who believe in a caring and all-powerful God find peace even in adverse situations because they are convinced that God will make a way for them to cope with difficult circumstances.

By and large, religious or spiritual coping is generally associated with more desirable reactions to stressful experiences. For example, Pargament et al. (1990, cited in Ellison, 2001) revealed that stress-coping strategies that involve faith in a compassionate God, feeling of having God as a partner, participation in religious activities, and finding spiritual support all lead to better results in terms of coping with stress. Indeed, any academic stress management program should provide ample opportunities for students to engage in spiritual pursuits, as they have been proven to produce affirmative results.

Connective Strategies

Family support (Patterson & McCubbin, 1987) and relationships within the family often provide the individual with an effective means to cope with stress, resulting in healthier behaviors, improved self-esteem, and an enhanced general sense of well-being (Thomas et al., 2017).

By and large, the Filipino family is a close-knit social unit. The cohesive character of the family often serves as the primary source of emotional support for many adolescents. Understandably, children's perceptions of having supportive parents lead to enhanced self-esteem and social assimilation, perception, control, and the general effectiveness of their coping strategies (Caycho, 2016). Family support, among other factors, helps shield individuals from the negative psychological and emotional effects of stress (Holahan & Moos, 1986). No wonder many study participants wanted to connect with family as one of their stress-coping strategies. Being loved and appreciated by one's parents is conducive to developing effective coping strategies (Caycho, 2016). Felner et al. (1985) stressed that the family's functioning level and organization are crucial factors in the adolescent's ability to adapt to stressors.

The family belongs to the larger concept of social support, including friends, relatives, neighbors, and even co-workers (Thoits, 1986). They primarily function as sources of socio-emotional and informational assistance, as well as instrumental aid (House, 1981; Turner, 1983, cited in Thoits, 1986). A significant number of the respondents indicated connecting with loved ones outside the immediate family as one of their stress-coping strategies. Many of them sought emotional support from relatives and friends. This is consistent with findings from other studies, which underscore the importance of connecting with friends as a coping strategy. Redhwan et al. (2009) reported "going out with friends" as one of their

strategies for coping with stressful situations, together with availing of counseling services and sharing problems, among a few others.

The availability of strong social support is of foremost importance in coping with stress as it mitigates the adverse effects of stress on one's well-being (Thoits, 2010). Moreover, social support likewise fosters a positive sense of well-being through enhanced self-esteem, resulting in a more positive self-concept (Fukukawa et al., 2000). Indeed, people who receive support from family members feel a heightened sense of self-worth, which leads to enhanced self-esteem, which may promote optimism, positive emotions, and a healthy mindset (Symister & Friend, 2003).

All the foregoing implies that an intervention program aimed at enhancing the stress-coping capabilities of our students should include provisions for strengthening connections among family, relatives, and friends. As underscored in the foregoing discussion, the family and the larger social support play a key role in one's efforts to cope with stress.

Cognitive-Affective Strategies

Based on the transactional stress theory (Lazarus & Folkman, 1986 in Caycho, 2016), coping is a cognitive and behavioral attempt to handle situations that are assessed as challenging or beyond the resources and capabilities of an individual. Lazarus and Folkman (1986, in Caycho, 2016) averred that there are two types of coping: problem-focused and emotion-focused. Problem-focused coping is more on the cognitive dimension, while emotion-focused coping is more affective in nature. This validates one of the themes generated in this study, which is the cognitive-affective dimension of coping, and the strategies related to this aspect of coping.

Deyreh (2012) reported that between the two categories into which stress responses may be classified, namely cognitive and affective, the former has been found to be more effective than the latter. When individuals employ cognitive coping strategies, they apply higher-order mental skills, including information processing, use of logic, and cognition. On the other hand, when affective strategies are used, the person's tendency is to resort to disengagement and avoidance, hence the low level of effectiveness in dealing with stress. It should be pointed out at this juncture that affective strategies do not only consist of disengagement and avoidance but also constructive ways of managing one's emotional reactions to stress (Holahan & Moos, 1987). In the end, Deyreh (2012) concluded that people who opt for cognitive coping strategies achieve a higher degree of success in managing stress.

One of the strategies identified by the study participants under this category is positive thinking. Sasson (2014) described positive thinking as a cognitive

and emotional approach in which the brighter side of an experience is given focus and positive results are expected. According to Garayeva (2022), positive thinking comprises cognitive, affective, and behavioral components. Apparently, adopting an optimistic view of their experiences during the pandemic helped the informants handle academic stress. As Naseem and Khalid (2010) pointed out, positive thinking leads to positive emotions, optimism, hope, and joy, among other constructs. By adopting a positive cognitive and affective stance, stress tends to be perceived as less threatening, resulting in an enhanced ability to deal effectively. In short, positive thinking can help reduce stress and amplify feelings of resilience and general well-being.

Motivation is another important component of the participants' cognitive-affective coping strategies. According to Rabideau (2005), motivation is the force that drives people towards certain courses of action. Based on one's emotions and individual goals, as well as on personal needs and aspirations, motivation strongly influences behavior (Rabideau, 2005). Motivation plays a crucial role in dealing with academic stress. The dynamics between academic stress and academic performance are affected by learners' coping strategies and motivation (Struthers et al., 2000). Struthers et al. (2000) further stressed that there exists a positive correlation between academic stress and motivation, explaining that this may have been caused by two factors, namely the value of performing well academically in specific courses and the importance of doing well in general.

Cognizant of the importance of motivation in dealing with stress, Struthers et al. (2000) advised teachers in college to fully understand how learners' coping styles affect their motivation and performance, as this can help instructors teach their students how to be more effective in managing stress. Finally, Struthers et al. (2000) concluded that coping and motivation are interrelated constructs and, therefore, should be considered in relation to one another.

Divertive Strategies

Divertive strategies are enjoyable activities to distance oneself from the source of academic stress temporarily, but with the full intent of returning to it once recharged or reenergized.

Moderate and high stress levels are common experiences among college students (Çevik, 2020), and engaging in leisure activities is an important divertive strategy in processing stress (Iwasaki, 2001). It is hardly surprising, therefore, that among the stress coping strategies reported by the study participants, leisure activities feature prominently. The hobbies and relaxation activities mentioned by the respondents fall under Kim and McKenzie's (2014) leisure

classifications: active, passive, and social. The active leisure activities they described consist of doing various forms of exercise, playing their favorite sports, taking care of their plants, going for a walk, cleaning the house and doing other household chores, raising animals, and caring for pets. Passive leisure activities, on the other hand, included reading, watching TV shows, movies, or online videos, crocheting, or simply taking a break. Only one type of social leisure was mentioned: hanging out with friends.

By and large, when people are exposed to stressful circumstances, they tend to employ certain coping techniques, such as leisure coping methods (Iwasaki & Mannel, 2000). Leisure coping is a common stress management strategy. A study by Lagunes-Córdoba et al. (2022) involving psychiatrists and trainees recommended engagement in leisure activities to improve the well-being of healthcare workers because leisure activities correlate with enhanced physical and mental health. Moreover, in their studies involving college students, Reich and Zautra (1981) found a correlation between regular participation in leisure activities and low levels of stress. Leisure activities generally serve as sources of enjoyment and satisfaction; hence, they play significant roles in people's coping resources (Çevik, 2020).

Iwasaki (2001) believed that one of the ways people may handle stress effectively is through coping by means of leisure, particularly through what he labeled leisure palliative coping, in which people temporarily take a break from a stressful event or experience to recharge, feel reenergized and take stock of their coping resources in order to be better equipped in solving their problems (Patterson & Carpenter, 1994). Lazarus et al. (1980, in Iwasaki, 2003), upholding the concept of leisure as a palliative coping strategy, argued that desirable leisure activities can act as "restorers" and "breathers" from stress that can sustain coping efforts. As "restorers," leisure pursuits (and other forms of meaningful positive events) help people to replenish coping resources – or even create new ones – enabling them to recover more quickly from the adverse effects of stress (Folkman et al., 1997 in Iwasaki, 2003). Even simple leisure such as a short vacation, a coffee break, or even a siesta or recess from school may provide opportunities for diversionary activities, thereby giving the individual a temporary respite from stress (Folkman et al., 1997, in Iwasaki, 2003). Furthermore, leisure and other fulfilling activities are sources of positive reinforcement for helpful coping, thereby motivating the individual to persist, with the effect of sustaining one's coping efforts (Folkman et al., 1997 in Iwasaki, 2003).

Leisure activities provide a tentative break from stressful events by keeping the mind and body occupied, making leisure palliative coping an escape-oriented coping mechanism (Iwasaki & Mannel, 2000).

Many of the participants in this study resorted to various kinds of leisure in their effort to cope with academic stress. This underscores the importance of including leisure dimensions in intervention programs intended to help students cope with stress more effectively. As pointed out by Çevik (2020), university administrators may learn important insights from the interaction between the perceived degree of stress and leisure coping techniques, enabling them to design more effective school recreation programs intended to empower students against the negative effects of stress.

CONCLUSION

By and large, university students experience varying degrees of academic stress and it is of foremost importance that they are able to manage stress if they are to maintain their mental health and general well-being. Through the convergent parallel mixed methods design, this inquiry disclosed that technology-related factors caused the greatest stress to Romblon State University education students during the COVID-19 pandemic as compared with other stressors like relationships with teachers, relationships with classmates, technology-related factors, financial factors, psychological factors, and cognitive factors. Additionally, this study phenomenologically surfaced the SCCAD strategies (spiritual, connective, cognitive-affective, and divertive strategies) through which the informants coped with academic stress during the COVID-19 scourge.

The findings in this study can be of value to the university particularly with respect to the design of intervention programs aimed at enhancing students' capability in managing stress more effectively. It is recommended that stress-coping intervention programs to be implemented in the university should focus on increasing knowledge and practice of any or all of the coping strategies that emerged in this investigation, namely spiritual, connective, cognitive-affective, and divertive strategies.

As this study focused solely on education students, it is likewise recommended that similar inquiries be made in other colleges and universities to explore similarities and uniqueness of the coping strategies of students from other disciplines

AUTHORS' CONTRIBUTIONS

VF led the study while LM and MF served as his assistants and co-researchers.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Examining the Effects of Metacognitive Awareness on the Reading Comprehension Skills of Grade 7 Students

Clarren Ann G. Vicente[1] and Philip R. Baldera[2]

ABSTRACT

This study examines the effects of metacognitive awareness on the reading comprehension skills of Grade 7 students at Odiongan National High School, Odiongan, Romblon, addressing a crucial gap in existing literature. With reading comprehension skills being fundamental to academic success, understanding the role of metacognitive awareness becomes imperative. Grounded in Flavell's Metacognition Theory, this research aims to investigate the level of metacognitive awareness and its effects on reading comprehension skills with a descriptive-causal approach. Methodologically, a quantitative approach was used, utilizing reading comprehension assessments alongside a modified Metacognitive Awareness Inventory (MAI) adapted from Schraw & Dennison (1994). Using a four-point Likert-type rating scale questionnaire, students rated their metacognitive awareness, divided into Metacognitive Knowledge (MK) and Metacognitive Regulation (MR). Metacognitive knowledge encompasses declarative, procedural, and conditional knowledge, while Metacognitive Regulation involves planning, monitoring, and evaluating. Using stratified random sampling, 198 respondents were selected out of 401 Grade 7 students, preceded by a pilot study with 20 respondents to refine research instruments and assess the validity and reliability. Furthermore, data were collected, processed, and analyzed using a statistical tool called Multiple Linear Regression. The results show that metacognitive awareness is positively correlated with the reading comprehension skills of Grade 7 students. This suggests the pivotal role of metacognitive awareness in enhancing reading comprehension skills.

Keywords: *cognition, metacognition, metacognitive awareness, reading comprehension skills, metacognitive reading strategies*

INTRODUCTION

Reading comprehension is crucial for a student's academic success and overall cognitive development. Furthermore, Cimmiyotti (2013) states that reading is essential at all levels of the educational system, as all subjects in the course require reading. However, reading is about more than just sounding out words. As defined in the study of Elish-Peper (2010), reading comprehension is the process of deciphering or interpreting written materials. However, not all students achieve the same level of proficiency in reading comprehension. According to Bilbao et al. (2016), some students continue to read below proficient levels even with teaching strategies from teachers to improve reading comprehension.

As shown in the study by Juan (2019), Filipino pupils performed worse in reading comprehension than their international peers. The results of the study show that there is a need to address the reading comprehension problem of Filipino learners. The Mother Tongue–Based Multilingual Education program supported by Republic Act 10,523 has been implemented to address these alarming academic conditions. The implementation results have significantly improved student performance, especially in language and reading tests.

Furthermore, while students frequently depend on various learning tactics and study techniques to succeed, metacognition is an often overlooked factor that emerges as a critical aspect of success (Zhou, 2022). Thus, the researcher was inspired to study the impact of metacognitive reading strategies on high school

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students' reading comprehension for further improvement. Therefore, exploring a higher level of metacognition is necessary, as more than utilizing reading strategies might be required to address students' poor reading comprehension. Hence, this is where metacognition comes into play – a term coined by James H. Flavell in 1979.

Due to its increased knowledge and control over the reading process, metacognitive awareness has gained attention in educational research. This is evident in the study of Ngoc (2022), in which several scholars have acknowledged metacognition as a driving force behind learning a second language. According to Flavell (1979), metacognition is cognition about cognition or simply thinking about thinking, and the term metacognitive awareness includes notions similar to metacognition. Moreover, planning before reading, checking understanding while reading, and assessing the reading experience are all part of the metacognitive level of comprehension (Carrell et al., 1998).

Metacognition improves reading comprehension by encouraging awareness, self-regulation, and strategic thinking. While cognitive strategies like using a dictionary, inferring from context, drawing on prior knowledge, summarizing a text, and using context clues may offer the necessary foundational skills, metacognition goes beyond them. Metacognitive reading strategies include planning, observing, and assessing a learning task's effectiveness, considered higher-order performance techniques. (Pressley & Afflerbac, 1995). However, Schraw (1998) contends that although cognitive strategies are essential for completing a task, knowledge of one's performance requires using metacognitive reading strategy awareness. Metacognitive awareness is crucial in reading comprehension, especially when facing challenging texts. This is shown in the study of Muhid et al. (2020), where metacognitive strategies positively affect students' reading abilities.

Additionally, Sinom and Kuswandono (2022) demonstrated quantitatively that academic reading comprehension positively correlates with a higher metacognitive awareness of reading strategies. Furthermore, readers who use metacognitive reading strategies in their reading comprehension are more successful than those who do not utilize this strategy in the reading comprehension process (Reza Ahmadi et al., 2013).

Components of metacognition are examined to understand how metacognitive awareness occurs during the reading process. According to Schraw and Moshman (1995), there are two (2) components of metacognition, namely (1) Metacognitive Knowledge (MK) and (2) Metacognitive Regulation (MR). Metacognitive knowledge is composed of the following : (1) declarative knowledge, (2) procedural knowledge, and (3) conditional knowledge. Meanwhile, Metacognition Regulation consists of the following: (4) planning, (5) monitoring, and (6) evaluating.

Firstly, under declarative knowledge, readers use existing knowledge and realize a gap between what the readers understand and what the text demands. Secondly, conditional knowledge is when a reader selects appropriate strategies tailored to the specific situation to fill the gap. Next, procedural knowledge becomes evident when the reader applies these strategies through execution during the reading process. Meanwhile, in metacognitive regulation, planning occurs when the readers prepare strategies for reading challenges. Monitoring comes into play when readers ensure they are on the right track by monitoring their reading progress. Lastly, evaluation occurs when readers assess the success of their efforts by determining how well they have understood the text.

By understanding how metacognitive awareness affects reading comprehension, readers, exceptionally high school students, will develop an awareness of their reading strategies, comprehension monitoring, and the capacity to regulate and evaluate their strategy when faced with challenging texts.

Summary of the Review of Related Literature

Cognition

According to Zhou et al. (2017), students and educators should strive to discover effective strategies for maximizing learning results and fostering cognitive growth in pursuing academic achievement. Furthermore, the role of general cognitive capacity in metacognitive monitoring is associated with higher intelligence (Karwowski, et al., 2014). However, merely providing instructions for a specific strategy may prove inadequate, as individuals might need more implicit knowledge or cognitive capabilities to execute it proficiently (Nusbaum et al., 2011). On the other hand, researchers are still grappling with the complex interaction between cognition and metacognition, posing ongoing challenges as they rely on and influence each other while sharing processes (Winne, 2018).

Metacognition

According to Norman et al. (2019), cognition on cognition or the reflection and regulation of one's cognitive activities is called metacognition. Additionally, metacognition is linked more to cognitive science and is partly assessed by performance-based tests. (Dinsmore et al., 2008). Moreover, metacognition is a multifaceted phenomenon that involves awareness and regulation of one's cognitions (Flavell, 1979). Also, Roebers (2017) claims that executive function and metacognition play quite similar roles in children's behavior and cognition.
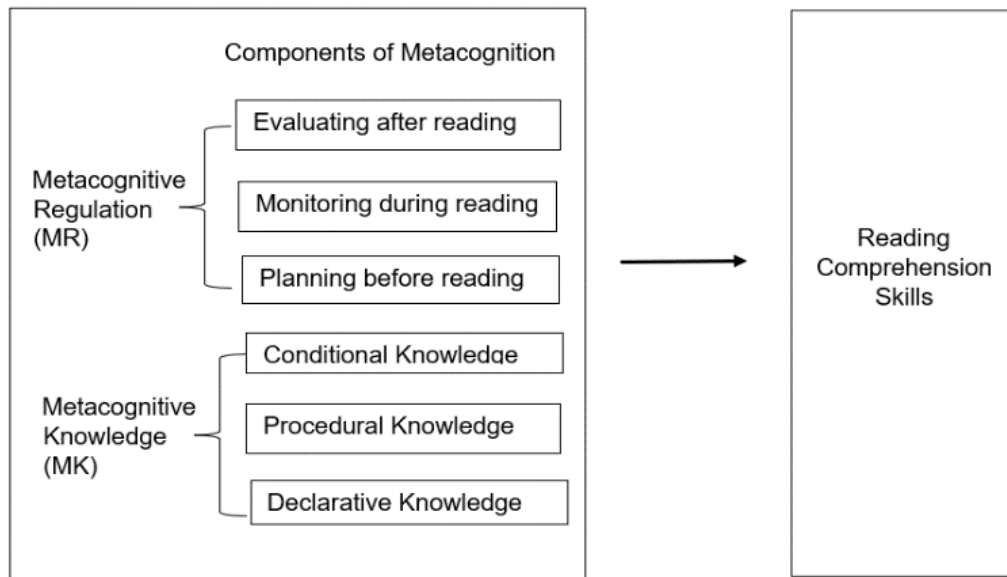
Figure 1. Conceptual Framework

Brown (2017) emphasized the role of metacognition in reading and understanding one's cognitive processes during reading activities. Furthermore, according to Pressley (2002), the theory of metacognition highlights the importance of planning, monitoring, and evaluating strategies for improving reading comprehension. These strategies boost active engagement and help students identify and address comprehension gaps, leading to a deeper understanding of the text. There is still much to be explored involving the development of Theory-of-Mind for the age of 3 to 5 years, followed by the development of metamemory and metacognitive knowledge and skills that continue to develop throughout the lifespan (Roebers & Spiess, 2017).

Metacognitive Awareness

Research suggests that native and non-native readers demonstrate different levels of metacognitive awareness regarding reading strategies, emphasizing the importance of considering these distinctions in evaluation approaches (Sheorey & Mokhtari, 2001). Moreover, assessing metacognitive awareness supports reading research and instruction, emphasizing the significance of metacognitive strategies in assessing comprehension (Mokhtari & Reichard, 2002).

Metacognitive Knowledge (MK)

Metacognitive knowledge comprises explicit task and strategy-related information, regardless of accuracy (Frazier et al., (2021). Furthermore, metacognitive

knowledge consists of three types of information regarding tasks and strategies: declarative information that answers the question "What?" (e.g., what type of strategy is appropriated in a particular task?), procedural information that answers the question "how?" (e.g., how to implement different strategies?), and conditional information that answers the questions "when and why?" (e.g., when to use a strategy?) (Pintrich et al., 2000). In addition, metacognitive knowledge is believed to aid monitoring and control processes by providing access to information for more accurate evaluations and informed decisions (Nietfeld et al., 2002). Moreover, metacognitive knowledge at the task level, concerning creative tasks, involves familiarity with problems that demand creative thinking (Duncker et al., 1945). Furthermore, metacognitive knowledge indicates the level of creative expertise, often more specialized within a specific creative domain for those with higher expertise (Kaufman et al., 2009).

Metacognitive Regulation (MR)

According to Afflerbach et al. (2017), the metacognitive regulation of reading is expressed as reading strategies, deliberate, goal-directed attempts to control and modify the reader's effort to decode text, understand words, and construct text meanings. Prior studies indicate that metacognitive regulation, the abilities learners employ to oversee their cognitions, correlates positively with proficient problem-solving (Berardi-Coletta et al., 1995), transfer (Lin & Lehman, 1999), and self-regulated learning (Zepeda et al., 2015).

However, metacognitive regulation has a different number of constructs and different levels of description. Nelson and Narens's (1990) model consists of monitoring and control processes that assess the current state of working memory and use information to regulate and guide subsequent actions. Moreover, Winne and Hadwin (1998) built a model and included additional higher-level metacognitive skills, such as planning and evaluating.

Reading Comprehension

Reading comprehension is the cognitive process shaped by the interaction between the reader, the text, and the context (Flavell, 1979). It involves deriving meaning from text rather than interpreting individual words or phrases (Klingner et al., 2015). Reading comprehension is a complex construct influenced by the reader, the text, and the purpose for reading (OECD, 2019).

León (2003) highlights the significance of inferences in reading comprehension, stating that readers utilize cognitive and metacognitive strategies to construct new propositions from existing information. Furthermore, reading comprehension is crucial for learning as it assigns meaning to text and represents the ultimate objective in reading development (Trainin et al., 2015).

Caballero (2008) identifies two challenges in teaching reading comprehension: the need for teacher engagement with additional strategies to enhance students' reading skills and reluctance to explore strategies requiring more guidance and knowledge. Despite exposure to English text, students need help with comprehension (Muhid et al., 2020). PISA results indicate below-average performance in reading comprehension on the National Achievement Test (DepEd, 2019). Therefore, teachers must provide explicit instruction to students in comprehension strategies because it can help students overcome their problems in understanding the text being read (Graham & Bellert, 2004).

Metacognitive Strategies

A metacognitive strategy refers to a deliberate and conscious effort aimed at comprehension during reading tasks (Burin et al., 2020). Students' awareness of comprehension monitoring is shaped by the metacognitive reading strategies they frequently employ (Falah et al., 2016). In reading, metacognitive strategies involve self-monitoring and self-regulating activities that address the reading process and outcome (Zhang & Seepho, 2013). However, The number of frustrated elementary-level readers remained higher than that of instructional and independent readers during the 2003–2004 school year (Luz, 2007). Educators can enhance students' development by identifying mastered metacognitive strategies and providing support in areas of struggle (Jacobs & Paris, 1987). Differentiated instruction, informed by identifying metacognitive strategies, is emphasized for addressing individual needs and abilities (Baker & Beall, 2009). Implementing metacognitive reading strategies in the reading process fosters strategic competence and cultivates strategic readers (Khellab et al., 2022). Additionally, O'Malley and Chamot (1990) categorized strategies into metacognitive and cognitive, with metacognitive strategies enabling learners to manage, guide, and regulate learning processes. Additionally, students' reading can benefit from metacognitive reading practices in several ways, such as understanding and supporting their educational endeavors (Wang et al., 2009).

Sutiyatno and Sukarno (2019) conducted a study to explore the correlation between metacognitive reading strategies and reading achievement. The findings indicated a significant relationship between metacognitive strategies and reading achievement, with all three sub-categories showing high correlation coefficients. Moreover, the results suggested that improving students' understanding and knowledge of metacognitive strategies can enhance their reading achievement, emphasizing the importance of this skill for comprehending English textbooks.

Reading Comprehension and Metacognitive Awareness

Research shows a positive correlation between employing metacognitive reading strategies and English reading comprehension proficiency (Hammad, 2023). Additionally, using metacognitive strategies has been linked to improved reading comprehension achievement (Muhid et al., 2020). Furthermore, According to Rajasagaran and Ismail (2022), explicit instruction in metacognitive strategies has effectively enhanced reading skills among ESL and EFL learners. In reading, metacognition can identify proficient and incompetent readers. The ability to comprehend literary texts and derive logical conclusions distinguishes proficient readers from less proficient readers. It also allows readers to monitor their understanding and make necessary corrections (Mokhtari & Reichard, 2002).

Studies emphasized the crucial role of metacognition and inferential ability in enhancing reading comprehension (Tantowie et al., 2022). Moreover, the relationship between metacognitive reading strategies and reading comprehension,

Table 1. Levels of Metacognitive Awareness in terms of Metacognitive Knowledge (MK) and Metacognitive Regulation (MR).

Metacognitive Knowledge	N	Mean	SD	Verbal Description
Declarative	198	2.85	.427	High
Procedural	198	2.78	.550	High
Conditional	198	2.87	.487	High
Overall	**198**	**2.83**	**.488**	**High**
Metacognitive Regulation	N	Mean	SD	Verbal Description
Planning	198	2.89	.467	High
Monitoring	198	2.75	.471	High
Evaluating	198	2.86	.501	High
Overall	**198**	**2.83**	**.480**	**High**

Table 2. Levels of Reading Comprehension Skills using Reading Comprehension Assessments.

Level of Reading Comprehension Skills	Score	F	%
Very High	9 – 10	11	5%
High	7 – 8	34	17%
Average	5 – 6	95	48%
Low	3 – 4	35	18%
Poor	1 – 2	23	12%
Total		**198**	**100%**

reading. Monitoring is when readers ensure they are on the right track by checking their progress while reading. Lastly, readers assess how well they have understood the text to evaluate the success of their efforts after reading. These components of metacognition have effects on the reading comprehension skills of readers.

METHODOLOGY

This study uses a descriptive-causal approach to examine the effects of metacognitive awareness on the reading comprehension skills of Grade 7 students of Odiongan National High School. A quantitative approach was used to address this study's objectives comprehensively. Specifically, this study used multiple linear regression as the statistical tool because it determines the cause-and-effect relationships and estimates the effect of one or more continuous variables on another variable. Multiple linear regression uses a straight line to measure the relationship between a quantitative dependent variable, reading comprehension, and two or more independent variables, namely metacognitive knowledge and metacognitive regulation.

To measure the levels of metacognitive awareness skills of Grade 7 students, a modified Metacognitive Awareness Inventory (MAI) by Schraw and Dennison (1994) was adopted. However, minor modifications were made to better align the questions with the context of reading comprehension, where a Four-point Likert-type rating scale was used. Questions were based on the two components of metacognitive awareness, namely: (A) Metacognitive Knowledge (MK) and (B) Metacognitive Regulation (MR), where Metacognitive Knowledge includes (1) declarative knowledge, (2) procedural knowledge; (3) conditional knowledge while Metacognitive Regulation includes (1) planning, (2) monitoring; (3) and evaluating. On the other hand, to measure reading comprehension skills, reading comprehension assessments, consisting of multiple-

particularly in first-year EFL students, underscores the importance of metacognitive strategies in developing reading comprehension (Maryam et al., 2019).

According to Nobles and Ortega-Dela Cruz (2020), reading comprehension involves strategic processes such as metacognition and monitoring. However, according to O'malley et al. (1985), learners who do not have metacognitive approaches are not given guidance or the chance to reevaluate their progress, accomplishments, and future courses. On the other hand, Wang et al. (2009) stated that there are several advantages for students' reading comprehension and learning activities when they use metacognitive reading strategies. Additionally, Flavell (1976) consequently claimed that the theoretical framework of the metacognitive reading strategy awareness theory, supported in this study, holds that the key to reading comprehension is self-monitoring and self-regulation.

As shown in Figure 1, metacognition has two components, namely Metacognitive Regulation (MR) and Metacognitive Knowledge (MK), as stated in Schraw & Moshman's (2001) study. Under metacognitive knowledge, the following are the following: First, in declarative knowledge, readers use what they already know and notice how their understanding differs from what the text requires. Second, conditional knowledge involves choosing the right strategies to bridge this gap and adapting them to the specific situation. Next, procedural knowledge becomes evident as readers implement these strategies while reading. Meanwhile, in metacognitive regulation, planning occurs when readers prepare strategies to handle any challenges they might encounter while

Table 3. Coefficients for the Multiple Regression Analysis

Predictor	B	SE	β	t	p
Metacognitive Knowledge	1.563	0.309	0.340	5.064	<.001
Metacognitive Regulation	1.380	0.307	0.305	4.489	<.001

choice questions, were given to students after reading the passage. The results of metacognitive awareness and reading comprehension skills were interpreted using the statistical tool Multiple Linear Regression through Statistical Package for Social Sciences (SPSS). This statistical tool quantifies the effects of metacognitive awareness on reading comprehension questions.

Regarding the research methodology, the study implemented a quantitative approach for data collection and analysis with descriptive causal as the approach. Employing a quantitative framework, the sampling process used stratified random sampling to ensure unbiased representation from various grade levels. Data were gathered through reading comprehension assessments, including textual passages consisting of 10 multiple choice questions and a modified Metacognitive Awareness Inventory (MAI) consisting of four-point Likert-type rating scale questionnaires. The results of the metacognitive awareness and reading comprehension skills were interpreted using a statistical tool called Multiple Linear Regressions through SPSS to examine the effects of the metacognitive awareness on the reading comprehension skills of Grade 7 students.

RESULTS AND DISCUSSION

The first component of metacognitive awareness is the Metacognitive Knowledge (MK). Table 1 shows that Metacognitive Knowledge (MK) in terms of declarative knowledge, which involves using prior knowledge to comprehend and interpret written text, the students exhibit a mean score of 2.85 with a standard deviation of 0.427. This suggests a strong comprehension of metacognitive concepts. Similarly, for procedural knowledge, which involves knowing how to apply metacognitive strategies effectively, the students display a mean score of 2.78 and a standard deviation of 0.550, indicating a solid grasp of procedural aspects. Furthermore, conditional knowledge, which encompasses the ability to adapt metacognitive strategies to various contexts and tasks, shows a mean score of 2.87 and a standard deviation of 0.487. This shows the students' adeptness in flexibly employing metacognitive skills across different learning situations. Considering all dimensions of Metacognitive Knowledge (MK) collectively, the students achieved a mean score of 2.83, reaffirming their high level of metacognitive awareness.

Furthermore, the second component of metacognitive awareness is the Metacognitive Regulation (MR). Table 1 shows that Metacognitive Regulation (MR) in terms of planning, which involves the ability to set goals and strategies when reading, students exhibit a mean score of 2.89 with a standard deviation of 0.467, indicating a high level of planning. Similarly, for monitoring, which refers to the capacity to assess one's progress during reading tasks, students achieve a mean score of 2.75 with a standard deviation of 0.471, suggesting strong monitoring skills. Additionally, for evaluating, which involves assessing the effectiveness of learning strategies, students achieve a mean score of 2.86 and a standard deviation of 0.501, indicating a high level of evaluative ability. Considering all dimensions of Metacognitive Regulation (MR) collectively, the students achieve an overall mean score of 2.83, reaffirming their high level of metacognitive awareness in this aspect.

While the two components of metacognitive awareness, namely Metacognitive Knowledge (MK) of awareness, the reading comprehension in Table 2 illustrates the variability in reading comprehension among Grade 7 students of Odiongan National High School. A notable proportion of students demonstrate average comprehension skills, comprising 48% of the total, followed by those with high comprehension skills at 17% and very high comprehension skills at 5%.

Table 4. Correlations Between Metacognitive Awareness and Reading Comprehension

Variable	r	p	N	Result
Metacognitive Knowledge	.340**	<.001	198	Significant
Metacognitive Regulation	.305**	<.001	198	Significant

Table 5. Correlations between Metacognitive Components and Reading Comprehension

Metacognitive Component	r	p	Result
Metacognitive Knowledge			
Declarative Knowledge	.217*	.002	Significant
Procedural Knowledge	.169*	.017	Significant
Conditional Knowledge	.403*	<.001	Significant
Metacognitive Regulation			
Planning	.300*	<.001	Significant
Monitoring	.207*	.004	Significant
Evaluation	.231*	.001	

Additionally, 18% of students exhibit low comprehension skills, while 12% show poor comprehension.

Moreover, in Table 3 the Metacognitive Knowledge and Metacognitive Regulation are significant to reading comprehension with t values of 5.064 and 4.489, respectively. These two independent variables are significant at a 0.000 p-value. This means that metacognitive awareness positively affects the reading comprehension skills of Grade 7 students at Odiongan National High School.

Table 4 shows correlations between metacognitive awareness and reading comprehension. Using multiple regression analysis, the correlation table shows that metacognitive knowledge positively affects the reading comprehension skills of the students with a .340 correlation coefficient value and p-value of .000. The metacognitive regulation also positively affects the reading comprehension skills of the students with a .305 correlation coefficient value and significant at 0.000 p-value.

In addition, significant positive correlations were found between each aspect of metacognitive knowledge (declarative, procedural, and conditional) and metacognitive regulation (planning, monitoring, and evaluating) with reading comprehension, as shown in Table 5. Specifically, conditional knowledge displayed the strongest correlation coefficient ($r = .403$, $p < .01$), followed by evaluating ($r = .231$, $p < .01$), planning ($r = .300$, $p < .01$), declarative knowledge ($r = .217$, $p < .01$), monitoring ($r = .207$, $p < .01$), and procedural knowledge ($r = .169$, $p < .05$). These results suggest that a deeper understanding of metacognitive processes and effective use of metacognitive strategies are associated with higher levels of reading comprehension.

CONCLUSION

In terms of Metacognitive Knowledge (MK), the findings from this study indicate a high level of metacognitive awareness among Grade 7 students of Odiongan National High School in terms of declarative, procedural, and conditional knowledge, showing that students have strong Metacognitive Knowledge in employing metacognitive strategies. Therefore, these students possess knowledge of their own reading skills and comprehension strategies, including declarative knowledge of the reading processes, procedural knowledge of when and how to apply reading strategies, and conditional knowledge of how to execute reading strategies effectively.

Furthermore, concerning Metacognitive Regulation (MR), the findings indicate a high level of metacognitive regulation in terms of planning, monitoring, and evaluating among Grade 7 students of Odiongan National High School. It means that students demonstrate strong abilities in setting goals, assessing progress, and reflecting on learning strategies. Therefore, these students have the cognitive processes of planning, monitoring, and evaluating their reading strategies to optimize reading comprehension and address challenges encountered before, during, and after the reading process.

The findings, showing the level of reading comprehension skills among Grade 7 students of Odiongan National High School, emphasize the importance of recognizing and addressing the variability in reading proficiency. While a considerable number demonstrate strong comprehension skills, the presence of students with lower reading comprehension skills necessitates proactive intervention strategies. Therefore, acknowledging and responding to these differences in skill levels can better support students in developing essential reading comprehension skills, ultimately fostering improved academic success and overall learning outcomes.

This study concludes that Metacognitive Knowledge (MK) and Metacognitive Regulation (MR) are significantly associated with reading comprehension, with conditional knowledge being the most impactful. Planning and evaluating also demonstrate substantial influence, indicating that the ability to plan effective strategies and evaluate one's understanding is critical for reading success. These findings suggest that educational interventions to improve reading comprehension should emphasize developing students' metacognitive skills, notably their ability to adapt to reading strategies based on contextual demands. Enhancing students' planning and evaluative skills can improve reading outcomes. Additionally, while declarative knowledge, monitoring, and procedural knowledge contribute positively to reading comprehension, their impact is less pronounced. Therefore, a comprehensive approach that includes these components, though to a lesser extent, is still beneficial. By fostering a deeper understanding and effective management of metacognitive processes across all dimensions, educators can better support students in achieving higher levels of reading comprehension.

AUTHORS' CONTRIBUTIONS

C.A.V. led the study and analysis of the data. Meanwhile, P.B. advised on the implementation of the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Computer System Evaluation: Information Security for Electronic Money Transfer Services

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ABSTRACT

This research examines how various organizations address the security challenges associated with money transfer systems. It reveals that the role of payment systems in money transfers has significantly evolved, with numerous electronic payment systems now available to facilitate secure online transactions. The study also identifies key success factors for each organization implementing its security solutions. Rapid technological advancements pose substantial risks to transaction security. The research shows that payment systems have become increasingly integral to the industry, and their impact on society is considerable. These advancements are expected to benefit future studies by offering insights into technological progress in both monetary and digital transactions. A range of sources, including academic journals, conference proceedings, and online articles, were used to review the current landscape of money transfer systems thoroughly. The study emphasizes the critical role of security measures and customer awareness in safeguarding electronic payment systems. Its findings offer valuable insights for policymakers, financial institutions, and researchers working on effective security strategies for money transfer systems.

Keywords: *Money Transfer System, risk for security, success factors, security practices and processes*

INTRODUCTION

Money transfer transactions have been a subject of continuous interest as individuals transfer funds to and from various locations. Camara (2016) critically examines remittances within a typical social context, highlighting that remittances reflect strong social bonds between migrants and their families left behind in their home country. Money transfer services for domestic and international transactions are transitioning from conventional providers to digital platforms, aiming to capture market share through enhanced accessibility and more affordable options (Merritt, 2011). These evolving services have played a key role in driving economic growth, directly and indirectly, by streamlining payment processes and trade and generating substantial revenue for the service providers.

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The rapid advancements in technology present significant risks in maintaining the security and reliability of electronic money transfer systems in today's digital landscape (Seetharaman & Raj, 2011). A major challenge for developers of electronic payment systems is ensuring both security and privacy, as digital information can be susceptible to breaches during transmission or while stored on servers (Aghdami, 2012). According to Grabner-Kräuter and Faullant (2008), many potential users avoid online money transfers due to privacy concerns, necessitating security improvements to build client trust and acceptance. Gaber et al. (2016) suggest that Security Information and Event Management (SIEM) systems could address these issues. However, these systems are currently more suited for network monitoring and need enhancements in multi-layer security, scalability, and resilience. Effective solutions are required to reliably and promptly detect fraud across various channels that handle daily transactions.

This review tries to fill this learning gap by better understanding the underlying processes and practices of different companies with electronic money transfer systems to have a strong intellect of security. Specifically, this study addressed the following research questions: (a) what are the practices and processes of the

company to provide security in their transactions?; and (b) what are the success factors involving the technology used in providing security?

To explore these issues, the paper investigates four organizations involved in money transfer payment systems, focusing on their methods for managing data and transaction security. It examines the strengths and weaknesses of each organization through a qualitative approach and various case studies. These companies exemplify common practices in executing transactions within the money transfer system. The Philippines was chosen as a case study due to its representation of typical features of developing countries, particularly in the ASEAN region (Karanasios, 2008). Light and Lewandowski (2015) report that remittance inflows to the Philippines increased from $1.46 billion in 1990 to $26.7 billion in 2013, with projections of $28.4 billion for 2014. In 2013, remittances accounted for 9.3 percent of the national GDP. According to the International Monetary Fund, the Philippines ranked third in total remittances worldwide in 2012, with total official payments (classified by the IMF as BPM6) amounting to $26 billion, surpassed only by China and India. This research is anticipated to provide valuable insights for other developing nations with similar technological, socio-economic, civic, cultural, and legal contexts as the Philippines. Currently, no comprehensive study addresses the factors, practices, and processes related to the security of money transfer systems in the Philippines.

Related Works

Background of Money Transfer System

Money Transfer Definition. Bogdan (2015) defines payment as transferring something valuable from one party to another in exchange for goods or services or to fulfill a legal obligation. Historically, payment systems have progressed from the simplest barter system—where goods or services are directly exchanged—to modern methods such as E-cash and electronic payment systems. Today, traditional payment methods for individuals include cash, checks, debit cards, credit cards, bank transfers, and online payments.

The SWIFT network (Society for Worldwide Inter-Bank Financial Telecommunication), which became operational in 1977, is a global payment system that allows banks to automate international payments, statements, and other banking communications (Bogdan, 2015). Operating in over 200 countries, SWIFT is the largest international payment network, encompassing more than 10,000 financial institutions. It offers a secure and dependable platform for cross-border transactions, facilitating global financial operations such as payments to international employees and contractors.

Although SWIFT is not a bank or financial institution, it serves as a messaging platform for banks to transmit transaction information. Based in Belgium, SWIFT ensures secure financial communications for its member institutions.

Banks like First Bank and United Bank for Africa use the SWIFT system to receive international money transfers in Nigeria. However, these banks cannot send funds abroad due to regulatory constraints. The functionality of electronic fund transfers within Nigeria heavily relies on the use of local area networks (LAN) and wide area networks (WAN) (Ekwueme et al., 2011). Koskosas (2011) highlights that electronic fund transfers offer significant benefits to clients, including greater convenience and reduced transaction costs. However, these advancements also present new challenges for banks, particularly in maintaining the financial system's security.

Trends and Risks of Money Transfer System. Tools, methods, and principles are necessary to transfer assets among participants. This constitutes a payment system to ensure that financial transactions are completed reliably, securely, efficiently, effectively, and accessibly (Mbuguah & Karume, 2013). Payment systems all have hazards, yet they endeavor to utilize electronic store exchange. Risks for Payment systems involve:

Legal: The risk of loss arises when legal frameworks do not support the system's rules and contracts cannot be enforced.

Credit: The risk that a counterparty fails to meet their obligations fully.

Liquid: In countries where non-bank entities issue e-cash, regulators often address concerns by requiring these issuers to maintain liquid assets equivalent to the total value of customer deposits (i.e., the total and outstanding electronic value issued, referred to as "e-float"). The risk here is that a counterparty may not fulfill its obligation on time but might settle later (DuPont, 2019).

Operational: The risk that human errors, malicious attacks, or deficiencies in the IT infrastructure could lead to financial losses.

Systemic: The risk of one participant's failure to meet their obligations could trigger a chain reaction affecting the entire financial system.

Reputation: The risk that the payment system's inability to meet its requirements effectively and reliably may result in a loss of trust from clients and counterparties.

The authors suggest that while these risks have been present in traditional payment systems, they are even more critical in electronic fund transfers, especially within Internet banking (DuPont, 2019).

In recent years, the banking sector has made considerable progress in electronic communication with customers, driven by the increasing number of Internet users. This advancement in electronic distribution channels has enhanced customer access to banking products and services. However, it has also introduced new risks, such as the potential for data breaches, unauthorized account access by hackers, and theft of customer funds. Securing electronic banking systems is a major challenge for bank management worldwide, as evidenced by numerous successful attacks on commercial banks and their clients. An essential part of tackling this issue involves raising customer awareness about security measures and potential threats (Belás et al., 2015).

Proposed Security Measures for Money Transfer. Security is a critical issue in business banking and is associated with various activities. Ensuring banking security involves multiple factors, as business bank security is a complex system encompassing various elements such as capital management about credit, market, and operational risks (i.e., capital adequacy policies). Effective security measures focus on operational risk, defined as the risk of loss resulting from internal processes, human errors, or external conditions (Grubicka, 2015).

In recent years, the rate of cybercrime has gradually increased. These criminal activities target digital security and data and invade personal information through electronic banking systems. Many criminals penetrate banking databases by breaching security measures to steal clients' personal details (e.g., account information, card details, user IDs, passwords) illegally. Once criminals obtain this personal information, client accounts become vulnerable to attacks. This poses a risk not only to customers but also to the banks themselves. Common authentication methods, including passwords, user IDs, identification cards, and PINs, face several limitations. Passwords and PINs can be unlawfully acquired through direct observation or other illicit methods (Islam, 2015).

The Internet Banking Customer Satisfaction Model

The IBCS (Internet Banking Customer Satisfaction) model identifies six key components: content, accuracy, order, ease of use, timeliness, and security. This model emphasizes that internet security is a critical factor for customers. The study by Chen et al. (2012) reveals that content and order significantly influence customer satisfaction, highlighting their prominence within the IBCS model. The relative importance of the other components is ranked as follows: accuracy, ease of use, timeliness, and security. This ranking suggests that content, order, accuracy, and timeliness are crucial for providing access to sensitive financial information through Internet banking.

Additionally, ease of use and security are important areas where banks should focus their investments to attract customers to their e-services. Customers generally expect a user-friendly interface and robust security measures for online transactions.

Encryption and Decryption. E-money transfer is vulnerable to attacks by hackers who use different malware and viruses to alter the transferee information and the transfer amount. According to Al-hamami et al. (2012), there are three main phases and layers of solution for fraud prevention: (1) Lock the browser, (2) Encryption, and (3) Decryption. These solutions are combined to provide the best results in preventing fraudulent attacks. The study found that the banking side plays a significant role in the detection process by checking whether the transaction process successfully transferred the amount efficiently and without error or inquiring about any failures from both the bank and customer sides.

Today, many customers prefer making electronic payments instead of cash or checks in person or via mail. Various electronic payment systems have been developed to facilitate secure Internet transactions. To ensure the security of these transactions, two cryptographic techniques are utilized as part of electronic payment frameworks. One technique is used to encrypt and decrypt the transmission to the recipient, while the other is a public key infrastructure that involves both a private and a public key (Camenisch et al., 2015).

Biometric-based authentication and identification systems

Biometric-based validation and identification systems are emerging as effective solutions to address the security and privacy challenges anticipated in the coming years. Biometrics offers a viable approach for automatically identifying individuals based on their physiological or behavioral characteristics, providing a better solution for the growing security demands of our information society. As biometric sensors become more affordable, the public will likely recognize biometrics as an effective method to prevent fraud, making this technology increasingly prevalent in transactions requiring authentication (Fatima, 2011).

Practices and Solutions for Different Types of Money Transfer Methods

These days, the most utilized electronic installment frameworks are the accompanying Smart card-based e-installment framework, Online segment framework, Mobile telephone-based layer framework, E-Wallet Payment System, and E-Check Payment System. New payment types are continuously discovered, and additional methods are continually developed yearly.

Smart card-based electronic payment system

The smart card is a plastic card embedded with an integrated circuit chip, providing users with flexibility and data portability. It combines features of plastic and magnetic cards used for various identification purposes into a single card, allowing access to multiple services, networks, and the Internet. This versatility enables its use in numerous functions and applications (Sumanjeet, 2009).

Online payment system

Online payments, which depend on Internet banking, involve transferring funds or purchasing through the Internet. Customers can transfer money to third parties from their bank accounts or use credit, debit, and prepaid cards for online purchases. The online payment system enables clients of financial institutions to perform financial transactions on secure websites managed by these institutions, which may include retail banks, virtual banks, credit unions, or building societies (Uddin & Akhi, 2014).

Mobile Phone-Based Payment System

Goyal et al., (2012) explored how mobile phones can be used for various transactions. Consumers can make payments by sending SMS messages, entering PINs, and using WAP for online transactions. Alternatively, they can manage different aspects of their transactions via their mobile devices. With advancements in communication technologies, it is anticipated that consumers will soon be able to use infrared, Bluetooth, NFC, and other technologies to transmit complete transaction data, enabling secure and efficient payments directly from their mobile devices. These mobile devices include smartphones, PDAs, wireless tablets, and other gadgets that connect to the mobile network to facilitate transactions.

Money Transfer Mechanism

In the remittance transfer process, beneficiaries receive cash through a remittance company, which ensures that recipients can collect their money from one of the company's branches or affiliated networks. Remittance transfers are prevalent in the Philippines, where the industry is advanced and competitive. Key aspects of the remittance payment process include:

Database Creation: The database may be simple, containing only names, the amount sent, and tracking numbers. However, banks may request additional information. Providers typically require an Excel file format for system uploads (Poisson, 2011).

Identification and Authentication: Remittance companies require official identification, listing 19 acceptable forms, including voter identity cards and barangay certificates, to withdraw cash. They may also accept NGO IDs (excluding banks). At the point of payment, recipients must present the tracking number and provide a signature. Procedures are in place to assist illiterate recipients and to handle minor discrepancies between the declared name and ID spelling, as long as these do not alter the recipient's gender. Significant discrepancies prompt contact with the agency for guidance.

Currency: Cash or e-money provided through G-cash can be used as the voucher.

Point of Payment (PoP): Payments can be made at the provider's branch or through a partner network location (e.g., a store). Some providers establish temporary PoPs in areas without existing facilities.

Reporting and Reconciliation: Electronic reporting and reconciliation are available daily or in real-time, with an audit trail that complies with financial and anti-money laundering regulations.

Promotion, Training, Communication, and Customer Support: Beneficiaries receive a brief session to obtain their tracking number and understand the pick-up process. Providers are developing communication materials and offering customer support through a call center for efficient complaint resolution. Technical assistance, such as an account manager, may be provided to work with NGOs.

The remittance process is typically quick, straightforward, and cost-effective, although the aid agency may face challenges as it needs to generate a separate order for each beneficiary. This payment method is designed to be user-friendly and convenient for recipients, especially those less familiar with complex systems. However, beneficiaries are required to visit a branch to collect their funds.

METHODOLOGY

This study employs a multiple case study methodology (Dubé & Paré, 2003; Yin, 2003) combined with a qualitative interview approach (Myers & Newman, 2007) to assess security measures in selected companies and to promote a reliable system mechanism. Interviews are structured interactions between interviewers and respondents, shaped by the specific contexts and conditions in which they occur (Fontana & Frey, 2000). The study aims to thoroughly investigate how each company's money transfer system operates to understand how they implement safety solutions against threats. Qualitative interviews are a prevalent and crucial tool for data collection in qualitative research (Rubin & Rubin, 2005).

The use of multiple case studies involving different types of organizations using similar types of a payment system in their money transfer is precious for this study.

Table 1. The participants for multiple case study

Company	Classification of remittance	Designations
A	International	Supervisor, Operator,
B	Local	Software Maintenance, Operator
C	International	Supervisor
D	Local	Operator

There should be a development of a more wide-range understanding of the implementation, particularly concerning the practices and processes of their solutions for security. Multiple case studies are favored over single case studies because findings from multiple cases generally provide more robust conclusions than those from a single case alone (Yin, 2003). This rationale underpins the decision to use a multiple-case study approach in our research. Regarding the use of qualitative interviews, Schostak and Barbour (2005) note that this method allows for in-depth exploration of a specific topic, offering insight into the meanings that interviewees attribute to the subject matter.

Several companies using money transfer system transactions between the Philippines and other international remittance centers were selected for the multiple case study. There is an equal presentation of local and international remittance centers to compare their transactional mechanism. Presented in Table 1 is a brief descriptor of the interviewees from the four cases. Interviews were conducted with the first participants concerned with the money transfer mechanism within the cases. This study employed semi-structured open-ended questions during the interviews and documented them upon full consent and agreement of the members.

This study also involved transcribing interviews to perform multi-level qualitative analysis, aiming to deeply understand the content through systematic coding and identifying themes or patterns (Hsieh & Shannon, 2005). Neuman (2007) defines a unit of analysis as an individual, a group, an organization, or a particular aspect of social life under investigation. This concept is crucial for data collection and analysis, including observation, empirical measurement, and concept development. In this research, four companies are utilized as the units of analysis, providing a range of money transfer system mechanisms that serve as the foundation for adequately addressing the research questions.

This study addresses consistency by following the guidelines Yin (2003) and Neuman (2007) established. To ensure construct validity, four techniques are employed: triangulation through multiple sources of evidence, comprehensive literature reviews on relevant topics, and having interviewees review the case study reports. These methods collectively ensure the accuracy

of transcription and translation, and they establish a chain of evidence through a case study repository. External validity is addressed using the replication logic technique, which enhances the generalizability of the study's findings. Internal validity is ensured through the careful selection of cases and interviewees, rigorous data collection procedures, and the appropriate application of theory and literature to explain the money transfer system and remittance phenomena. The internal validity is tested to confirm that the identified causal relationships are broadly applicable.

To ensure reliability in this review, a contextual analysis approach is used for data collection, a case study repository is employed to store all research data, and a pilot study is conducted to validate the interview questions. Neuman (2007) recommends the use of a pilot study as a method to enhance the reliability of measures. Two preliminary reviews were conducted with remittance centers to assess the feasibility of examining the research topic across various organizations using money transfer systems.

RESULTS AND DISCUSSION

The following describes the practices and processes for securing transactional methods for each company's money transfer system, as well as the success factor of each company in implementing these transactions.

Transaction Controls

To prevent the network from being exploited for unauthorized payments, various controls are implemented:

A. Real-Time Transaction Controls: The company employs advanced transaction controls designed to restrict the amount of funds and the number of transactions in areas known for high levels of human smuggling.

B. Transaction Monitoring and Regulatory Reporting: Transactions are continuously monitored to detect suspicious activities and to meet regulatory reporting requirements.

C. Interdiction and Blocking: In collaboration with law enforcement, efforts are made to block individuals suspected of illegal activities from accessing the service.

Prevention of Fraud

Although technology offers numerous advantages, it also presents increased opportunities for fraudsters to deceive individuals through email, websites, and phone calls. Scams can target anyone, including those seeking companionship, aspiring lottery winners, online shoppers, and job seekers. To combat these fraudulent activities and stay ahead of emerging scams, companies adopt a multifaceted strategy: enhancing consumer

awareness, providing training for their agents or operators, investing in advanced technological solutions, and collaborating with law enforcement agencies.

A. Engaging their agents and operators in proper training against fraud.

Agents receive training to recognize potential fraud victims. If an agent suspects a transaction may be fraudulent, they are instructed to refuse or report it for further investigation. As frontline representatives in customer service, agents are equipped with various tools and techniques to prevent fraud. This support includes access to training resources and materials such as fraud kits, newsletters, fraud alerts, and an online Agent Resource Center.

According to Company C (Branch Supervisor):

"Our company offers training for agents to recognize signs of consumer fraud and authorizes them to decline transactions they suspect are fraudulent. We also run a reward program, the Eagle Eye Award, to recognize agents who successfully identify and prevent fraud. Additionally, we monitor agent performance and review consumer fraud complaints to assess whether agents require further training, additional oversight, or potential disciplinary actions such as suspension or termination. These evaluations have improved our programs, including enhanced transaction controls and increased training and support where necessary."

B. Investing in Fraud-Prevention Technology

Senders often prioritize finding the most cost-effective and convenient method when transferring money. As a result, the reliance on physical infrastructures is decreasing, with many money transfer services exploring new technologies like the Internet and mobile phones as viable alternative channels. A typical process for these transactions involves sending SMS notifications to inform recipients of the control number generated by the system.

According to the Company A (Supervisor):

"Our system technology plays a crucial role in enhancing our security measures. We use various system controls to monitor transaction activities, ensure thorough consumer due diligence, and comply with legal and internal recordkeeping and reporting requirements. Many of these controls are activated when transactions reach certain currency thresholds."

C. Fraud prevention through identification and authentication

For receiving transactions, the receiver must provide a valid ID for identification. Fail to provide such identification, cannot access their transaction. This aims to identify the profile of the receiver properly.

According to Company Operator/Agent (Company B):

"There must be a proper credentials and proof of the profile of the receiver to allow us to identify them that they are the right person to receive the money."

According to Company Operator/Agent (Company D):

"We make sure that we deliver the money to the right person by asking them to provide valid ID's or NSO Birth certificate."

Empowering Consumers through Information

A. Pricing and Transparency

Various external stakeholders consider pricing a critical factor. When evaluating pricing, it is essential to provide solutions for small and medium-sized businesses, universities, and other organizations, including options for bill payments and cost-effective prepaid cards. However, consumer-to-consumer money transfer services often attract the most scrutiny regarding pricing.

According to Company C (Branch Supervisor):

"To ensure consumers can make well-informed decisions, we offer several methods for disclosing fees and foreign exchange rates. Our agents provide this information at the point of sale prior to completing the transaction, and senders receive a receipt detailing both the fees and exchange rates associated with their transaction."

B. Transparency in Marketing

The company is committed to adhering to all regulatory obligations, which include implementing appropriate security measures to safeguard personal information from unauthorized access and misuse.

C. Data Security and Privacy

The Privacy and Records Management team is tasked with developing policies to protect consumer information. The handling of personal data is governed by privacy regulations that can vary by country and, within a country, by state.

The standard procedure for remittance transfers across companies involves several key steps. First, the sender provides the funds and recipient information. The remittance company or the sender then issues a tracking number to the recipient. Finally, the recipient can collect the cash from any branch by presenting the tracking number and a valid ID.

The process further includes contracting with a remittance company, funding the company account, setting up a bank account, and uploading a recipient list. The tracking numbers provided to recipients facilitate the pick-up process and communicate relevant details to them.

In the Philippines, remittance transfers are prevalent, and the industry is characterized by sophistication and competitiveness. Agencies utilize this method for secure cash transfers, with the company managing the disbursement and ensuring discretion by conducting transactions in closed branches at the recipient's convenience.

Key operational considerations include ensuring branch accessibility, although some providers offer mobile remittance services or temporary points for cash distribution. Recipients present their tracking numbers and ID at the branch, where the provider disburses the cash, offers customer support, and maintains communication with the agency. Reports on withdrawals are provided daily or in real-time. This method is typically fast, simple, and cost-effective. However, setup and contracting processes may be prolonged, particularly if remittance providers lack experience working with humanitarian agencies. Despite this, the system is designed to be user-friendly for recipients, though it requires them to visit a branch. The results indicate that the remittance transfer process is streamlined to enhance convenience and security. Tracking numbers and ID verification ensure that only authorized recipients can access the funds, which aligns with best practices in financial security, as noted in the literature (Al-hamami et al., 2012). This method also leverages existing branch networks to facilitate cash distribution, reflecting a practical approach to remittance that balances efficiency with accessibility.

The prevalence of remittance transfers in the Philippines highlights the industry's adaptation to local needs and competitive dynamics. According to Poisson (2011), tracking numbers and recipient identification are crucial for preventing fraud and ensuring accurate disbursements. This is consistent with findings from previous studies that emphasize the importance of secure and transparent processes in financial transactions (Chen et al., 2012; Sumanjeet, 2009).

Despite the need to travel to a branch, the convenience of the remittance process for recipients underscores the system's effectiveness in providing reliable and secure cash transfers. However, the challenges associated with setup and contracting, particularly for humanitarian agencies, suggest that further improvements could enhance the system's efficiency. These findings align with the observations of Belás et al. (2015), who noted that improving operational aspects and streamlining interactions with different types of organizations can further optimize remittance services.

The study's results confirm the effectiveness of the remittance transfer process while also identifying areas for potential improvement. The combination of technological and procedural measures ensures security and efficiency, although the integration with humanitarian agencies could benefit from additional support and streamlined processes.

CONCLUSION

The research was conducted, designed, analyzed, and interpreted independently, primarily focusing on examining security processes and practices in money transfer systems in the Philippines. It provides a detailed look at the technological and procedural measures selected companies adopt. It offers insights into how these systems operate, their impact on consumer trust, and implications for future research and practice. There are no conflicts of interest related to this study, and it was conducted without financial or personal relationships influencing the outcomes. Ethical research practices were strictly followed, including obtaining informed consent from all interview participants and ensuring their confidentiality and anonymity. The study complied with relevant ethical guidelines and institutional review board requirements, maintaining integrity and respect for participants' rights.

This study focuses on the security processes and practices adopted in the money transfer systems within the Philippines, offering insights valuable to academic and professional fields. Initially, the study outlines the mechanism of money transfer systems, providing background information on the systems under review. It then details the processes and practices of selected companies using these systems, emphasizing how their security implementations and transaction controls contribute to their effectiveness in providing reliable cash transfer services.

The findings offer significant insights into these systems' operations and the various methods used to secure transactions, including technological and external strategies. This understanding aids consumers in developing trust in their chosen payment systems. Moreover, the study is beneficial for payment system operators, as it underscores the importance of continuous process improvement, staying updated on emerging trends and risks, and devising effective solutions to address them.

Moreover, the interviews conducted in this study reveal that the money transfer payment systems have significantly evolved within the industry. Future research could explore how these systems impact society by advancing technology in monetary transactions and promoting paperless transactions. Given that our study involves a multiple case study of four organizations, it is important to interpret the findings within their contexts. The study prioritizes a detailed understanding of the experiences of the participating organizations over statistical generalization. Notably, the case study participants have effectively adopted digital advancements, enhancing the security and efficiency of their money transfer systems.

AUTHORS' CONTRIBUTIONS

The authors confirm equal contribution to the paper.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Effect of Science Learning Coach on Student Self-Regulation Skills

Numerico Lloyd B. Fabrigar

ABSTRACT

To improve students' self-regulation skills toward accomplishing science-related tasks and workloads, this study was designed to determine the effect of a science learning coach as an intervention program on student self-regulation skills. This quasi-experimental study determined the mean pre-test and post-test performance of Grade 10 students under the Special Science Curriculum. This research used a non-random purposive sampling procedure to select the respondents. The experimental group participated in the intervention program throughout the 3rd Quarter of SY 2023–2024, per the Department of Education calendar. The research instrument used in this study was a 35-item test questionnaire aimed at measuring the self-regulation skills of the respondents. The data were analyzed using Statistical Package for Social Science (SPSS) using t-test for independent samples to compare the pre-test and post-test mean scores before and after the implementation of the intervention program, respectively, and using paired samples t-test to determine the difference between the pre-test and post-test mean scores of the experimental group. Also, an analysis of covariance was used to determine and evaluate whether the means of the dependent variable are equal across levels of a categorical independent variable. This research study revealed a significant difference in terms of pre-test and post-test mean scores before and after the implementation of the intervention program using t-test for independent samples. This also showed no significant difference in the experimental group's pre-test and post-test mean scores using a t-test for paired samples. However, using pre-test mean scores as covariates, it was revealed that there is a significant difference in the post-test results of tests between subjects.

Keywords: *self-regulation skills, science learning coach, intervention programs*

INTRODUCTION

In today's fast-paced world, various external factors often compromise learning. Many students struggle with time management and organization, and certain groups are more vulnerable than others to these issues. However, these challenges do not just affect pupils who have been diagnosed with learning problems. These issues are widespread, and the increasing availability of technology seems to exacerbate the problem for students (Garhammer, 2002, as cited by Pellas, 2014). With these, independent learning becomes imperative.

According to Zimmerman et al. (1996, as cited by Pellas, 2014), independent learning requires managing time, an essential strategy. Additionally, it is shown that in the absence of efficient study time management, students often make learning judgments based on expediency since they lack the time to carry out self-regulation treatments. Therefore, pupils must become proficient in time management to apply study skills and autonomous learning methodologies.

Stress reduction, a stronger sense of control, and increased life and work satisfaction correlate with effective time management and allow students to finish tasks and use self-regulation techniques necessary for autonomous learning (Velencia-Vallejo et al., 2019).

Students who lack effective time management skills frequently put off and postpone finishing their assignments and other obligations, leading to procrastination. It is the act of putting off or failing to complete a task even though one considers it a high priority. Knowing what needs to be done but not wanting to do it leads to it. The skill to employ self-control strategies and regulate procrastination are prerequisites for delaying the satisfaction of instant gratification and controlling procrastination (Graziano et al, 2015). The most common situations where procrastination is used are when a person finds a task

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┌─────────────────────┐      ┌──────────────────────────┐      ┌─────────────────────┐
│                     │      │ Intervention program:    │      │                     │
│ Self-regulation     │      │                          │      │ Self-regulation     │
│ skills              │ ───▶ │  a.  Science Learning    │ ───▶ │ skills              │
│ -Pre-test           │      │      Coach               │      │ -Post-test          │
│ result              │      │  -   Scheduler and       │      │ result              │
│                     │      │      Reflection Notebook │      │                     │
└─────────────────────┘      └──────────────────────────┘      └─────────────────────┘
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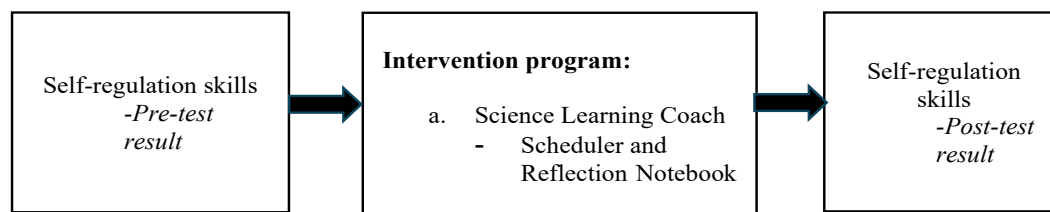
Figure 1. Conceptual framework of the study

tough or overwhelming, unpleasant, or dull. When working on reasonably challenging projects, students are significantly more likely to put off doing them than when doing ordinary homework or going to class. Students who struggle with their studies are more likely to put things off (Bembenutty, 1999; Wolters, 2003, as cited by Broadbent and Poon, 2015).

Independence to do tasks also plays a big role in the learning process. According to Bakir (2014), independence refers to the degree of control students have over their learning environment and style.

With these factors, metacognition skills are critically important to students' academic success because this has a significant impact on the acquisition, comprehension, retention, and application of what is learned (Lichtinger & Kaplan, 2015). Metacognition is defined as "cognition about cognition" or "thinking about thinking". It is an awareness and understanding of one's thought processes. Additionally, this includes the capacity to consciously reflect on and act on one's knowledge of cognition to adjust or modify one's thought processes and methods (Flavell, 1976, as cited by Blalock et al., 2015). For one learner to succeed, learning reflection and learning management are important in learning and development (Lehmann et al., 2014). Learning reflection and learning management belong to the metacognitive abilities that learners must possess. According to Chang and Chang (2015), developing metacognitive abilities is about acquiring specific learning strategies and not just simply becoming reflective learners. Independent learning requires a high level of metacognitive skills for students to succeed. Metacognitive skills allow students to be more mindful of their performance, accomplishments, reasons, and ways of gaining and developing the skills they are learning, which are essential in various situations they will face.

Figure 1 shows the conceptual framework of this study. The intervention program is perceived to be effective in improving students' self-regulation skills.

One of the goals of this study is for the students to gain independence in their studies. According to one explanation, independence refers to how much influence students exercise on the situation and approach. It is the sole element of the intricate relationship between several elements that make up the educational process (Montroy et al., 2016).

Objectives of the study

This quasi-experimental study was conducted to describe, assess, and analyze respondents' pre-test and post-test scores before and after the implementation of the intervention program.

Specifically, this study aimed to answer the following: (1) is there a significant difference between the pre-test and post-test mean scores of the two groups of respondents before and after the implementation of the intervention program?; (2) is there a significant difference between the pre-test and post-test mean scores of the experimental group before and after the implementation of the intervention program?; and (3) will the intervention program improve the self-regulation skills of the students after its implementation using mean pre-test scores as covariates?

Synthesis of the review of related literature and studies

Independence in the context of the learning process

Students' degree of control over the setting and mode of their education has been referred to as their independence (Komarraju & Nadler, 2013). It is but a small portion of the intricate interactions between several elements that make up the learning process.

According to Komarraju and Nadler (2013), one of adult education's most often mentioned goals must be to support learners' capacity to plan and carry out their education independently. Some educators have considered this to be an equally vital goal, but Short et al. (2016) suggest that it is the ability to make decisions free from outside pressure or constraints. This includes the freedom to select one's learning objectives, activities, and assessment techniques. The person is free to choose without being forced to do so because they know these options. This is the freedom to determine what, when, and where to learn, as well as the ability to analyze one's learning requirements and create one's learning objectives.

Independent Learning

Students' perception of the need for change is a prerequisite for developing independent learning skills. Students will not be incentivized to break long-standing habits or modify their approach unless they see this requirement and want to change. Studying is deliberate, not incidental. It is not under the authority of an adult; instead, it is autonomous and independent. For most students, developing independence requires instruction in both tactics and approaches. However, according to Lichtinger and Kaplan (2015), kids hardly ever acquire the self-monitoring abilities required for the best academic achievement unless they are taught tactics. Consequently, teaching self-regulation rather than only particular study techniques is now advised. (Zimmerman et al., 1986, as cited by Lichtinger and Kaplan, 2015).

According to Broadbent and Boon (2015), self-regulated students actively and independently direct their education and refresh their knowledge as needed. Developing self-regulation abilities and providing opportunities for lifelong learning should also be top priorities in school. It has been discovered that self-regulation techniques and guided instruction are more crucial than natural aptitude when people are learning chess, computer programming, sports, music, typing, and writing. (Zimmerman et al., 1996, as cited by Lichtinger and Kaplan, 2015). Similar techniques are used when academically successful students study on their own. They self-regulate their motivation, emotions, behavior, time management, mental processes, and context to optimize their learning. As they gain knowledge, they put strategies into practice, assess their effectiveness, and adjust their tactics based on their performance (Ifeanyi & Chukwuere, 2018). Self-regulatory mechanisms—specifically, organization, record keeping and monitoring, record review, and environmental management—predict academic success with 96% accuracy. (Blalock et al. 2015 quoted Zhou et al., 2001). Additionally, student characteristics interact with social and instructional aspects to create a more expansive dynamic system (Hood, 2015).

Self-regulation

Self-regulation involves at least three phases (Alvi & Gillies, 2015): preparation, performance, and appraisal. Planning, goal-setting, task description, analysis, and the choosing of a strategy based on attitudes like self-efficacy, outcome expectations, valuing, and intrinsic motivation are all components of preparation. Performance consists of goal-setting, applying strategies, monitoring and modifying strategies, self-monitoring, attentional focus, self-recording, self-experimentation, and self-control. The last stage, known as assessment, includes self-reflection, self-judgment, performance evaluation, performance feedback, and self-satisfaction. A Successful learner controls their motivation and emotions during each of the three stages of self-regulation. (Zimmerman et al., 1996, as cited by Lichtinger and Kaplan, 2015). In phase one, preparation, the learner takes ownership of their education and adopts effective goal orientations and attributions for both success and failure. In the second phase, known as the performance phase, the learner observes and practices strategies to maintain motivation and regulate emotions. During the evaluation phase, which is the third stage of the learning process, the learner evaluates their motivation and feelings from the experience and applies those insights to modify their future objectives, attitudes, and attributions.

Self-regulated learners include self-regulation techniques in their time management and behavior. During planning, individuals break down more complex assignments into smaller, more manageable tasks, set goals, and schedule their time. During the performance phase, individuals use self-observation to monitor their actions and manage their innate procrastination tendencies. During the performance evaluation stage, they take stock of their actions and apply the insights they gain to modify their conduct and self-care techniques going forward. In addition, self-regulated learners organize, track, evaluate, and manage the environmental elements that influence their learning (Graziano et al., 2015)

Self-regulated students ensure they eat healthily and have the proper vision and hearing correction for the tasks at hand. They get enough sleep since sleep deprivation impairs one's capacity to concentrate, regulate behavior, and learn. (Lehmann and Ifenthaler, 2014). During the learning sessions, students also consider any physical aspects that might have helped or hurt their performance. These strategies are influenced by the learner's context, which consists of the learning environments created in the classroom, school, and home and the social context provided by instructors, parents, and classmates (Li et al., 2016).

Social cognition is the main process that develops the capacity for self-regulation. (Bandura, 1986, as cited by Pellas, 2014). The child first understands key strategy elements by closely observing their parents, siblings, peers, and teachers exhibiting self-regulation. The youngster mimics similar tactics while being guided by someone else. so gaining the capacity to regulate motivation, feelings, thought processes, actions, and behavior in controlled environments.

Self-regulation strategy in managing distractions

Since distraction prevents the attentional selection and processing of appealing stimuli and the behavioral implications of these stimuli, it can be a very helpful self-regulation technique. (Montroy et al., 2016).

However, distraction will not help with the problem of self-control. Short et al. (2016) state that maintaining a high cognitive load once a strong desire has already been aroused may make it more difficult to resist temptation (like chocolate cake) and stick to long-term objectives (like dieting). This could be because cognitive load hinders self-control attempts (top-down) rather than the emotive reactions (bottom-up) that create temptation.

Thus, the working memory load may paradoxically impact self-regulation depending on when the distracter activity is finished. Traumatic memory intrusions can be reduced by reducing the working memory load during the consolidation of emotional memories (Broadbent & Poon, 2015). This distinguishes between two aspects of mindfulness: attention regulation, which is defined by a greater level of top-down control over attention, and attention quality, which we refer to as the mindful attention perspective.

METHODOLOGY

Research Design

The study employed a quasi-experimental group pre-test and post-test methodology, and participants were not paired off at random into two groups. Through experiments in which the intervention is not allocated randomly, quasi-experimental studies assess the relationship between an intervention and a result. Furthermore, quasi-experiments are a subset of non-studies that mimic the experimental design of genuine, randomized experiments but do not use random assignment.

Similar to the control group designs for the pre-and post-tests, implementing a science learning coach as an intervention program was introduced to the two groups of respondents. Pre-tests and post-tests were administered to both groups to assess their similarity before and after the intervention program.

Research method

A two-group, quasi-experimental pre-test and post-test design was used in this investigation. Empirical studies that establish the causal effects of an intervention on the target population are known as quasi-experimental studies. Usually, it enables the researchers to regulate the allocation to the treatment condition by employing a different criterion than random assignment. The researcher utilized the quasi-experimental research method through pre-tests and post-tests to determine the effect of the science learning coach as an intervention program to improve the students' self-regulation skills.

Research locale and time of the study

The setting of the experimental investigation at Odiongan National High School, Brgy. Dapawan, Odiongan, Romblon, Division of Romblon. Odiongan is one of the municipalities on Tablas Island, the largest among the islands of Romblon.

Population and samples of the study

The study samples were the 2 sections of Grade 10 students under the Special Science Curriculum from Odiongan National High School, with 20 students in each section.

To choose the control and experimental groups for the study, the researcher pre-tested the participants using the self-regulation abilities questionnaire.

Since the respondents to this study are minors, written parental approval was obtained before conducting the study. They received guarantees that all information and data collected will be utilized exclusively for this study and in compliance with RA 10173, often known as the Data Privacy Act of 2012.

Research Sampling Procedure

This research work used non-random purposive sampling to determine the effect of a science learning coach as an intervention program to improve students' self-regulation skills. his method was chosen because the respondents were intentionally selected based on their pre-test self-regulation skills. Forty students made up this quasi-experimental design: twenty for the experimental group and twenty for the control group. The intervention program was presented to twenty pupils in total.

Formulation of research instrument

A 35-item test that the researcher created to measure the student's abilities in self-regulation was the research tool utilized in this study. To measure the self-regulation skills of the respondents, a Likert Scale with seven (7) alternative ratings was adapted: 7 – Very True For Me, 6 – Moderately True For Me, 5 – Slightly True For Me, 4 – Neutral, 3 – Slightly Not True For Me, 2 – Moderately True For Me, 1 – Not All True For Me.

Validation and reliability of the instrument

The instrument was given to specialists for a reliability test and content validation to determine its validity and dependability. Additionally, 150 students who were not study participants participated in a pilot test of it.

Data gathering procedure

The Odiongan National High School Office of the School Principal was consulted to obtain permission to conduct the study. To gauge the students' abilities in self-regulation, the researcher gave the target respondents the pre- and post-tests, respectively, before and after the intervention program's start.

Table 1. Pre-test and post-test mean scores of the control and experimental groups

Test	Group	Mean	StD	N
Pre-test	Control	5.22	.50077	20
	Experimental	5.69	.64643	20
Post-test	Control	5.16	.55691	20
	Experimental	5.83	.72470	20

Data processing and analysis

The pre-test was given to the target groups by the researcher to identify the control and experimental groups for the study. Independent samples t-test was then administered to determine the difference between the pre-test mean scores of the 2 groups before the implementation of the intervention programs. After the study's control and experimental groups were identified, the experimental group underwent an 8-week intervention program throughout the entirety of the third quarter of the 2023–2024 academic year. The 8-week duration of the intervention program is supported by a quasi-experimental study conducted by Blancia and Fetalvero (2021), who conducted quasi-experimental research and employed an intervention for a duration of 8 weeks. Another quasi-experimental study conducted by Power et al. (2017), who tested the impact of the intervention on student achievement of the students conducted their data collection for a duration of 2 weeks. Mirhosseini et al. (2018), who tested the effectiveness of self-regulation learning skills on motivational and academic variables among students, provided the students with a self-regulation training program in 12 sessions of 1 hour, 12 hours in total, the entire duration of the intervention.

After the intervention program's implementation, the researcher gave the post-test to the two groups. An independent samples t-test was used to find the difference between the post-test mean scores following the intervention program's execution. A paired samples t-test was used to ascertain the difference between the experimental group's pre- and post-test mean scores following the execution of the intervention program. Additionally, pre-test mean scores were used as covariates, and analysis of covariance (ANCOVA) was used to assess whether the means of the dependent variable were equivalent across levels of a categorical independent variable.

FINDINGS AND DISCUSSION

Table 1 shows the descriptive statistics of the pre-test and post-test mean scores of the samples in the control and experimental groups. The pre-test and post-test have the same number of students, with a total sample of 40. The pre-test mean score of the control group is 5.22 with a standard deviation of .50077, while the experimental group is 5.69 with a standard deviation of .64643. As for the post-test, the control group's mean score is 5.16 with a standard deviation of .55691, while the experimental group is 5.83 with a standard deviation of .72470.

Table 2 shows the result of the independent samples t-test for the pre-test and post-test mean scores of control and experimental groups. Before the Analysis of Covariance, the test for homogeneity was first established using a t-test for two independent samples, which resulted in a significant value of 0.014, lower than a significant value of 0.05. This implies a significant difference between the two groups regarding pre-test mean scores, indicating different levels of self-regulation skills.

The initial result is supported by Verstege et al.'s (2019) study, which examined the relationship between students' perceived levels of self-regulation and their associated learning behaviors and outcomes in a virtual experiment environment, supports the idea that students' initial levels of self-regulation skills vary depending on what they already know. Students in the study were categorized as having high, medium, or low perceived levels of self-regulation skills. Additionally, this study demonstrated that those with limited self-regulation skills exhibited the lowest level of engagement and the highest level of optimal learning activity.

As for the post-test mean scores of the control and experimental groups, the test resulted in a significant value of 0.002, lower than a significant value of 0.05. This implies that there is a significant difference between the two groups in terms of post-test mean scores and directly describes that both groups have different levels of regulation skills after the implementation of the science learning coach as an intervention program.

Table 3 shows the result of the paired samples t-test for the pre-test and post-test mean scores of the experimental group after the implementation of the intervention program. The test resulted in a significant value of 0.350, higher than a significant value of 0.05. The test implies no significant difference in the pre-test and post-test mean scores of the experimental group

Table 4 shows the ANCOVA results of test between-subject effects in the post-test mean scores of the control and experimental groups. The results have shown a significance value of 0.042 (F = 4.421). The significance value of 0.042 is lower than the significance value of 0.05, implying that the experimental group's post-test mean score is significantly higher than the control group. This means that the science learning coach is effective as an intervention program to determine its effect on student self-regulation skills.

Table 2. Independent samples t-test for pre- and post-test mean scores of control and experimental groups

Test		Levene's Test for Equality for Variances		t-test for Equality of Means	
		F	Sig.	t	Sig. (2-Sided p)
Pre-test	Equal variances assumed	2.478	.124	-2.563	.014
	Equal variances not assumed			-2.563	.015
Post-test	Equal variances assumed	2.648	.112	-3.278	.002
	Equal variances not assumed			-3.278	.002

Table 3. Paired samples t-test for pre-test and post-test mean scores of the experimental group

Test	Paired - differences			
	Mean	Std. Deviation	t	Sig. (2-tailed)
Pre-test & Post-test	-.14000	.65363	-.958	0.350

Table 4. ANCOVA post-test results of tests of between-subjects using pre-test mean scores as covariates

Source	F	Sig.	Partial Eta Squared
Corrected model	13.065	< .001	.414
Intercept	7.905	.008	.176
Pre-test	12.217	.001	.248
Group	4.421	.042	.107

The result of the analysis of covariance shows that the use of science learning coaches as an intervention program influences the students' self-regulation skills. As revealed, a significance value of 0.042 implies that using a science learning coach as an intervention program effectively improves the student's self-regulation skills. It also revealed an effect size of 0.107, which means that the effect is small, with 58% of the control group below the experimental group's mean. Nevertheless, no matter how big or small the effect size, implementing a science learning coach as an intervention program affects student self-regulation skills.

This has been proven by a similar study conducted by Montroy et al. (2016), which showed that when students can manage their emotions, behaviors, and attitudes to reach an ideal level of simulation where they can learn, self-regulation skills are affected and improved. Another similar study conducted by Ejubovic and Puska (2019) showed that academic performance is affected by self-regulation skills. To support this further, the following are direct reflections of some of the respondents:

"The reasons for me to accomplish the scheduled tasks are because I wanted to finish all the pending activities and I wanted to finish it on time."
"I realized that time management is very important when you have a lot of activities to do."

"I am more productive when I have a planned out schedule."

The implications of the result o this study revealed the effect of science learning coaches on student self-regulation skills. Elementary and secondary schools need to adapt to different methods and strategies that can be employed to improve students' self-regulation skills and academic performance. In return, teachers would not have to make interventions to improve student academic performance after a rating period which can be classified as a reactive approach than a proactive approach. According to Fonteyne et al. (2014), academic achievement and students' usage of self-regulation learning practices are related. Academic performance and self-efficacy both increase when self-regulation learning skills rise. Freeman et al. (2017) also found that students can apply metacognitive skills and link these skills to academic success. Academic accomplishment is positively and significantly impacted by practicing self-regulation learning mechanisms, as demonstrated by a study conducted by Mirhosseini et al. (2018).

CONCLUSION AND RECOMMENDATIONS

This study investigated how scientific learning coaches affected students' abilities to self-regulate. In this investigation, the control and experimental groups were chosen by non-purposive random selection. The

analysis of covariance utilizing pre-test mean scores as covariates produced data that indicated the impact of the science learning coach on students' self-regulation abilities. However, the independent samples t-test for pre-test and post-test scores showed no significant change in self-regulation skills after the intervention program.

This research has certain limitations. The respondents in this study were under the Special Science Curriculum of the Department of Education, which somehow students have structured learning abilities and strategies. To validate the results, additional statistical analysis must be performed to examine the link between the variables. The study must include more respondents, along with additional criteria and questions. Aside from that, more research must be done to determine how and what the science learning coach influences and affects the students' self-regard capacity.

The curriculum should be created by curriculum designers to support students' learning autonomy. Teachers should try implementing more student-centered learning activities in the classroom and inspire students to study more autonomously by introducing them to cutting-edge ideas in self-regulated learning. Students should constantly complete extremely challenging academic assignments to increase their self-efficacy. They should also strive to generate intrinsic drive as they approach each new learning endeavor.

Given the results and discussions of the study, the researcher recommends that school administrators and policymakers use the empirical results generated from this study as evidence and a springboard in the formulation of rules and guidelines for better quality education. Also, as this study only covers one-quarter of the school year, the adequacy of the length of the intervention cannot be fully ascertained. With this, the researcher recommends a similar study with a two-quarter-long experiment or a yearlong investigation. In addition, since the researcher used the students under the Special Science Class program as respondents to the study, the students somehow have more structured learning strategies and higher self-regulation skills than others. With this, the researcher also recommends conducting a similar study with students from the Basic Education Program or other Department of Education curriculum programs.

AUTHOR'S CONTRIBUTIONS

The author confirms sole authorship of this study.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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Predictors of Science Process Skills among Grade 7 Learners in A Remote Learning Setup

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ABSTRACT

This study evaluated the quality of science self-learning modules the Department of Education (DepEd) provided. It examined their impact, parental support, and teacher engagement on the development of science process skills among Grade 7 learners in a remote learning setup. The study aimed to identify key predictors of effective module use and their influence on learners' skills. A statistically significant regression model (F = 4.76, p = 0.001) revealed that attainability of objectives, content appropriateness, and presentation were critical factors, with a combined explanatory power of 8.81%. Engagement and feedback from teachers emerged as crucial, while motivation and instructional quality had less impact. Parental support significantly correlated with learners' science process skills, particularly in educational engagement and motivation. The study used a combination of quantitative methods, analyzing data from surveys and assessments to evaluate module quality and its effects. The results underscored the importance of well-designed self-learning modules and active involvement from both parents and teachers. In conclusion, the findings highlight the need for improved module quality, increased parental support, and enhanced teacher engagement to foster scientific inquiry and skill development among learners. An intervention program is proposed to address these areas. Future research should adopt a mixed-methods approach to uncover deeper insights and contextual factors influencing science education. The study emphasizes a comprehensive strategy involving multiple stakeholders to enhance science process skills and support effective science education in remote learning environments.

Keywords: *science self-learning modules, parental support, teacher engagement, grade 7 learners, remote learning, science process skills*

INTRODUCTION

Science process skills are essential for inquiry-based learning but pose challenges in remote education, particularly during the modular distance education approach adopted by the Department of Education. At Romblon National High School and throughout the District of Romblon, science literacy levels, measured by the mean percentage score (MPS) from 2017 to 2020, fell below the acceptable threshold of 75% (DepEd, 2020). Recent data from 2022 to 2023 shows some improvement, yet the MPS remains below the threshold at only 44.80% (DepEd, 2023). The shift to distance education has further exacerbated difficulties in acquiring basic science process skills.

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Learners face numerous obstacles in remote education, including the absence of direct instructor assistance and limited feedback mechanisms, which hinder effective learning (Aldhafeeri & Alotaibi, 2022). Additionally, many parents lack the expertise to provide instructional support at home, compounded by busy work schedules and inadequate subject knowledge (Dolbin-MacNab et al., 2023). The lack of face-to-face classes also deprives learners of essential interactions necessary for acquiring knowledge, skills, and values, especially in remote areas where additional barriers exist.

The COVID-19 pandemic has necessitated a shift to remote learning, highlighting significant challenges in maintaining educational quality. This shift has underscored the limitations of current educational resources and methodologies, making the need for effective remote learning strategies more urgent.

This study is situated within Romblon National High School and the broader District of Romblon, where remote learning has revealed significant deficiencies in science education. The geographical and cultural

Figure 1. Research Paradigm of the Study

context includes remote areas with limited educational resources and support access.

Research on science process skills has primarily focused on elementary levels (Mutlu, 2020; Wei et al., 2021; Solé-Llussà et al., 2022; Zainil et al., 2023). These studies highlight the importance of early skill development but do not adequately address the challenges faced by secondary-level learners in remote settings.

Studies in various contexts have underscored the critical role of teacher engagement in skill development. However, there is a limited exploration of teacher engagement within pure modular education systems, particularly in regions like Romblon.

Significant gaps remain in understanding how parental educational engagement influences learners' competence at the secondary level. Additionally, the impact of the current health crisis on learners' science process skills is underexplored.

Addressing these knowledge gaps is crucial for developing effective educational strategies and interventions. Understanding the challenges and needs of Grade 7 learners in remote settings can inform institutional plans and programs, help teachers tailor their approaches, and empower parents to provide better support. Ultimately, this research aims to improve science process skills and foster scientific inquiry among learners in a remote learning environment.

Summary of the Review of Related Literature

The literature review focuses on three main areas relevant to the study's objective of determining predictors of science process skills among grade 7 learners in a remote learning setup: the impact of distance education, parental involvement, and teacher engagement.

Impact of Distance Education on Science Process Skills

Research by Smith et al. (2020) highlights the benefits and drawbacks of modular distance education, emphasizing its flexibility and noting the challenges in keeping students engaged in inquiry-based activities. Torres (2024) suggests that designing modular programs to include active participation and practical learning is essential. Brown and Jones (2021) identify the lack of hands-on experiences as a significant hurdle, which can be mitigated by technology-mediated instruction, including virtual labs and simulations (Garcia & Martinez, 2019; Amini et al., 2022). Effective teacher feedback and guidance are critical for student engagement and skill development in remote environments (Johnson & Smith, 2020; Lee & Kim, 2021). Incorporating technology-enhanced learning tools and robust teacher support can help foster science process skills (Van Den Beemt et al., 2023).

Parental Involvement and Support in Science Education

Wilder (2023) underscores the positive correlation between active parental involvement and student achievement in science. This involvement is crucial in remote learning, where it can bridge gaps in student engagement (Gonzalez-DeHass et al., 2020). Effective parental strategies include providing educational resources and engaging in science-related activities (Ata-Aktürk & Demircan, 2021; Darmaji et al., 2022). Parental attitudes significantly impact student interest and achievement in science (Cui et al., 2023; Pelikan et

al., 2021). A meta-analysis by Daucourt et al. (2021) confirms parental involvement's substantial positive effect on student performance across subjects, including science. Collaborative efforts between parents and educators are essential for comprehensive student support in remote learning contexts (Budhrani et al., 2021).

Teacher Engagement and Feedback in Distance Education

Teacher engagement is crucial for student learning outcomes in online courses (Wang et al., 2020). Regular communication, personalized feedback, and interactive discussions enhance student engagement and achievement, especially in science education (Xoliyorova et al., 2024). Timely and constructive feedback plays a significant role in student understanding and motivation (Zhang & Zhao, 2019; Carless, 2022). A meta-analysis by Tao et al. (2022) supports the positive correlation between teacher engagement and student success in distance education. Innovative teaching approaches, such as using online platforms for discussions and virtual labs, are essential for maintaining student interest and developing science process skills (Brown et al., 2021; Putri et al., 2021). Active teacher engagement and feedback are paramount in remote learning, particularly for fostering science process skills among seventh-grade learners (Pramesworo et al., 2023).

This study aimed to determine the predictors of science process skills among grade 7 learners in a remote learning set-up.

Conceptual Framework

The conceptual framework for this study on predictors of science process skills among Grade 7 learners in a remote learning setup focuses on three key components: parental involvement, teacher engagement and feedback, and the impact of distance education modules.

Parental involvement includes the level of engagement, types of support, and attitudes towards science. Teacher engagement and feedback encompass the degree of involvement, quality, and frequency of feedback and instructional strategies in remote learning. These factors are hypothesized to influence the development of science process skills, the dependent variable.

The framework suggests that higher parental involvement, teacher engagement, and quality feedback positively correlate with better science process skills. The study uses quantitative methods, such as surveys and statistical analyses, to explore these relationships and aims to inform educational policies to enhance science learning in remote settings.

METHODOLOGY

Research Design

Using a quantitative research design, this study investigated the impact of DepEd's science self-learning modules, parental support, and teacher engagement on developing science process skills among Grade 7 students in a remote learning setup. Standardized assessments and surveys measured parental involvement, teacher engagement, student engagement, and science process skills, allowing statistical analysis to test hypotheses, identify correlations, and derive generalizable findings.

Techniques like regression analysis and structural equation modeling examined these predictors' direct and indirect effects, providing insights into the mechanisms underlying science education outcomes in remote learning. The study aimed to contribute empirically grounded evidence to the literature on science education and distance learning, informing policies and practices to enhance science process skills among Grade 7 learners.

Population and Samples of the Study

Stratified random sampling determined the number of learner-respondents per school. Using Slovin's formula with a 5% margin of error, 303 Grade 7 learners were selected from Romblon National High School, Macario Molina National High School, and Agnipa National High School.

Research Instrument

The instrument had four parts: Part I evaluated the quality of the science self-learning module; Part II and III assessed perceptions of parental support and teacher engagement; Part IV tested science process skills with a 60-item self-made test covering six skills. A five-point Likert scale measured agreement levels on module quality, parental support, and teacher engagement.

Validity and Reliability of the Instrument

Three education experts reviewed the method with 30 Grade 8 and 20 Grade 9 learners to ensure validity. Cronbach's Alpha analysis showed the following results: science process skills (0.77, acceptable), module quality (0.982, excellent), teacher engagement (0.822, good), mean assessment score of 83.95 out of 100, as indicated in Table 2. High levels of parental support were noted, particularly in "Providing all academic needs" and "Inspiring good grades," which received the highest and parental support (0.877, good).

Table 1. The learners' assessment on the qualities of science self-learning modules.

Qualities of the Modules	Mean	SD	Classification
Attainability of Objectives			
1. The learning materials have learning activities aligned with the most essential competencies.	4.12	0.85	Acceptable
2. The learning materials ensure that learners can acquire the knowledge, skills, and values expected in every lesson.	4.23	0.83	Acceptable
3. It has what learners are required, which is seen as essential, in the teaching-learning process to develop abilities that would prepare students for succeeding lessons and, ultimately, for life-long learning.	4.06	0.95	Acceptable
4. The type of learning materials reflects the type of education provided.	4.06	0.98	Acceptable
5. It provides teaching and learning opportunities that students should master.	4.02	0.98	Acceptable
Total Mean Assessment Score	20.49	3.17	Acceptable
Readability of the Materials			
1. The modules are easy to read and absorb for it is structured in a clear hierarchy of information.	3.85	1.01	Acceptable
2. The font size and style are clear enough to be easily read and understood	4.00	0.88	Acceptable
3. Images and illustrations are clear enough to support the lessons and students' learning.	4.00	0.93	Acceptable
4. Vocabulary level is adapted to target learners' experience and understanding.	3.93	1.01	Acceptable
5. Length of sentences is suited to the comprehension level of the target user.	3.85	1.03	Acceptable
Total Mean Assessment Score	19.63	3.13	Acceptable
Accuracy of the Content			
1. The learning materials contain no errors.	3.73	1.05	Acceptable
2. Lessons and discussions are accurate and precise.	3.93	0.97	Acceptable
3. Answer keys are provided at the end of every learning task.	3.61	1.08	Acceptable
4. It provides factual data on lessons and theories.	4.00	0.96	Acceptable
5. It contains no typographical errors.	3.57	1.13	Acceptable
Total Mean Assessment Score	18.84	3.45	Acceptable
Content Appropriateness			
1. The learning activities can be performed by the learners by considering their characteristics.	4.20	0.95	Acceptable
2. The learning tasks in the self-learning modules are easy to comprehend.	3.84	0.96	Acceptable
3. The learning material promotes ease of understanding of the lesson and instructions in every learning task.	3.94	0.91	Acceptable
4. The learning material uses appropriate language that responds to learners' linguistic backgrounds.	4.00	0.99	Acceptable
5. Content is suitable to the target learner's level of development, needs, and experiences.	4.19	0.92	Acceptable
Total Mean Assessment Score	20.17	3.19	Acceptable
Presentation			
1. The presentation of the lesson is well-organized.	4.29	0.84	Highly Acceptable
2. It considers the learning competencies learners need to master before proceeding with the next lessons/ activities.	4.19	0.88	Acceptable
3. Activities ensure the smooth and gradual development of the learners.	4.00	0.93	Acceptable
4. The learning materials follow and use a specific format.	4.04	0.89	Acceptable
5. Activities are provided before and after the lessons.	4.06	1.02	Acceptable
Total Mean Assessment Score	20.58	3.38	Acceptable
Illustration			
1. The self-learning modules have enough interpretation, or visual explanation of a text, concept, or process.	4.13	0.99	Acceptable
2. Pictures, images, and illustrations are included in the learning materials to help clarify the topics.	4.09	0.89	Acceptable
3. The concepts and theories addressed in the instructional materials are supported with illustrations.	4.08	0.94	Acceptable
4. Images, visual images, and font style and size are clear.	4.14	0.97	Acceptable
5. The modules improve and refine the visual perception of the offered examples.	4.00	1.01	Acceptable
Total Mean Assessment Score	20.44	3.47	Acceptable
Overall Mean Assessment Score	**120.15**	**0.96**	**Acceptable**

Data Gathering Procedures

The study used a descriptive-correlational one-shot survey and linear regression analysis to investigate predictors of science process skills among Grade 7 learners in remote learning. Data were collected via structured surveys from three secondary schools in Romblon District and analyzed through descriptive statistics, correlational analysis, and regression modeling to identify significant predictors of science process skills.

RESULTS AND DISCUSSION

The study aimed to evaluate the quality of DepEd's science self-learning modules and assess the impact of these modules, alongside parental support and teacher engagement, on the development of science process

Table 2. Parents' Level of Support towards Respondents' Capacity to Learn

SUPPORT	Mean	SD	Classification
Educational Engagement			
1. My parents keep an eye on my academic performance.	4.13	0.89	Supportive
2. My parents constantly encourage me to do well or excel in school.	4.03	0.93	Supportive
3. My parents provide all my academic needs.	4.20	0.96	Supportive
4. My parents allocate sufficient time with me to assist my studies.	3.82	1.06	Supportive
5. My parents support me financially, emotionally, and morally.	4.11	1.10	Supportive
6. My parents ensure I can acquire the knowledge, skills and values taught in school.	3.97	1.01	Supportive
7. My parents ensure I can understand the lessons well.	3.91	1.11	Supportive
8. My parents ensure that I am doing my school tasks and activities.	4.06	1.03	Supportive
9. My parents participate in all parent-teacher conferences and meetings.	4.04	1.10	Supportive
10. My parents talk with me if I am getting poor grades in school.	3.85	1.21	Supportive
11. My parents ask my teachers how I am doing in school.	3.75	1.20	Supportive
Total Mean Assessment Score	43.87	6.37	
Motivation			
1. My parents inspire me to get good grades.	4.32	0.93	Supportive
2. My parents motivate me to do well in school.	4.07	1.06	Supportive
3. My parents motivate me to give my all-out performance in school.	3.98	0.97	Supportive
4. My parents tell me to do well in any extracurricular activities.	3.91	1.07	Supportive
5. My parents motivate me to perform well in various learning tasks.	3.97	1.07	Supportive
6. My parents support me in every school activity.	4.07	1.12	Supportive
7. My parents sufficiently reward me for my school achievements.	3.88	1.08	Supportive
8. My parents help and support me in my academic tasks.	4.08	1.01	Supportive
9. My parents share in every success I have.	3.87	1.08	Supportive
10. My parents cheer me up when I am struggling nwith school activities.	3.92	1.13	Supportive
Total Mean Assessment Score	40.08	6.42	
Overall Mean Assessment Score	**83.95**	**11.89**	

Table 3. The teachers' level of engagement in assisting the learners in their modular learning

Statements	Mean	SD	Classification
Providing Feedback			
1. The teachers provide timely feedback.	4.08	0.94	Engaged
2. The teachers set criteria for assessment/ judging clearly in advance.	4.02	0.99	Engaged
3. The teachers' marking has been fair and reasonable.	3.90	1.04	Engaged
4.I receive detailed comments, both written and oral, on my work.	3.89	1.07	Engaged
5. The teachers clarify things whenever I have questions.	4.10	1.02	Engaged
Total Mean Assessment Score	19.99	3.17	
Instruction			
1. The teachers are good at explaining things whenever I communicate with them.	4.28	1.01	Engaged
2. The teachers master the lessons well whenever I ask them about concepts that are vague to me.	4.07	0.94	Engaged
3. The teachers make the lessons interesting by providing different learning activities.	4.22	0.93	Engaged
4. The teachers use appropriate techniques to simplify the lessons.	4.05	1.03	Engaged
5. The teachers provide different learning activities manifested in the self-learning modules.	4.08	1.05	Engaged
Total Mean Assessment Score	20.71	3.36	
Overall Mean Assessment Score	**40.70**	**5.80**	

skills among Grade 7 learners in a remote learning setup. Learners assessed the modules on several criteria, including attainability of objectives, readability, accuracy, appropriateness, presentation, and illustration (Table 1). The regression analysis, as shown in Table 5, revealed that "Attainability of Objectives" and "Presentation" significantly and positively influenced science process skills, while "Content Appropriateness" and "Accuracy" did not. This finding suggests that clear objectives and well-presented content are crucial for effective learning.

Parental support was evaluated regarding educational engagement and motivation, with an overall mean assessment score of 83.95 out of 100, as indicated in Table 2. High levels of parental support were noted, particularly in "Providing all academic needs" and "Inspiring good grades," which received the highest scores. Significant positive correlations between parental support and learners' science process skills underscore the importance of parental involvement in academic success.

Teacher engagement was also positively perceived, particularly in providing feedback and instruction. Table 3 shows that the overall mean assessment score of teacher engagement was 40.70 out of 50, or 81.4%. While learners appreciated teachers'

Table 4. The learners' level of science process skills

SKILLS	M	SD	Classification
Observing	4.19	1.92	Below Average
Communicating	1.39	2.13	Poor
Classifying	4.55	2.30	Average
Predicting	4.29	2.73	Below Average
Measuring	3.80	2.38	Below Average
Inferring	4.28	2.55	Below Average
Overall Mean Score	**22.52**	**8.79**	

Table 5. The correlation between science process skills and module quality, parents' support, and teachers' level of engagement

Independent Variable	rho	p-value
Module Quality		
Attainability of Objectives	0.177**	0.002
Readability of the Materials	0.140**	0.015
Accuracy of the Content	0.015	0.797
Content Appropriateness	0.027	0.642
Presentation	0.198**	0.001
Illustration	0.132**	0.022
Parents' Support		
Educational Engagement	0.224**	0.001
Motivation	0.168**	0.002
Teachers' Level of Engagement		
Providing Feedback	0.189**	0.001
Instruction	0.179**	0.002

Table 6. Analysis of variance of module quality on science process skills

Source	Sum of Squares	df	Mean Square	F	p-value
Regression	2053.984	6	342.331	4.764	<.001
Residual	21271.580	296	71.863		
Total	23325.564	302			

availability for clarification and good explanations, areas like detailed feedback and appropriate techniques scored lower. Significant positive correlations were found between teacher engagement and science process skills, highlighting the importance of active teacher involvement.

Learners demonstrated varying proficiency levels across different science process skills, as shown in Table 4. The overall proficiency level remained below 75%, with learners achieving a mean score of 22.52 out of 60, or 37.5%. "Classifying" scored highest, indicating a moderate ability, while "Communicating" and "Measuring" were identified as weaker areas. This underscores the need to enhance communication and measurement skills to improve scientific proficiency.

Significant positive correlations were found between learners' science process skills and module qualities, parental support, and teacher engagement, as seen in Table 5. Key factors such as clear objectives, well-presented materials, educational engagement, and

constructive feedback were strongly linked to better science process skills. Regression analysis identified significant predictors of science process skills, as shown in Table 6. "Attainability of Objectives" and "Presentation" in modules, parental educational engagement, and teacher feedback were significant predictors. This highlights the importance of well-structured modules and active support from parents and teachers.

Based on the findings, a multifaceted intervention program is proposed. This program should integrate improved module design, enhanced parental support, and increased teacher engagement. By addressing these factors, educators can create a supportive learning environment that fosters the development of science process skills, enhancing scientific inquiry and overall academic achievement. The study emphasizes the need for comprehensive strategies involving well-designed educational materials, active parental involvement, and robust teacher engagement to improve science process skills among Grade 7 learners in a remote learning setup.

CONCLUSION

The study found that the quality of DepEd's science self-learning modules, parental support, and teacher engagement significantly influence the development of science process skills among Grade 7 learners in a remote learning setup. Clear objectives and well-presented content in the modules were crucial for effective learning. High parental support and active teacher engagement, particularly in providing feedback, were strongly correlated with better science process skills. A comprehensive approach is needed to improve these skills, including better-designed modules, enhanced parental involvement, and increased teacher engagement. This holistic strategy can create a supportive learning environment that fosters scientific inquiry and academic achievement among learners.

AUTHORS' CONTRIBUTIONS

RM conceived and designed the study, collected and analyzed the data, interpreted the results, and drafted the manuscript. BS served as the adviser of the lead author.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Mediating Effects of Organizational Learning on Transformational Leadership and Sustainability Capacity of Public Elementary Schools

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ABSTRACT

This study investigated the mediating role of organizational learning in the relationship between transformational leadership and sustainability capacity in public elementary schools in Looc District, Division of Romblon. Using a researcher-designed instrument, this study assessed the levels of transformational leadership, organizational learning, and sustainability capacity. Data collected from 124 respondents revealed significant positive correlations between transformational leadership ($r = 0.527$, $p < 0.000$) and organizational learning, as well as between organizational learning ($r = 0.589$, $p < 0.000$) and sustainability capacity. Furthermore, organizational learning partially mediates the relationship between transformational leadership and sustainability capacity, accounting for 51.3%, highlighting its crucial role in enhancing sustainability efforts in public elementary schools. The identified partial mediation effect of organizational learning on sustainability capacity highlights the importance of nurturing a learning-oriented culture within schools to enhance sustainability practices. Future research could explore the causal processes and mechanisms of this mediation effect and additional factors that may contribute to or moderate this relationship, providing valuable insights for organizational development and sustainability initiatives in educational contexts.

Keywords: *Looc District, mediation analysis, organizational learning, sustainability capacity, transformational leadership*

INTRODUCTION

Their leadership significantly shapes educational institutions' culture, performance, and results. Good leaders set the tone for the entire organization by influencing all stakeholders' attitudes, values, and actions, including administrators, parents, teachers, and students (Gurr, 2017).

This research was conducted in 13 public elementary schools in Looc District, Division of Romblon, to identify the mediating effects of organizational learning on transformational leadership and sustainability capacity among schools in the district.

This study serves as the basis of their sustainability practices in relation to transformational leadership and

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organizational learning. They can use the results of this study to implement any programs or policies that contribute to the overall sustainability of schools in the Looc District. Further, the pupils benefit from the sustainability practices observed by the schools. Improved sustainability practices create a more conducive learning environment for the pupils. At the same time, teachers will benefit from this study as they will be informed about how sustainable their schools' practices are and how they can help improve and sustain them. This is also timely as it will serve as the basis for the Schools Division Office of Romblon to examine how these variables can affect the overall management of schools in the Looc District and the entire Division of Romblon.

Synthesis of Related Literature

Their leadership significantly shapes educational institutions' culture, performance, and results. Good leaders set the tone for the entire organization by affecting the attitudes, values, and actions of all those involved, such as administrators, parents, teachers, and students (Gurr, 2017).

ORGANIZATIONAL LEARNING
- Information Acquisition
- Information Dissemination
- Information Integration
- Information Interpretation
- Organizational Memory

Mediating Variable

TRANSFORMATIONAL LEADERSHIP
- Vision Building
- Individualized Consideration
- Intellectual Stimulation
- Innovative Climate

Independent Variable

SUSTAINABILITY CAPACITY
- Strategic Planning
- Environmental Support
- Program Adaptation
- Organizational Capacity
- Communications
- Program Evaluation
- Funding Stability

Dependent Variable

Figure 1. Conceptual Framework of the Study

First, organizational culture in educational institutions is influenced by leadership. The leader's direct behavior and decision-making for the school community sets the norms, expectations, and priorities. Strong leadership cultivates an environment that is welcoming and inclusive, encouraging teamwork, creativity, and a shared dedication to high standards in education (Hoy & Miskel, 2013).

Second, there is a direct correlation between leadership and academic institution performance. Teachers and staff are inspired to strive for excellence and continual improvement by transformational leaders who enable and motivate people to realize their full potential (Northouse, 2018). Effective leaders foster an environment favorable to excellent teaching and learning, improving student outcomes (Robinson et al., 2008). They do this by offering vision, direction, and support.

Furthermore, leadership affects how educational institutions function as a whole. Effective leaders integrate organizational strategies with educational goals and priorities to ensure that resources are distributed effectively and efficiently to support student success (Fullan, 2014). Strong leadership also promotes transparency and accountability, which helps schools move closer to goals like higher graduation rates and student accomplishment (Louis et al., 2010).

Meanwhile, transformational leadership is increasingly recognized as crucial in determining organizational effectiveness and student achievement in educational contexts. Initially proposed by Burns (1978) and refined by Bass (1985), transformational leadership is defined by leaders who encourage and inspire

subordinates to put the interests of the organization ahead of their own (Bass & Riggio, 2006).

Research has shown that transformational leaders cultivate a climate of trust, empowerment, and teamwork among staff, professors, and students (Leithwood et al., 2019). Transformational leaders establish a supportive and encouraging atmosphere conducive to teaching and learning by clearly communicating a compelling vision and setting high standards.

The relationship between transformational leadership, sustainability capacity, and organizational learning form a dynamic and symbiotic framework within public elementary schools in Looc, Romblon. Transformational leadership catalyzes profound shifts in perspectives and behaviors among stakeholders within the school community. Through transformative learning experiences, individuals develop a deeper understanding of sustainability principles and practices, leading to the integration of sustainable approaches into various facets of school operations and curriculum design (Jones, 2018).

Organizational learning is a crucial mediator in this relationship, facilitating the translation of individual transformative experiences into collective institutional knowledge and action. Schools that prioritize organizational learning establish structures and processes that enable the acquisition, interpretation, and dissemination of sustainability-related knowledge throughout the organization. By promoting collaboration, experimentation, and reflection, organizational learning harnesses the insights gained from transformational learning to inform strategic decision-making and enhance the school's overall

Table 1. Level of Organizational Learning of Public Elementary Schools

Organizational Learning	Mean	SD	DI
a. Information Acquisition			
1. The teachers learn from the stakeholders.	4.20	0.67	H
2. The teachers benchmark themselves with other schools.	4.23	0.65	H
3. The teachers have processes to acquire relevant information from outside the school.	4.73	0.65	VH
4. The teachers develop new knowledge from existing knowledge.	4.48	0.63	H
Total	**4.41**	**0.65**	**H**
b. Information Dissemination			
1. The teachers share their experiences and/or knowledge.	4.61	0.52	VH
2. The lessons learned by one group are actively shared with others.	4.50	0.64	VH
3. The school has processes or mechanisms for exchanging knowledge between individuals.	4.37	0.63	H
4. The school has processes or mechanisms to disseminate knowledge and ideas with other institutions.	4.76	0.61	VH
Total	**4.56**	**0.60**	**VH**
c. Information Interpretation			
1. The employees, as individuals, are prepared to rethink decisions when presented with new and relevant information.	4.39	0.62	H
2. The employees seek to deeply understand issues and concepts.	4.41	0.58	H
3. The employees do not hesitate to question things they do not understand.	4.52	0.66	VH
4. The employees, as individuals, are interested in knowing not only what to do but also why we do things.	4.55	0.53	VH
Total	**4.47**	**0.60**	**H**
d. Information Integration			
1. The school leader and teachers discuss issues until they arrive at a shared understanding.	4.60	0.52	VH
2. The school management integrates information from different organizational areas.	4.49	0.58	H
3. The teachers meet regularly to resolve issues and concerns.	4.57	0.50	VH
4. The teachers seek to achieve consensus by dialogue and reasoning.	4.51	0.56	VH
5. The school stresses sharing and trying to understand management vision through communication with colleagues.	4.58	0.56	VH
Total	**4.56**	**0.56**	**VH**
e. Organizational Memory			
1. The teachers make strong efforts to preserve information.	4.48	0.53	H
2. The teachers employ mechanism to store information.	4.48	0.53	H
3. There is a formal data management function in the school.	4.44	0.55	H
4. The school stores detailed information to guide its operations.	4.46	0.53	H
5. When teachers need specific information, they know who is to be contacted.	4.60	0.49	VH
Total	**4.49**	**0.53**	**H**

sustainability capacity. Through continuous improvement and knowledge sharing, organizational learning reinforces a culture of innovation and adaptability (Hernaus et al., 2019).

The relationship between transformational learning, sustainability capacity, and organizational learning empowers public elementary schools in Looc, Romblon, to become agents of positive change within their communities.

This study explores how transformational leadership influences sustainability capacity in public elementary schools in the Looc District as mediated by organizational learning.

METHODOLOGY

This study used a quantitative research design, particularly the descriptive-developmental research method. The study involved 124 elementary teachers in

Looc District who were at least employed for the last school year. The researcher-made instrument was subjected to validation by experts. Frequency count, mean, Spearman rho, and mediation analysis were used to analyze the data.

Figure 1 explains the relationship of the three variables. Transformational Leadership is vital in enhancing the sustainability capacity of public elementary schools in Looc, Romblon, anchored on the Sustainable Development Goals of UNESCO. Organizational Learning is a critical mediator in the

relationship between Transformational Leadership and the Sustainability Capacity of public elementary schools in Looc, Romblon.

RESULTS AND DISCUSSION

Regarding organizational learning (Table 1), public elementary schools in the Looc District demonstrate robust strengths. Teachers actively engage in processes to acquire pertinent information from

Table 2. Level of Transformational Leadership of Public Elementary Schools

Transformational Leadership	Mean	SD	DI
a. Vision Building			
1. Refers explicitly to our school's goals during decision-making processes	4.37	0.63	H
2. Explains the relationship between the school's vision and initiatives of the school district, collaborative projects, or the government	4.26	0.73	H
3. Discusses the consequences of the school's vision for everyday practice	4.12	0.74	H
4. Uses all possible means to share the school's vision with the team the students, parents, and others	4.40	0.58	H
5. Incorporates the vision, mission, goals, and objectives in addressing the current issues and problems of the school	4.42	0.66	H
Total	**4.31**	**0.67**	**H**
b. Individualized Consideration			
1. Takes opinions of individual teachers seriously	4.43	0.65	H
2. Listens carefully to team members' ideas and suggestions	4.58	0.54	VH
3. Is attentive to problems that teachers encounter when implementing innovations	4.44	0.56	H
4. Shows appreciation when a teacher takes initiatives to improve the teaching and learning process	4.56	0.54	VH
5. Encourages teachers to talk about their feelings	4.40	0.66	H
Total	**4.48**	**0.59**	**H**
c. Intellectual Stimulation			
1. Encourages teachers to experiment with new didactic strategies	4.15	0.65	H
2. Encourages teachers to try new strategies that match their personal interests	4.23	0.66	H
3. Encourages teachers to reflect on new experiences	4.29	0.63	H
4. Motivates teachers to look for and discuss new information and ideas that are relevant to the school's development	4.33	0.65	H
5. Stimulates teachers to constantly think about how to improve the school	4.19	0.67	H
6. Offers enough possibilities for teachers' professional development	4.23	0.65	H
7. Encourages teachers to talk about their personal views on education	4.23	0.66	H
Total	**4.24**	**0.65**	**H**
d. Innovative Climate			
1. Teachers are willing to try new ideas	4.15	0.65	H
2. Teachers benchmark ideas from other institutions.	4.23	0.66	H
3. Teachers have a positive "can-do" attitude	4.29	0.63	H
4. Teachers are willing to take risks to make the school better	4.33	0.65	H
5. Teachers are constantly trying to improve their teaching	4.19	0.67	H
6. Teachers are encouraged to go as far as they can	4.23	0.65	H
Total	**4.23**	**0.66**	**H**

Table 3. Level of Sustainability Capacity of Public Elementary Schools

Sustainability Capacity	Mean	SD	DI
a. Strategic Planning			
1. The school has a sustainability plan.	4.57	0.53	VH
2. The school's goals to maintain specific programs, projects, and policies are understood by all stakeholders.	4.55	0.52	VH
3. The school clearly outlines roles and responsibilities to schedule programs, projects, and policies for all stakeholders.	4.59	0.54	VH
4. The school includes the stakeholders in the preparation of sustainability plan.	4.62	0.53	VH
5. The school has a sustainability plan anchored on the needs of the school and community.	4.65	0.51	VH
Total	**4.60**	**0.53**	**VH**
b. Environmental Support			
1. There are advocates within the school of different programs, projects, and policies.	4.48	0.56	H
2. There are advocates within the school with the ability to get resources for the different programs, projects, and policies.	4.38	0.62	H
3. The school has support from within broader organizations and private organizations.	4.34	0.65	H
4. The school has support from external education department/office.	4.35	0.61	H
5. The scheduling of programs, projects, and policies for students has strong public support.	4.50	0.56	VH
Total	4.41	0.60	**H**
c. Program Adaptation			
1. The school adapts or changes the scheduling of programs, projects, and policies as needed.	4.55	0.52	VH
2. The school has a mechanism to proactively adapt any programs, projects, and policies to meet the changing needs of the school community.	4.48	0.58	H
3. The school makes decisions about which programs, projects, and policies components are ineffective and should not continue.	4.54	0.55	VH
4. The school adapts best practices from other schools or institutions.	4.46	0.56	H
5. The school makes informed decisions in implementing programs, projects, and policies.	4.60	0.52	VH
Total	**4.53**	**0.55**	**VH**
d. Organizational Capacity			
1. The school adapts or changes the scheduling of programs, projects, and policies as needed.	4.43	0.56	H
2. The school has a mechanism to proactively adapt any programs, projects, and policies to meet the changing needs of the school community.	4.24	0.68	H
3. The school makes decisions about which programs, projects, and policies components are ineffective and should not continue.	4.53	0.53	VH
4. The school adapts best practices from other schools or institutions.	4.52	0.52	VH
5. The school makes informed decisions in implementing programs, projects, and policies.	4.42	0.56	H
Total	**4.43**	**0.57**	**H**

Table 3. Level of Sustainability Capacity of Public Elementary Schools (cont'd)

e. Communications			
1. The school has communication strategies in place to secure and maintain school communities' support for different programs, projects, and policies.	4.58	0.53	VH
2. Staff members communicate the need for programs, projects, and policies to the community which include parents and local officials.	4.61	0.54	VH
3. The different programs, projects, and policies of the school increase community awareness of the need for such activities to students.	4.52	0.56	VH
4. The school has a feedback mechanism from various stakeholders.	4.45	0.59	H
5. The school conducts regular meeting schedules to discuss various school-related concerns and issues.	4.68	0.49	VH
Total	**4.57**	**0.54**	**VH**
f. Program Evaluation			
1. The school has a system in place to actively evaluate the scheduling of programs, projects, and policies (improvements in children's academic standing and skills, student on-task behavior, etc).	4.52	0.53	VH
2. The school reports the outcomes of scheduling the recommended programs, projects, and policies (e.g., improvement in students' activities, implementation of new activity for reading, etc)	4.84	3.67	VH
3. The evaluation results are used in planning and implementation of the different programs, projects, and policies.	4.54	0.52	VH
4. The stakeholders are well-informed about the evaluation procedures.	4.43	0.59	H
5. Evaluation of different programs, projects, and policies is regularly conducted.	4.46	0.60	H
Total	**4.56**	**1.18**	**VH**
g. Funding Stability			
1. The school takes action to ensure there are ongoing funds to support the different programs, projects, and policies.	4.52	0.62	VH
2. My school has a process in place to allow staff to attend professional development on crafting and preparing proposed programs, projects, and policies (e.g., funding for ongoing professional development).	4.44	0.63	H
3. My school provides time at work for staff to plan their schedule for the implementation of programs, projects, and policies.	4.42	0.59	H
4. My school can access a variety of funding sources for the different programs, projects, and policies.	4.37	0.64	H
5. My school has established linkages with other agencies and non-government organizations (NGOs) that contribute to the implementation of programs, projects, and policies.	4.58	0.57	VH
Total	**4.47**	**0.61**	**H**

external sources, enriching their teaching practices with diverse perspectives and up-to-date knowledge. Moreover, schools have established effective mechanisms for sharing knowledge and ideas within their institution and with other educational entities, fostering a culture of collaboration and mutual enrichment. Strong leadership encourages discussions among school leaders and teachers until a shared understanding is reached, promoting consensus and unity in addressing issues.

The analysis of organizational learning in public elementary schools in Romblon shows a strong capacity for acquiring, disseminating, and interpreting information. Teachers are highly effective in acquiring relevant information from external sources and developing new knowledge from existing resources (Mean = 4.41, SD = 0.65, DI = H). They also excel in sharing their experiences and knowledge within the school and with external partners, as well as in fostering a deep understanding of issues and concepts (Mean = 4.56, SD = 0.60, DI = VH; Mean = 4.47, SD = 0.60, DI = H). These elements highlight the schools' commitment to continuous learning and collaboration internally and with the broader community.

The schools also demonstrate a robust approach to Information Integration and Organizational Memory. Teachers and school leaders engage in regular discussions to achieve shared understanding and

Table 4. Relationship Among Transformational Leadership, Organizational Learning, and Sustainability Capacity in Public Elementary Schools

Variables	r	p
Organizational Learning → Transformational Leadership	.527**	(<.001)
Transformational Leadership → Sustainability Capacity	.479**	(<.001)
Organizational Learning → Sustainability Capacity	.589**	(<.001)

consensus, effectively integrating information from different areas (Mean = 4.56, SD = 0.56, DI = VH). Additionally, there is a strong emphasis on preserving and managing information, ensuring that knowledge is readily accessible and can be utilized effectively in school operations (Mean = 4.49, SD = 0.53, DI = H). These practices indicate that the schools have established a solid foundation for organizational learning, where information is acquired, shared, retained, and integrated into the school's ongoing development.

Furthermore, the significant correlation between teachers' perceptions of school climate and organizational learning capability identified in the study suggests that a positive school environment fosters a conducive learning and knowledge exchange atmosphere. This connection emphasizes the importance of nurturing a supportive and collaborative culture within schools, as observed in the Looc District, to facilitate effective organizational learning processes.

The analysis of transformational leadership (Table 2) in public elementary schools in Romblon reveals that school leaders effectively align the school's vision with daily practices and decision-making. This is evident in their emphasis on incorporating the school's vision into addressing current issues (Mean = 4.42, SD = 0.66, DI = H) and their proactive efforts to communicate this vision to all stakeholders (Mean = 4.40, SD = 0.58, DI = H). Additionally, leaders demonstrate strong Individualized Consideration by attentively listening to teachers' ideas (Mean = 4.58, SD = 0.54, DI = VH) and appreciating their efforts to improve teaching (Mean = 4.56, SD = 0.54, DI = VH), which fosters a supportive and motivating environment.

Furthermore, the schools are committed to Intellectual Stimulation, encouraging teachers to explore new strategies and engage in continuous professional development (Mean = 4.24, SD = 0.65, DI = H). This intellectual engagement is complemented by

a positive Innovative Climate, where teachers are encouraged to try new ideas, take risks, and continuously improve their teaching practices (Mean = 4.23, SD = 0.66, DI = H). These aspects of transformational leadership contribute to a dynamic school environment supporting innovation and professional growth.

The analysis of sustainability capacity (Table 3) in public elementary schools in Romblon, focusing on Strategic Planning, reveals that these schools are highly proactive in ensuring their long-term viability. The schools have established comprehensive sustainability plans that are well-understood by stakeholders, with clear roles and responsibilities outlined (Mean = 4.60, SD = 0.53, DI = VH). Stakeholders are actively involved in preparing these plans, and the plans are closely aligned with the needs of the school and the community (Mean = 4.65, SD = 0.51, DI = VH). Additionally, in the area of Environmental Support, the schools benefit from a supportive environment, with intense internal advocacy and external backing, including from broader organizations and private entities (Mean = 4.41, SD = 0.60, DI = H).

Moreover, the schools demonstrate strong Program Adaptation and Organizational Capacity, as they effectively adapt programs to meet changing needs and integrate best practices from other institutions (Mean = 4.53, SD = 0.55, DI = VH). This adaptability is supported by robust Communication strategies, ensuring that the need for various programs is well communicated to the community and that regular feedback is obtained from stakeholders (Mean = 4.57, SD = 0.54, DI = VH). Finally, Program Evaluation and Funding Stability are also key strengths, with schools maintaining rigorous evaluation systems and taking proactive steps to secure ongoing funding from diverse sources (Mean = 4.56, SD = 1.18, DI = VH; Mean = 4.47, SD = 0.61, DI = H). These combined efforts ensure the schools are well-positioned to sustain their initiatives over time.

Table 4 presents the relationship between transformational leadership, organizational learning, and sustainability capacity in public elementary schools. Organizational learning has a strong relationship with both transformational leadership (r = 0.527, p < 0.000) and sustainability capacity (r = 0.589, p < 0.000). Likewise, there is also a positive correlation (r = 0.479, p < 0.000) between transformational leadership and sustainability capacity. The hypotheses are all rejected. In terms of the mediation effect (Table 5), the data unveils a significant partial mediation effect, with organizational learning accounting for approximately 51.3% of the influence of transformational leadership on

Table 5. Mediation estimates between organizational learning, transformational leadership, and sustainability capacity

Effect	Label	Estimate	SE	Lower	Upper	Z	p	% Med
Indirect	a x b	0.254	0.0583	0.1400	0.369	4.36	<.001	51.3
Direct	c	0.242	0.0859	0.0735	0.410	2.82	0.005	48.7
Total	c + a x b	0.496	0.0818	0.3359	0.656	6.07	<.001	100.0

Table 6. Path Estimates Between Transformational Leadership, Organizational Learning, and Sustainability Capacity

Path	Estimate	SE	Lower	Upper	Z	p
Transformational Leadership → Organizational Learning	0.641	0.0928	0.4587	0.822	6.90	<.001
Organizational Learning → Sustainability Capacity	0.397	0.0706	0.2587	0.535	5.62	<.001
Transformational Leadership → Sustainability Capacity	0.242	0.0859	0.0735	0.410	2.82	0.005

sustainability capacity. This suggests that transformational leadership not only directly impacts sustainability capacity but also indirectly through its influence on organizational learning. Despite this mediation, a substantial direct effect of transformational leadership on sustainability capacity remains, implying

Table 6 summarizes the path estimates between transformational leadership, organizational learning, and sustainability capacity. Results show significant positive relationships among the variables. Specifically, transformational leadership significantly predicts organizational learning (β = 0.641, p < .001) and sustainability capacity (β = 0.242, p = .005). Organizational learning also significantly predicts sustainability capacity (β = 0.397, p < .001). The confidence intervals further confirm the robustness of these findings.

CONCLUSION

The results show that the public elementary schools in Looc District, Division of Romblon, have high levels of transformational leadership in vision building, individualized consideration, intellectual stimulation, and innovative climate. The schools also have high levels of organizational learning in terms of information acquisition, information interpretation, and organizational memory, while they have very high levels of information dissemination and integration.

Moreover, the results show that the public elementary schools in Looc District, Division of Romblon, have high levels of sustainability capacity in terms of environmental support, organizational capacity, and funding stability. In contrast, they have very high levels of strategic planning, program adaptation, communications, and evaluation. Transformational leadership has a significant relationship with organizational learning and sustainability capacity.

the presence of other contributing factors. Therefore, while fostering transformational leadership and cultivating organizational learning is pivotal, acknowledging additional elements is crucial for effectively bolstering sustainability within the organizational framework.

Likewise, organizational learning is also significantly related to sustainability capacity. The hypothesis is hereby rejected. Likewise, organizational learning has a significant partial mediation effect on sustainability capacity at 51.3%. The hypothesis is hereby rejected.

It is recommended that this organizational learning be continued in public schools, emphasizing vision building, individualized consideration, intellectual stimulation, and fostering an innovative climate to further enhance organizational effectiveness and sustainability. With the already high levels of organizational learning, particularly in information dissemination, integration, acquisition, interpretation, and memory, schools should focus on sustaining and expanding these practices while exploring avenues to improve areas with relatively lower scores to ensure continuous improvement and adaptability.

While public elementary schools in the region demonstrate strong sustainability capacities, especially in strategic planning, program adaptation, communications, and evaluation, concerted efforts should be directed toward maintaining these strengths and addressing any identified weaknesses, particularly in environmental support, organizational capacity, and funding stability, to ensure long-term resilience and success among public schools. Future studies should focus more profoundly on the specific mechanisms through which these relationships operate, exploring potential moderating or mediating variables (aside from those studied in this research) to better understand their relationship within different educational settings. The identified partial mediation effect of organizational

learning on sustainability capacity highlights the importance of nurturing a learning-oriented culture within schools to enhance sustainability.

AUTHORS' CONTRIBUTIONS

The lead author, Edelfred R. Panoy, conceptualized and conducted the study and interpreted and analyzed the data. At the same time, the co-author, Dr. Emelyn R. Villanueva, provided guidance, support, and recommendations in finalizing the manuscript. Both authors critically reviewed and approved the final version of this manuscript for publication.

CONFLICT OF INTEREST

The authors declare that no financial, personal, or professional relationships with other individuals or organizations could be considered a conflict of interest.

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Opportunities from Unprecedented Challenges: The Lived Experience of School Leaders from COVID-19 Pandemic to Post-Pandemic Period

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ABSTRACT

This study delves into the lived experiences of school leaders from the COVID-19 or Coronavirus Disease pandemic to the post-pandemic period, aiming to identify, explain, and interpret their journey through this unprecedented period. The study was operationalized using the Interpretative Phenomenological Analysis (IPA) research design to address the objectives alongside the Thematic and Hermeneutical Analyses in data analysis and interpretation. The study illuminates the school leaders' experiences, their explanations of those experiences, and their interpretation through a grand theme. It concludes that there are opportunities from unprecedented challenges for pursuing education, implying a positive perspective that unprecedented challenges are surmountable. Thus, school leaders should become driven to maintain the continuity of education amidst inevitable challenges in the future. Moving forward, this insight suggests research directions, including longitudinal studies of school leaders' cross-cultural comparisons to identify cultural influences on crisis management and mixed-methods approaches for a deeper understanding of crisis response strategies. Furthermore, evaluating the impact of technological interventions, leadership development programs, stakeholder engagement strategies, and education policies for crisis management are recommended areas for future research.

Keywords: *lived experiences, school leaders, COVID-19 pandemic, post-pandemic period*

INTRODUCTION

The current situation in Romblon's Educational Landscape, specifically the Elementary Basic Education in Looc District, Looc, Romblon, is marked by the aftermath of the COVID-19 -pandemic. The sudden disruption and shift to remote learning, implementation of health and safety protocols, challenged financial and learning resources, collaboration and communication challenges, learning performance and assessments, adaptability and flexibility challenges, and preparedness and planning have significantly impacted the education of these elementary basic learning institutions. The pandemic left the leaders of Looc District Elementary Schools with valuable lessons, challenging their approaches to navigating education in unprecedented circumstances.

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The problem is situated within the geographical and cultural context of Romblon, Philippines, specifically at Looc District Elementary Schools. Looc District shares common features with the rest of the municipalities in the province of Romblon, such as its diverse population and unique educational landscape. Looc District Elementary Schools play crucial roles in providing elementary basic education opportunities to learners from various socio-economic backgrounds. However, the challenges posed by the COVID-19 pandemic upon the school leaders have underscored the need for targeted interventions and sustainable solutions to ensure that elementary basic education opportunities in Looc District, Looc, Romblon can continue to contribute to the socio-economic development of the province and the country under any challenging circumstances of the future.

Summary of Literature and Studies

School leaders are critically important key players in the school system when responding to pandemic challenges with solutions. In the study of Caño et al. (2023), they emphasize that school leaders must be able to build effective teams, foster a culture of collaboration

and teamwork, and leverage the expertise and resources of others to achieve goals.

Along with the World Organization's declaration of a global pandemic in March 2020 (WHO, 2020) due to the COVID-19 virus, education suffered disruption. According to Rani et al. (2022), such an abrupt disruption turned the world into a new arena immobilized by pandemic lockdowns, leading to the temporary closure of schools, colleges, and universities in almost all affected countries. About 90% of students from kindergarten through higher education experienced interruptions in their education (UNESCO, 2020). These then silenced the normality of many routine activities. Nevertheless, a few months later, COVID-19 Vaccines came and controlled the pandemic strike. This led to the resumption of education in the Philippines, including Looc District, Looc, Romblon, where DEPED or the Department of Education adopted the Basic Education Learning Continuity Plan (BELCP) for the School Year 2020-2021 (DO 012, 2020). The BELCP provided schools with options for learning modalities. The new normal stepped in and had its part in the learning continuity a year later. We had a sudden and forceful entry to adapting to the 'new normal' characterized by work-from-home setting, parents home-schooling their children in a new blended learning setting, lockdown and quarantine, and the mandatory wearing of face masks and face shields in public (Corpuz, 2021). A few more times passed, and the post-pandemic came along. According to Zaman (2023), the post-pandemic period is distinguished by reduced pandemic occurrences. There has been a modification in the socio-economic environment, which has led to forced migration and constitutional instability. In the study of Estrellado (2021), it surfaced that the Philippine government and academic institutions maintain a hopeful outlook on the resumption of face-to-face (F2F) classes, including the policies and a contingency plan with a budget to address the widespread impact of COVID-19. Today, the District of Looc continues pursuing education from the past pandemic's shadows. How well the schools can go along with another inevitable unforeseen trial remains to be unfolded.

Objectives of the Study

The study aimed to interpret the experiences of school leaders from the COVID-19 pandemic to the post-pandemic period via an informed theoretical application.

Specifically, it sought answers to the following:
 1. Identify the experiences of school leaders from the COVID-19 pandemic to the post-pandemic period.
2. Explain the experiences of school leaders from the COVID-19 pandemic to the post-pandemic period.

3. Interpret the experiences of school leaders from the COVID-19 pandemic to the post-pandemic period via an informed theoretical framework.

METHODOLOGY

Research Design

This study employed an Interpretative Phenomenological Analysis (IPA) to interpret the qualitative data. IPA focuses on how individuals make sense of their experiences within their personal and social contexts (Smith & Nizza, 2021).

Research Method

A qualitative phenomenological approach involved one-on-one interviews with ten semi-structured questions to explore the participants' lived experiences. Thematic Analysis (Braun & Clarke, 2006) and Hermeneutical Analysis were used to facilitate the comprehensive analysis and interpretation of data.

Research Locale and Time of the Study

The study took place in Looc District, Romblon, covering thirteen elementary schools. The research explored the lived experiences of school leaders from the COVID-19 pandemic to the post-pandemic period.

Population and Samples of the Study

The population included school leaders from Looc District Elementary Schools, specifically principals, head teachers, or teachers-in-charge who led their schools during the pandemic.

Population Selection Procedure

The purposive selection was used, selecting nine school leaders based on criteria such as experience in school leadership during the pandemic, health condition, permanent status, and willingness to participate in one-on-one interviews.

Research Instrument

Semi-structured interview questions were developed to gather detailed lived experiences from the school leaders. These questions served as a tool for collecting rich and comprehensive data.

Validation and Reliability of the Instrument

The interview questions were validated by three expert researchers using a ten-point validation checklist. For reliability, the transcribed responses were presented to the interviewees for verification, accuracy, and corrections.

Data Gathering Procedure

The qualitative data were collected following a one-on-one interview protocol with the study

Table 1. Themes of Experiences of School Leaders from the COVID-19 Pandemic to the Post-Pandemic Period

Responses	Codes	Themes of Experiences
Teachers had a challenging time	Challenge	
There was no allocated budget	No budget	
Nothing was set aside for the unexpected arrival of the pandemic	Unprecedented event	
There were delays in the DEPED budget release	Budget delays	
Though the budget was available, printers were not available in the market.	Unavailable printers	Resource Challenges
The things we purchased for printing were not enough	Insufficient Printing materials	
Teachers faced difficulties in producing modules due to a lack of supplies such as coupons, inks, and printers	Lack of supplies	
Insufficient number of printers	Insufficient printer	
Despite the challenges, we were able to continue educating our students and keep them safe.	Continued education	
As a school leader, I faced the challenge of adjusting to distance learning	Adjusting to modality	
How to conduct enrollment when there were no face-to-face classes?	Enrollment Problem	
DEPED provided an online orientation about learning modalities to choose from	Choosing learning modality	
DEPED sent a memorandum on choosing any learning modality that would fit the school situation.	Choosing learning modality	Educational Adaptation
Manage modular distance learning	Managing modality	
In choosing modular distance learning, teachers faced several problems like the delivery of learning goods	Delivering Learning	
As a school leader during the COVID-19 pandemic and post-pandemic period, I experienced several challenges like students had to learn at home using modules	Home Learning	
During the COVID-19 pandemic, educating learners became very challenging due to the health threats.	Health threats challenge education	
Combat the spread of the COVID-19 virus in the school.	Combatting COVID-19	
Protecting oneself from getting afflicted with the virus was another big thing at that time	Protecting oneself	
Teachers faced challenges in the, distribution, and returning of modules as no one was allowed to stay outside due to the pandemic.	No one stayed outside	Safety and Health Measures
Along the modular distance learning, the school prioritized the safety and health of everyone involved in continuing education	Prioritizing safety and health	
Address concerns about the health and safety of students and teachers	Health and safety	
We cannot predict what the future holds	Cannot predict the future	
Anticipate and handle any emergencies	Anticipate	
As a school leader, it's crucial to be prepared for any eventualities in the future, as we can't predict what might happen.	Be prepared	Preparation
During my learning journey, I recognized the importance of being prepared for any circumstances	Being prepared	
Addressing unexpected circumstances like the pandemic.	Addressing unexpected circumstance	

Table 1. Themes of Experiences of School Leaders from the COVID-19 Pandemic to the Post-Pandemic Period(cont'd)

Responses	Codes	Themes of Experiences
Became more resilient and prepared to overcome challenges	Resilient and prepared	Resilience and Preparation
As a school leader, I learned not to give up on the challenges and prepare	Not giving up and prepare	
The MLGU, under the leadership of the mayor also did a great job in helping the school with medical supplies like facemasks, gallons of alcohol, and others	MLGU gave help	School-Community Collaboration
We asked for help from barangay officials in the distribution and return of modules	Distribution and return of modules	
Teachers and parents regularly followed up on the students' tasks	Following up	
The Barangay Local Government Unit was also helpful	Helpful BLGU	
Parents supported	Parental support	Parental Involvement and Support
Parents became more active in being partners of the school	Active parent partners	
The parent leaders stepped in	Parent leaders	
During the full face-to-face classes a large number of learners hardly read and do basic numeracy skills, particularly those in the primary grades	Poor literacy and numeracy skills	Home Learning Concerns
The retrieved modules showed that almost all learners provided correct answers in the modular tasks	Almost all learners gave correct answers in modules	
There were low literacy and numeracy learning performances or no learning at all during modular learning	Learning Performances	
It appeared that many of the outputs were not their work but instead were completed by parents, older siblings, or even neighbors.	Not the learners' work	
During the time of using the modular learning modality, teachers were concerned about the learning performance of the learners.	Concerned about learning performances	
Helped teachers manage the stress and pressure brought by their work	Manage work stress	Teachers' Well-Being
There was no stable internet in the area, and most children did not have gadgets like cellphones and laptops, technology intervention	No internet and gadgets	Technology Deprivation

participants using ten semi-structured questions anchored on the research objectives. A voice recorder was used to capture responses. Significant physical gestures and vocal changes were noted during the interviews. After the conduct of one-on-one interviews, transcribing responses verbatim was done and reviewed multiple times for accuracy.

Data Analysis

Initially, the researcher studied related literature and lectures on qualitative data analysis to understand how to avoid biases. The researcher eventually stood at the midway point, acting as a hybrid interpreter of the data to address concerns about biases. Next, the Thematic Analysis of Braun and Clarke (2006) was used for the first two specific objectives, where the researcher familiarized himself with the data by reading the transcribed responses several times. Next was converting significant ideas into codes. Then, codes were combined into themes. After this, the themes were reviewed by returning to the transcribed responses for validation. Analyzing the importance of themes was done next. Finally, the themes were reported. For the third specific objective, Hermeneutic Analysis facilitated the interpretation of the study participants' themes of experiences and explanations of their

Table 2. Themes of Explanation of the Participants' Experiences

Themes of Experiences	Explanation/Action Taken	Themes of Explanation
Resource Challenges	The teachers took the initiative to solicit donations from possible donors around the community, such as parents, neighbors, and others.	Resourcefulness
	We kept in touch with individuals who could help augment our needs until the budget arrived	
	We posted on Facebook our need to have more printing materials where well-off parents extended their financial help.	
	The teachers took photos of the modular tasks and sent them to the pupils using an Android cellphone and available internet signal.	
	Teachers just did the spirit of sharing the use of printers.	Sharing
Educational Adaptation	Safety and health protocols were put in place for the benefit of both children and parents and everyone followed them just to continue education	Compliance with Protocols
	I attended division-initiated online training, which identified modular distance learning as the top priority delivery mode	The Need to Attend Relevant Training
	Teachers conduct house-to-house enrollment with precautionary measures	Decisiveness
	I met with my teachers to talk about the learning modality and reached a point where I pushed to choose modular distance learning	
	We agreed to use modular distance learning and allocated some funds from our MOOE to purchase a printer for module reproduction.	
Educational Adaptability	Teachers used group chats and other online communication means to manage the chosen modality	Being a Solution-Seeker
	We made adjustments, especially in connection with the module reproduction just to continue with the modality	
	Along with using the modality, we implemented systematic procedures that followed the existing public health and safety protocols	Flexibility and Compliance with Protocols
Safety and Health Measures	The BLGU officials were asked to help in distributing and retrieving the modules in designated areas in barangay sitios.	The Need for Stakeholders' Coordination
	Used the materials given by the MLGU to control the spread of the virus	Using Precautionary Measures
	Embraced vaccination	The Need for Vaccination
	Followed the protocols imposed by the authorities.	Compliance with Protocols
	As a school leader, I made it mandatory for parents to ensure that their children strictly comply with the community and school's health protocols	Mandatory Compliance with Protocols

Table 2. Themes of Explanation of the Participants' Experiences(cont'd)

Themes of Experiences	Explanation/Action Taken	Themes of Explanation
Resilience and Preparation	Have a contingency plan	Contingency Plan
	Having the Lord Almighty at the center and prepare	The Need for Spiritual Resilience and Preparation
Preparation	We should always prepare ahead of time for any national emergency	The Need to Prepare Ahead of Time
	It's important to set plans in advance	The Importance of Advance Planning
	I recognized the importance of being prepared for any circumstances	The Importance of Preparing for Circumstances
	Fostering resilience to handle difficult situations	Fostering Resilience
	The mayor solicited donations from benevolent families to provide the school with the necessary equipment to combat the spread of the COVID-19 virus in the school."	A Support System
School-Community Collaboration	We asked for help from barangay officials in the distribution and return of modules by assigning them to every dropping area per sitio which they supported.	The Need for Stakeholders' Coordination
	We encouraged parents to ask questions or seek clarification when needed about their children's home-learning	Encouragement for Participation
	The BLGU is providing the school with medical supplies and helping in implementing health and safety protocols in the community.	BLGU's Engagement with the School Efforts
Parental Involvement and Support	Parents gave support when asked to donate some amount for purchasing printing supplies	A Support System
	Parents keeping up their part in the delivery and retrieval of learning outputs.	
	Although it was taxing for parents to help in the distribution and retrieval of modules, they were willing to become partners with the school in bridging the learning gap.	Commitment
Home Learning Concerns	There was less improved learning or worse was the downgrading of basic skills like reading and numeracy.	Downgrade in Basic Skills
	There are parents with poor educational attainment or those who had not attended school that affected their way of helping children's home learning.	Parents' Poor Educational Background
Teachers' Well-Being	When teachers are given time to have symposium on work stress management, this brought relief and added confidence to them in facing the taxing work brought about by the pandemic	Good Effect of Stress Management
Technology Deprivation	Not many have electronic gadgets and internet connection because most families in the area had low economic status.	Low Economic Status

experiences, giving way to the overall concept of their lived experiences. Interpretative Phenomenological Analysis was integrated throughout the processes to ensure a deep understanding of the participants' lived experiences.

Ethical Considerations

The researcher observed the highest possible ethical attributes during this qualitative study to maintain reliability, validity, and trustworthiness in all parts of the research.

RESULTS AND DISCUSSION

The study illuminates the school leaders' themes of experiences, themes of explanations of their experiences, and the grand theme in the study's theoretical framework. Their themes of experiences reflected in Table 1 are as follows: (1) Resource Challenges which, according to the first study participant, "Teachers had a challenging time in having no allocated budget for the unexpected arrival of the pandemic." (2) Educational Adaptation, just like what the second study participant said, "I faced the challenge of adjusting to distance learning." (3) Safety and Health Measures according to the second study participant, "Protecting oneself from getting afflicted with the virus was another big thing at that time." (4) Preparation and Resilience according to the fifth study participant, "As a school leader, it is crucial to be prepared for any eventualities in the future, as we cannot predict what might happen." (5) School-community collaboration just like what the fourth study participant said, "They asked for help from barangay officials in the distribution and return of modules." (6) Parental Involvement and Support as the fourth study participant disclosed that "Parents became more active in being partners in the school." (7) Home-learning Concerns as the ninth study participant disclosed, "During the time of using the modular learning modality, teachers were concerned about the learning performance of the learners." (8) Teachers' Well-Being, as the eighth study participant emphasized, "There was a need to help teachers manage the stress and pressure brought on by their work." Finally, Technology Deprivation, as the fourth study participant mentioned, "There was no stable internet in the area, and most children did not have gadgets like cellphones and laptops." The themes of the experiences of the school leaders display significant challenges to pursuing education under unprecedented circumstances, such as the pandemic strides that passed.

The themes of explanations of school leaders' experiences in Table 2 highlight the following: Resource Challenges were addressed through resourcefulness, including soliciting donations and sharing resources;

Educational Adaptation involved compliance with health protocols, decisive actions, and stakeholder coordination to ensure continued education; Safety and Health Measures emphasized precautionary measures and vaccination; Preparation and Resilience underscored the need for contingency planning; School-Community Collaboration and Parental Involvement were crucial in supporting educational efforts; Home-Learning Concerns and Technology Deprivation highlighted disparities in learning environments; and Teachers' Well-Being focused on managing work-related stress. These themes of explanations of the school leaders' experiences show multifaceted approaches and concerns in addressing prevailing circumstances during the pandemic strides

The school leaders' themes of experiences and explanations of their experiences relate to some reviewed literature, such as budget constraints and insufficient materials, which are addressed by soliciting donations and resource sharing (Caño et al., 2023). The abrupt transition to modular learning and stringent health protocols requiring effective educational adaptations and stakeholder coordination align with the Department of Education's Learning Continuity Plan (DO 012, 2020). Emphasizing preparation and resilience, these leaders developed advanced plans and contingency measures, reflecting the resilience needed in educational settings discussed by Estrellado (2021). Collaborative efforts with local government units and active parental involvement were crucial for maintaining educational continuity. Challenges like poor literacy, numeracy skills, and technology deprivation also highlighted the need for targeted interventions and robust support systems, underscoring the essential role of effective leadership and community collaboration in overcoming educational disruptions. Moreover, the studies by Šapale et al. (2021), Chatzipanagiotou and Katsarou (2023), Aberle and Hoekstra (2020), Estrellado (2021), and Bello et al. (2022) collectively highlight the challenges faced by educational institutions, the critical role of leadership in crisis management, and the importance of adaptability and resilience in navigating disruptions in the education sector. The study's findings corroborate the identified themes from the literature, such as resource constraints, challenges in transitioning to remote learning, the importance of equitable access to educational technology, and the need for proactive crisis management strategies. The strategies employed by school leaders, including collaboration with stakeholders, proactive decision-making, and adaptation to alternative learning modalities, resonate with the recommendations proposed in the reviewed literature. The accounts lead to the grand theme of the study's theoretical framework in Figure 1, stating that

Themes of Experiences **Themes of Explanations of the Experiences** **Interpretation of the Lived Experiences of School Leaders**

Resource Challenges →
--Resourcefulness
--Sharing

Educational Adaptation →
--Compliance with Protocols
--The Need to Attend Relevant Training
--Decisiveness
--Being a Solution-Seeker
--The Need for Stakeholders' Coordination
--Flexibility and Compliance with Protocols

Safety and Health Measures →
--Using Precautionary Measures
--The Need for Vaccination
--The Need for Stakeholders' Coordination
--Compliance with Protocols
--Mandatory Compliance with Protocols

Preparation and Resilience →
--The Need to Prepare Ahead of Time
--Contingency Plan
--The Need for Spiritual Resilience and Preparation
--The Importance of Advance Planning
--The importance of Preparing for Circumstances
--Fostering Resilience

School-Community Collaboration →
--A Support System
--The Need for Stakeholders' Coordination
--Encouragement for Participation
--BLGU's Engagement with the School Efforts

Parental Involvement →
--A Support System
--Commitment

Home Learning Concerns →
--Downgrade in Basic Skills
--Parents' Poor Educational Background

Teachers' Well-Being →
Good Effect of Stress Management

Technology Deprivation →
Low Economic Status

OPPORTUNITIES FROM UNPRECEDENTED CHALLENGES: THE LIVED EXPERIENCE OF SCHOOL LEADERS FROM COVID-19 PANDEMIC TO POST-PANDEMIC PERIOD
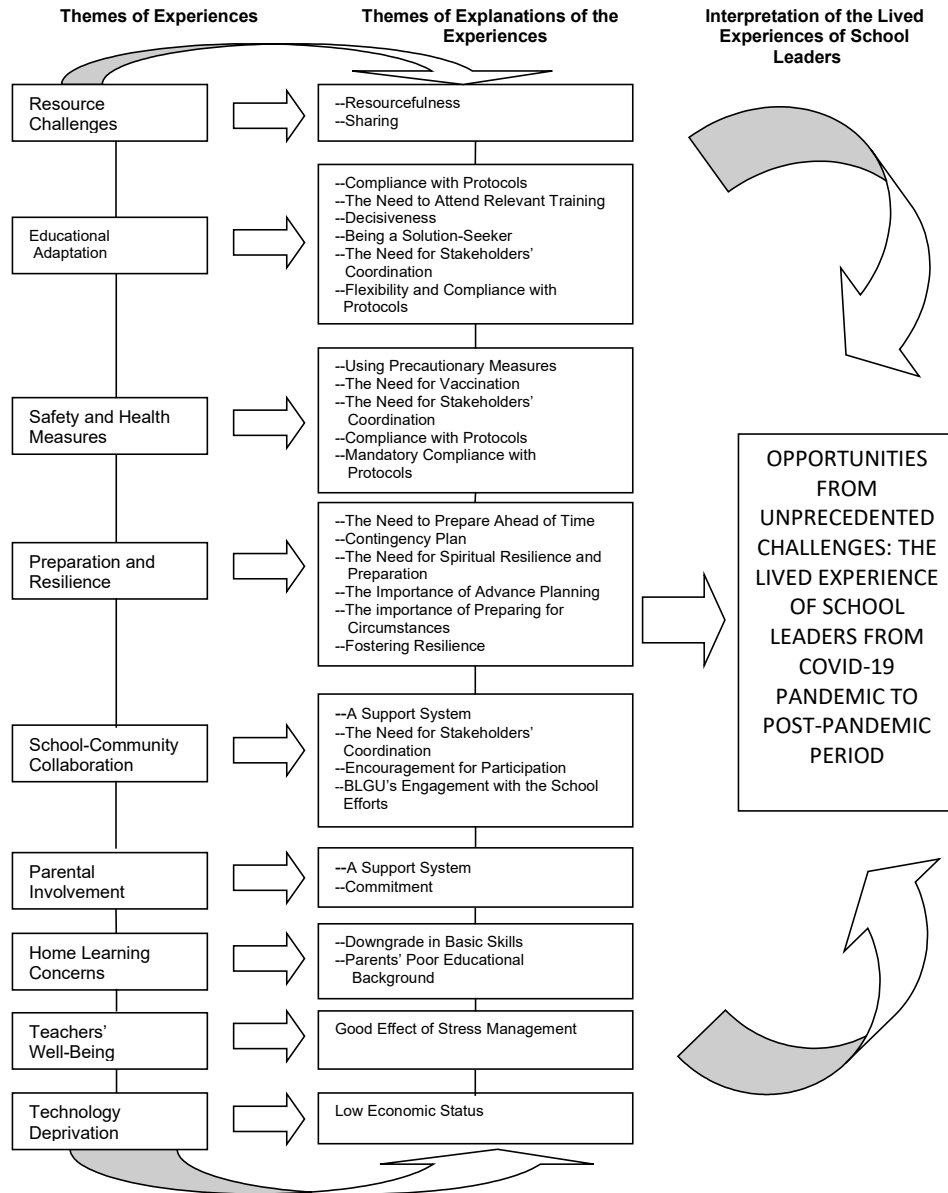
Figure 1. The Theoretical Framework of the School Leaders' Lived Experiences from the COVID-19

unprecedented challenges like those from the past pandemic still provide opportunities for school leaders to hold on to in pursuing education. The study by Francisco and Nuqui (2020) supports this, stating that the pandemic opens a stronger school community and external partnerships, especially with parents and guardians, so schools create opportunities. This conforms to the themes of explanations of the school leaders' experiences.

This dissertation extends beyond academics to practical educational policy and leadership development applications. It significantly contributes to the existing body of knowledge by bridging the gap between theory and practice. The study informs the need for evidence-based decision-making in education policy and leadership development, contributing to the resilience and sustainability of educational systems in the face of unprecedented challenges.

CONCLUSION

Based on the study's findings, it is concluded that unprecedented challenges like those from the past pandemic still provide opportunities for school leaders to hold on to in pursuing education. The study participants proved it with their themes of explanations on their lived experiences where they manifested

resourcefulness and sharing, being solution seekers, need for stakeholders' coordination, fostering resilience, getting a support system, and commitment. These insights imply a positive perspective that unprecedented challenges are surmountable. Thus, school leaders should become driven to maintain the continuity of education amidst inevitable challenges in the future.

AUTHORS' CONTRIBUTIONS

The contributions of each author to this study are outlined as Crisby N. del Mundo, Lead Author; Dr. Emelyn R. Villanueva, Co-Author.

Crisby N. del Mundo conceived and designed the study, collected and analyzed the data, interpreted the results, and drafted the manuscript. Dr. Emelyn R. Villanueva provided invaluable guidance, support, and constructive feedback throughout the research process. Dr. Villanueva's expertise and mentorship significantly contributed to refining the research methodology, interpreting the findings, and enhancing the overall quality of the manuscript.

CONFLICT OF INTEREST

The authors declare that no financial, personal, or professional relationships with other individuals or organizations could be considered a conflict of interest.

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Demographic Profile, School Heads' Supervisory Practices, and Teachers' Performance: Towards Corresponding Intervention Program

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ABSTRACT

This study examines the demographic profile of secondary school heads and secondary teachers, school heads' supervisory practices, and teachers' performance in the Schools Division of Romblon. The research highlights significant findings by focusing on instructional leadership, learning environment, human resource management, and school leadership. Predominantly male, aged 40-49, and married, most school heads hold principal positions, have extensive experience, and have pursued higher education. The teaching workforce, mainly female and young, shows outstanding performance in content knowledge, pedagogy, and creating inclusive learning environments. Significant relationships were found between the supervisory practices of secondary school heads and teachers' performance. The study suggests diversified leadership roles, enhanced training for school heads in instructional leadership, and continuous professional development for teachers to maintain high-performance standards. Implementing mentorship programs and collaborative learning communities can further support these efforts. The findings underscore the need for tailored interventions to enhance educational leadership and teacher performance, ultimately improving student outcomes. Future research should include broader samples and qualitative methods to deepen understanding of supervision practices and their impact on teacher performance.

Keywords: *supervision practices, teachers' performance, intervention program, teacher, school heads*

INTRODUCTION

Formal education plays a vital role in both societal and individual development. The Philippine Constitution prioritizes access to quality education, and the Department of Education (DepEd) addresses this by ensuring instruction is appropriate and achievable in every organization. As part of this effort, the curriculum has shifted from Basic Education to the K to 12 Program. The Philippine Professional Standards for Teachers (PPST), implemented through DepEd Order No. 42, s. 2017, supersedes the National Competency-Based Teacher Standards (NCBTS) outlined in DepEd Order No. 32, 2009. These standards support personal growth and professional development, providing clear

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guidelines, indicators, and standards for professional teaching practices and performance.

Through the Results-Based Performance Management System (RPMS), DepEd meets its vision, mission, values, and strategic priorities, delivering quality instructional services to Filipino learners. The RPMS aligns with the PPST to effectively measure and evaluate supervisors' performance. This system helps teachers assess and improve their practices and professional growth plans, and it sets clear expectations for school heads in the performance evaluation process.

Despite these structured frameworks, challenges persist in the supervisory responsibilities of school heads. Significant issues include inadequate supervisor training, a strained rapport between teachers and school heads, and insufficient time for comprehensive school supervision. According to Ankoma-Sey and Marina (2016), school heads may often be competent but lack professional qualifications and continuing training to update their educational knowledge and skills required for proper supervision. This gap in training prevents school heads from overseeing every aspect of the school's instruction, posing a threat to teaching and

learning quality. Moreover, as Ampofo et al. (2019) noted, ample time during school supervision hinders principals from comprehensively inspecting all teaching and learning activities.

Recent educational policies and standards developments, such as the PPST and the RPMS implementation, have aimed to address these issues by providing structured guidelines and performance metrics. However, the effectiveness of these frameworks depends heavily on the proper training and execution by school heads, which remains an area of concern. These changes have led to the current situation where school heads must navigate these new standards while addressing existing supervision and teacher performance challenges.

This study is situated within the geographical and organizational context of the Schools Division of Romblon. It involves 51 secondary school heads, including Principals, Head Teachers, Teachers-in-Charge, and 569 secondary school teachers. The setting highlights the diverse roles and responsibilities of school heads and teachers within the educational framework of the Department of Education (DepEd) in Romblon.

Previous research has explored the roles and responsibilities of school heads and teachers in similar educational settings. Studies have highlighted the importance of effective supervision and professional development in enhancing teacher performance and student outcomes. However, significant gaps remain in understanding the direct relationship between school heads' supervisory practices and teachers' performance.

Research in other educational settings has revealed similar challenges and emphasized the need for continuous professional development and effective supervisory practices. Commonalities include the necessity for school heads to be well-trained and the importance of creating a supportive teacher environment. Differences often arise in specific cultural and organizational contexts, which can influence the implementation and effectiveness of supervisory practices.

Despite these insights, several aspects of the problem remain insufficiently explored. Questions about the specific impact of different supervisory practices of school heads on teachers' performance, the role of continuous professional development for school heads, and the influence of teacher perceptions on their performance are still unanswered. Additionally, the interplay between supervision and teacher motivation requires further investigation.

Filling these gaps is crucial for several reasons. Addressing these knowledge gaps can lead to developing targeted intervention programs to improve teacher performance and student outcomes. Understanding the specific supervisory practices that most effectively enhance teacher performance can

inform training programs for school heads, leading to better management and support for teachers. This study aims to contribute to this understanding by examining the relationship between school heads' supervisory practices and teachers' performance in the Schools Division of Romblon, providing valuable insights for policy-makers, educators, and administrators.

By addressing these gaps, this study sought answers to the following questions: What is the profile of secondary school heads regarding a. sex;b. age;c. civil status;d. position;e. length of years in service;f. highest educational attainment; and g. OPCRF rating?; What is the secondary school teachers' profile regarding a. sex; b. age; c. civil status; d. position; e. length of years in service; f. highest educational attainment; and g. IPCRF rating?; What is the level of school heads' supervisory practices regarding a. instructional leadership; b. learning environment; c. human resource management and development; and d. school leadership management and operations?; What is the level of secondary school teachers' performance in terms of a. content knowledge and pedagogy; b. learning environment and diversity of learners; curriculum and planning; and d. assessment and reporting? Is there a significant relationship between the teachers' profile and performance? Is there a significant relationship between the school heads' profile and supervisory practices? Is there a significant relationship between school heads' supervisory practices and teachers' performance?

The study aims to support DepEd administrators in identifying and addressing the needs for improvement within schools. It will also assist faculty members in enhancing their efficiency and adapting to new educational trends. Ultimately, the study will benefit students by ensuring they are taught by well-supported and motivated teachers, thereby improving their academic achievements. The findings of this study will serve as a foundation for developing programs to strengthen teacher performance and supervisory practices in schools.

METHODOLOGY

The primary goal of this study is to determine the relationship between the demographic profile of secondary school heads and secondary teachers, the supervisory practices of school heads, and the teachers' performance. To achieve these goals, the researcher used a non-experimental, descriptive-correlational design. This method focused on the present situation, describing the profiles of the respondents, the supervision practices of school heads, and the performance of secondary school teachers. The correlational aspect explored the relationships between these variables.

Table 1. Profile of the secondary school heads

Demographic Profile	Frequency	Percent	Rank
A. Sex			
Male	35	68.6	1
Female	16	31.4	2
Total	51	100.0	
B. Age			
30-39	9	17.6	3
40-49	21	41.2	1
50-59	18	35.3	2
60 and above	3	5.9	4
Total	51	100.0	
C. Civil Status			
Single	15	29.4	2
Married	34	66.7	1
Widower	2	3.9	3
Total	51	100.0	
D. Position			
Principal	24	47.1	1
Head Teacher	19	37.3	2
Teacher-In-Charge (TIC)	8	15.7	3
Total	51	100.0	
E. Length of Years in Service			
0-5	4	7.8	5
6-10	7	13.7	3
11-15	10	19.6	2
16-20	5	9.8	4
Above 20	25	49.0	1
Total	51	100.0	
F. Highest Educational Attainment			
With MA Units	13	25.5	2
CAR in MA	15	29.4	1
MA Graduate	9	17.6	3
With PhD Units	8	15.7	4
CAR in PhD	1	2.0	6
PhD Graduate	5	9.8	5
Total	51	100.0	
G. OPCRF Rating			
Very Satisfactory	5	9.8	2
Outstanding	46	90.2	1
Total	51	100.0	

Table 2. Profile of the secondary teachers

Demographic Profile	Frequency	Percent	Rank
A. Sex			
Male	167	29.3	2
Female	402	70.7	1
Total	569	100.0	
B. Age			
Below 30	190	33.4	1
30-39	167	29.3	2
40-49	120	21.1	3
50-59	5	10.4	4
60 and above	33	5.8	5
Total	569	100.0	
C. Civil Status			
Single	162	28.5	2
Married	373	65.6	1
Separated	13	2.3	4
Widower	21	3.7	3
Total	569	100.0	
D. Position			
Teacher I	253	44.5	1
Teacher II	129	22.7	2
Teacher III	126	22.1	3
Master Teacher I	44	7.7	4
Master Teacher II	17	3.0	5
Total	569	100.0	
E. Length of Years in Service			
0-5	161	28.3	2
6-10	224	39.4	1
11-15	52	9.1	5
16-20	59	10.4	4
Above 20	73	12.8	3
Total	569	100.0	
F. Highest Educational Attainment			
BS Graduate	172	30.2	2
With MA Units	241	42.4	1
CAR in MA	110	19.3	3
MA Graduate	35	6.2	4
With PhD Units	10	1.8	5
CAR in PhD	1	0.2	6
Total	569	100.0	
G. OPCRF Rating			
Satisfactory	4	0.7	3
Very Satisfactory	100	81.7	2
Outstanding	465	17.6	1
Total	569	100.0	

The researcher included 51 secondary school heads and 569 teachers in the entire Schools Division of Romblon under the Department of Education in the MIMAROPA region.

The researcher asked the school's division superintendent for permission to conduct the study. Likewise, she asked permission from the School Heads and teachers through letter requests to allow her to gather the data needed for her research. The questionnaires distributed to the responders had the aforementioned letter requests attached. To provide

Table 3. Level of supervisory practices of secondary school heads

Supervisory Practices	Med	Description	Level
1. Instructional leadership	4	SCMA	VS
2. Learning environment	5	SHL	O
3. Human resource management and development	5	SHL	O
4. School leadership management and operations	5	SHL	O
Overall	5	SHL	O

Scale	Description	Level
1	I am doing supervision below the expected standard. (SBE)	1 (Poor)
2	I am doing supervision slightly below the expected standard. (SSBE)	2 (Unsatisfactory)
3	I am doing supervision adequately and approximately the level of skill.(SAA)	3 (Satisfactory)
4	I am doing supervision competently and managed adequately. (SCMA)	4 (Very Satisfactory)
5	I am doing supervision at the highest level and well managed.(SHL)	5 (Outstanding)

important instructions, the researcher distributed the questionnaires personally. After two days of the questionnaires being distributed, the results were collected, allowing the respondents ample time to complete the survey.

The researcher ensured that the data presented and reported were honest and reliable. The results show that

Table 4. Level of teachers' performance of secondary school teachers

Teachers' Performance	Med	Description	Level
1. Content Knowledge and Pedagogy	5	ELA	O
2. Learning environment and diversity of learners	5	ELA	O
3. Curriculum and planning	5	ELA	O
4. Assessment and reporting	5	ELA	O
Overall	5	ELA	O

Scale	Description	Level
1	Performance was consistently below expectations and progress.(CBE)	1 (Poor)
2	Performance failed to meet expectations and goals.(FME)	2 (Unsatisfactory)
3	Performance met expectations in terms of quality of work.(MEQ)	3 (Satisfactory)
4	Performance exceeded expectations and goals.(EEG)	4 (Very Satisfactory)
5	Performance represents an extraordinary level of achievements.(ELA).	5 (Outstanding)

the overall reliability of school heads' supervisory practices was 0.925, indicating "excellent" internal consistency. The teachers' performance also had an "excellent" result with an overall reliability of 0.993. This means that the responses are highly reliable,

Table 5. Test of Significant Relationship between teachers' profile and teachers' performance

Teachers' Performance	Profile	χ^2	p-value	Decision
Content Knowledge and Pedagogy	Sex	10.557	0.032**	Reject H_o
	Age	11.773	0.464	Do Not Reject H_o
	Civil Status	11.953	0.216	Do Not Reject H_o
	Position	9.486	0.661	Do Not Reject H_o
	Years in Service	21.491	0.044**	Reject H_o
	Educational Attainment	11.316	0.730	Do Not Reject H_o
	IPCRF rating	8.658	0.008**	Reject H_o
Learning Environment and Diversity of Learners	Sex	9.234	0.050**	Reject H_o
	Age	11.515	0.777	Do Not Reject H_o
	Civil status	5.589	0.935	Do Not Reject H_o
	Position	8.508	0.932	Do Not Reject H_o
	Years in Service	9.844	0.875	Do Not Reject H_o
	Educational Attainment	14.768	0.790	Do Not Reject H_o
	IPCRF rating	7.038	0.046**	Reject H_o
Curriculum and Planning	Sex	2.058	0.725	Do Not Reject H_o
	Age	34.427	0.005**	Reject H_o
	Civil status	11.998	0.446	Do Not Reject H_o
	Position	30.173	0.017**	Reject H_o
	Years in Service	11.532	0.776	Do Not Reject H_o
	Educational Attainment	11.898	0.920	Do Not Reject H_o
	IPCRF rating	1.794	0.026**	Reject H_o
Assessment and Reporting	Sex	3.442	0.487	Do Not Reject H_o
	Age	15.208	0.509	Do Not Reject H_o
	Civil status	6.522	0.887	Do Not Reject H_o
	Position	12.592	0.399	Do Not Reject H_o
	Years in Service	11.854	0.754	Do Not Reject H_o
	Educational Attainment	13.788	0.542	Do Not Reject H_o
	IPCRF rating	2.030	0.013**	Reject H_o

Table 6. Test of Significant Relationship between school heads' profile and supervisory practices

Supervision Practices	Profile	χ^2	p-value	Decision
Instructional Leadership	Sex	0.838	0.658	Do Not Reject H_o
	Age	1.910	0.928	Do Not Reject H_o
	Civil Status	2.648	0.618	Do Not Reject H_o
	Position	11.471	0.022**	Reject H_o
	Years in Service	4.675	0.792	Do Not Reject H_o
	Educational Attainment	8.373	0.592	Do Not Reject H_o
	OPCRF rating	5.765	0.056	Do Not Reject H_o
Learning Environment	Sex	0.236	0.889	Do Not Reject H_o
	Age	5.710	0.456	Do Not Reject H_o
	Civil Status	8.998	0.061	Do Not Reject H_o
	Position	3.305	0.508	Do Not Reject H_o
	Years in Service	19.413	0.013**	Reject H_o
	Educational Attainment	18.993	0.040**	Reject H_o
	OPCRF rating	8.592	0.014**	Reject H_o
Human Resource Management & Development	Sex	0.259	0.611	Do Not Reject H_o
	Age	4.030	0.258	Do Not Reject H_o
	Civil Status	2.519	0.284	Do Not Reject H_o
	Position	0.533	0.766	Do Not Reject H_o
	Years in Service	8.069	0.089	Do Not Reject H_o
	Educational Attainment	6.104	0.296	Do Not Reject H_o
	OPCRF rating	5.765	0.016**	Reject H_o
School Leadership Management & Operations	Sex	0.958	0.619	Do Not Reject H_o
	Age	9.045	0.171	Do Not Reject H_o
	Civil Status	4.779	0.311	Do Not Reject H_o
	Position	4.850	0.303	Do Not Reject H_o
	Years in Service	13.978	0.082	Do Not Reject H_o
	Educational Attainment	9.596	0.477	Do Not Reject H_o
	OPCRF rating	10.163	0.006**	Reject H_o

ensuring the findings and conclusions of this study are dependable. The following statistical treatment was employed in processing the data: Descriptive statistics were used to present the nature of the variables involved. Frequency counts, percentages, and median were used to score and interpret the descriptive data on the demographic profile of school heads and teachers, supervisory practices of school heads, and teachers' performance. The chi-square test was used at a 5% confidence level to test the relationship between teachers' demographic profile and teachers' performance, school heads demographic profile and supervisory practices, and supervisory practices and teachers' performance.

RESULTS AND DISCUSSION

Table 1 reveals that most school heads in the Schools Division of Romblon are male, with a significant portion falling within the 40-49 age bracket and married. Additionally, many school heads hold principal positions, have extensive experience in the education sector (over 20 years), and have achieved outstanding ratings in their Overall Performance Commitment and Review Form (OPCRF). Furthermore,

some school heads have completed the academic requirements in their respective master's programs.

This information sheds light on the demographic and professional profile of school leaders in the Division, indicating potential trends and areas for consideration in leadership development, succession planning, and policy formulation. Understanding the characteristics and achievements of school heads can help tailor support mechanisms, training programs, and initiatives to enhance leadership effectiveness and promote continuous improvement in educational management and governance within the division. This finding contradicts Lazaro's (2018) study, where females outnumbered male school heads in his study covering the realm of MIMAROPA. According to him, teaching still appeared dominated by females more inclined to mothers' task of teaching learners.

Table 2 shows that most of the teaching workforce in the Schools Division of Romblon is predominantly female, with a significant portion of teachers being relatively young and married. Additionally, many teachers hold entry-level positions (Teacher I), have moderate tenure (6 to 10 years), and have pursued further education by earning units in master programs. Furthermore, most teachers have received outstanding ratings in their Individual Performance Commitment and Review Form (IPCRF). This information provides

Table7. Test of significant relationship between supervisory practices of school heads and teachers' performance

Supervision Practices	Teachers' Performance	χ^2	p-value	Decision
Instructional Leadership	CKP	9.745	0.045**	Reject H_o
	LEDL	9.611	0.022**	Reject H_o
	CP	6.392	0.041**	Reject H_o
	AR	12.807	0.046**	Reject H_o
Learning Environment	CKP	16.931	0.010**	Reject H_o
	LEDL	18.715	0.005**	Reject H_o
	CP	8.738	0.068	Do Not Reject H_o
	AR	27.146	0.000**	Reject H_o
Human Resource Management & Development	CKP	8.504	0.014**	Reject H_o
	LEDL	10.326	0.016**	Reject H_o
	CP	2.519	0.029**	Reject H_o
	AR	10.667	0.014**	Reject H_o
School Leadership Management & Operations	CKP	5.134	0.274	Do Not Reject H_o
	LEDL	5.465	0.486	Do Not Reject H_o
	CP	13.517	0.036**	Reject H_o
	AR	12.729	0.048**	Reject H_o

Legend: CKP - content knowledge and pedagogy
       LEDL - learning environment and diversity of learners
       CP - curriculum and planning
       AR - assessment and reporting

insights into the demographic and professional characteristics of the teaching staff in the division, which can inform targeted recruitment strategies, professional development initiatives, and resource allocation to support and further enhance the quality of education delivery in the region. According to Auden (2019), demographic profiles such as age, sex, position, years in service, and educational attainment determine every teacher's level of teachers' performance and productivity. This requires teachers to have a positive and proactive attitude, such as responsiveness, initiative, inventiveness, and adaptive sensibility, which can increase teachers' performance.

Table 3 highlights the four supervisory practices of secondary school heads. The overall median is 5, supervisory at the highest level and well-managed, implying an "Outstanding" level. This means that while school heads effectively manage administrative aspects of the school, there may be opportunities for further development or support in enhancing their role in guiding and supporting instructional practices among teachers. Addressing this improvement area could lead to even greater overall effectiveness in school leadership and improved educational outcomes. The result is supported by the study of Kintanar (2017), which states that school heads in public schools are proficient in their supervision practices. Furthermore, it also supports the result of Varona (2017), who concluded that school heads exhibit highly positive attitudes towards school-community partnership, and Victor (2017), who found that the school heads have managerial competencies for effective supervision practices; however, the result also

agrees his findings that school heads have managerial competencies for the effective supervision practices.

Table 4 above shows the performance of secondary school teachers. Their performance is based on the four practices mentioned above, and the results are great, with an overall median result of five, which means that the four practices are perfect and suitable to measure the level of performance of school teachers. In addition to that excellent performance, it follows the description results, which is an extraordinary level of achievement with an outstanding result on all the school teachers' performance. It simplifies that the four practices above have a very good influence on school teachers' performance. This implies that these teachers possess a high level of competence and proficiency in key areas essential for effective teaching and student learning. Such outstanding performance could contribute positively to student achievement and overall educational outcomes within the secondary school setting. Gerumi's (2002) research findings reveal that the teachers had outstanding performance ratings and performed beyond the target.

Table 5 reveals the relationship between teachers' profiles and teachers' performance. It was found that sex, years in service, and IPCRF rating of the respondents were significantly related to the content knowledge and pedagogy with a sig value of 0.032, 0.044, and 0.008. In the learning environment and diversity of learners, it was found that sex and IPCRF rating of the respondent have a significant relationship with a sig. value of 0.050 and 0.046, then the profile like age, position, and IPCRF rating were significantly related to the curriculum and planning (.005, .017,.026);
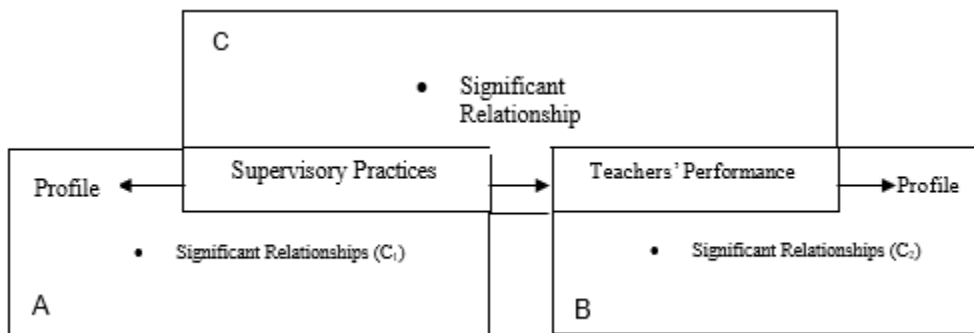
Figure 1. Corresponding Intervention Program

lastly, among the seven profile variables of the respondents, the IPCRF rating has a significant relationship to assessment and reporting with a sig—value of .013.

Table 6 reveals the relationship between secondary school heads' profiles and supervisory practices. Respondents' position was significantly related to instructional leadership in the seven profile variables, with a sig value of .022. The years in service, educational attainment, and OPCRF rating of the respondents have a significant relationship to the learning environment with a sig. value of .013, .040, and .014, then the OPCRF rating was significantly related to human resource management and development and school leadership management and operations (.016 and .006).

Table 7 reveals the relationship between supervisory practices of secondary school heads and teachers' performance utilizing the four variables: Content Knowledge and Pedagogy, Learning Environment and Diversity of Learners, Curriculum and Planning, and Assessment and Reporting as dependent variables. Supervision practices of school heads in Instructional Leadership and Human Resource Management were significant and appeared in the four variables of teacher performance as Content Knowledge and Pedagogy, Learning Environment and Diversity of Learners, Curriculum and Planning, and Assessment and Reporting, while in Learning Environment, almost of teacher performance variables were very significant except "Curriculum Planning", as appeared in the Asymp. Sig. column, which was .010, .005, and .000. the variables had probability values lower than a 1% significance level.

Accordingly, school heads' supervisory practices on school leadership management and operations based on the statement indicators inherent to their functions had a significant relationship to the two (2) variables of teacher performance. On the other hand, the content knowledge and pedagogy, learning environment, and

diversity of learners had no significant relationship with asymptotic significant values of .274 and .486.

CONCLUSION

Based on the advanced hypotheses, the conclusions were drawn from the results; specific characteristics within teachers' profiles influenced their content knowledge and pedagogy performance. Both sex and performance ratings influence how teachers handle the learning environment and diverse student populations. Age, position, and IPCRF rating affect how teachers approach curriculum development and planning. Moreover, the IPCRF rating provided valuable insights into how teachers conduct assessment and reporting practices. School heads in different positions demonstrated varying levels of effectiveness in guiding instructional practices. Their years in service, educational attainment, and OPCRF rating influenced how educators created and managed learning environments for their students. Furthermore, OPCRF ratings provided valuable insights into how effectively school heads managed human resources and overall school operations.

How school heads supervise and manage teachers influences their performance. The quality of the learning environment might impact teachers' proficiency in subject matter and teaching methods. It may also imply that how teachers accommodate diverse student populations is influenced by the learning environment created by school heads. Similarly, the environment affects teachers' assessment practices and student progress reporting. On the other hand, how school heads manage the school's overall operations impacts teachers' curriculum development and planning. Effective school management influences how teachers conduct assessments and report student progress.

Based on the preceding findings and conclusions, the researcher recommends Figure 1. This framework shows that there was a corresponding intervention program if the result of profiling has no significant

relationship with either the supervisory practices of school heads or teachers' performance. In contrast, a sustainability intervention program will occur if the results have a significant relationship. Furthermore, the basis of profiling to determine whether there was a corresponding intervention or sustainability both on the supervisory practices of school heads and teachers' performance depends on the outcome of the study, and you can see in the above diagram the connection of profiling on supervisory practices and teachers' performance.

Diversify leadership roles by actively promoting opportunities for female educators to ascend to principal positions. May implement succession planning strategies to address the impending retirement of school heads within the 40-49 age bracket and with over 20 years of experience. Recognize and reward outstanding performance while facilitating access to advanced education programs for those interested in furthering their qualifications. In order to improve the teaching workforce in the Schools Division of Romblon, targeted initiatives for career advancement and professional development, especially for female educators, are recommended. These initiatives include mentorship, leadership training, and access to advanced education programs. Recognizing and rewarding outstanding performance will motivate educators to excel. By implementing these strategies, the division can empower teachers and improve educational outcomes for students in Romblon.

The performance of school heads in the Schools Division of Romblon can be improved through targeted training, and support in instructional leadership is recommended. This includes professional development focusing on instructional leadership strategies, curriculum development, and fostering continuous improvement. Implementing mentorship programs with experienced school leaders can further enhance instructional leadership skills. By addressing this aspect, school heads can better lead and support their schools, benefiting educators and students. To maintain the exceptional performance of secondary school teachers in the Schools Division of Romblon, ongoing support for professional development is advised. This includes training in innovative teaching methods, diversity and inclusion, curriculum design, and assessment practices. Encouraging collaboration among teachers to share best practices further enriches their skills. By prioritizing the continuous growth of secondary school teachers, the division can uphold educational excellence and ensure students' success in Romblon.

School heads' supervision and management practices greatly influence teachers' performance in the Schools Division of Romblon. The quality of the learning environment, shaped by school heads, significantly impacts teachers' proficiency and ability to support diverse student populations. Furthermore, school management practices impact various aspects of teaching, including curriculum development, planning, assessment, and reporting student progress. To optimize teacher performance, it is crucial to prioritize improving supervision practices and fostering a supportive learning environment that encourages effective teaching and learning.

AUTHORS' CONTRIBUTIONS

D.C. conceived and designed the study, collected and analyzed the data, interpreted the results, and drafted the manuscript. J.D. provided essential guidance, support, and feedback throughout the research process.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Utilization of Locally-Based Reading Resources in Improving Science Concept Comprehension among Grade 9 Learners

Hazel Joy F. Dela Austria[1] and John Philip I. Ramos[2]

ABSTRACT

The study aimed to assess the effectiveness of locally-based reading resources (LBRR) on the comprehension of science concepts among ninth-grade learners at Odiongan National High School. A quasi-experimental design was employed to achieve this, wherein two groups were tested using a non-equivalent pre- and post-test setup. The sample comprised ninth-grade learners from Odiongan National High School, selected through purposive sampling. Two sections were chosen, with 31 students in each group. The samples were selected due to their similar average grades in Science during the second quarter of the school year 2023-2024. Data collection utilized a teacher-made test, validated and reliability-tested administered to the treatment group (exposed to LBRR) and the control group (exposed to DepEd Learning Material). Statistical analysis involved using mean and standard deviation, with a one-way analysis of covariance (ANCOVA) employed to assess the effect of LBRR as an intervention. The findings indicated that post-test results demonstrated a notable difference, with the treatment group showing a higher mean score. The effect size was found to be medium, further supporting the significance of the results. The study concluded that LBRR effectively enhances science concept comprehension among ninth-grade learners at Odiongan National High School based on these outcomes. This conclusion was drawn from the observed improvement in post-test scores following the implementation of LBRR.

Keywords: *literacy in science, scientific literacy, locally-based reading resources (LBRR), Deped learning material, science concept comprehension, pre-and post-test*

INTRODUCTION

Reading comprehension and scientific literacy are crucial to academic success, particularly in subjects like Science. Enhancing learners' literacy in Science facilitates the development of their scientific comprehension and inquiry abilities (State Government of Victoria, Australia, 2019).

The Department of Education (DepEd) remains committed to the continuous efforts of improving learners' academic achievements, addressing the challenges of low reading proficiency levels as identified in both national and international large-scale assessments.

A study by Calleja et al. (2023) used machine learning to identify 15 factors predicting poor science literacy among Filipino students in PISA 2018, including metacognitive reading strategies, classroom experiences, motivation, and family background, highlighting the need for targeted interventions.

The Department of Education emphasizes enhancing reading proficiency and comprehension through the DepEd Memorandum No. 173 of 2019 while Republic Act 10533 promotes a flexible, locally-adapted curriculum and the use of locally produced teaching materials.

The researchers acknowledge the necessity of implementing interventions particularly in strengthening literacy skills including utilizing locally-based reading resources (LBRR) to improve science concept comprehension among ninth-grade learners at Odiongan National High School.

Integrating literature and storytelling in science education has been shown to captivate students' interest, provide context for the material, and demonstrate the genuine application of storytelling in science, making

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the subject matter more relevant (MacNeil et al., 2017; Schwartzbach-Kang & Kang, 2018). Additionally, research indicates that embedding scientific content in a narrative format can enhance comprehension, retention, and personal connections to the content (Arya & Maul, 2012, as cited in MacNeil et al., 2017).

The effectiveness of localized reading materials in improving comprehension has been highlighted in various studies. Gallano (2019) found that using reading materials tailored to local contexts ignited students' enthusiasm for reading and facilitated better comprehension. Similarly, Angeles et al. (2022) reported that localized reading resources significantly improved students' reading skills, supporting their use for both beginning and struggling readers.

Schema theory explains that readers use their prior knowledge to comprehend and derive meaning from text (Rumelhart, 1980; An, 2013). This theory emphasizes the importance of readers' background knowledge and experiences in engaging with and understanding the text, forming the theoretical foundation for the development of LBRR in this study.

The study aims to determine the effectiveness of LBRR in improving science concept comprehension among grade 9 learners at Odiongan National High School. Specifically, the objectives are:

1. To determine the pre-test mean scores in Science of grade 9 learners exposed to LBRR and DepEd Learners Material (control).
2. To determine the post-test mean scores in Science of grade 9 learners exposed to LBRR and DepEd Learners Material (control).
3. To determine the significant difference between the post-test mean scores of grade 9 learners exposed to LBRR and the control group, using pre-test scores as covariates.

The study's conceptual framework follows the Input-Process-Output (IPO) paradigm, where LBRR is developed (Input) based on schema theory principles, incorporating local contexts and familiar elements. The implementation phase (Process) involves using LBRR for the treatment group and DepEd Learning Materials for the control group, with pre- and post-tests administered. Statistical analysis (Output) is then employed to evaluate the intervention's effectiveness by comparing the groups' post-test scores.

METHODOLOGY

The study employed a quasi-experimental design to assess the effectiveness of locally-based reading materials on students' science comprehension. Here is a summary of the methodology:

The methodology involved two groups:

1. Treatment group: This group was exposed to locally-based reading materials that integrate science concepts into the context of students' experiences.
2. Control group: This group followed the standard curriculum without tailored reading materials.

To test the effectiveness of the locally-based reading materials, the researchers looked at the differences between the two groups' performances, controlling for prior knowledge through the analysis of covariance.

The analysis of covariance allows the researchers to examine the relationship between the reading materials and comprehension while accounting for students' prior knowledge. This ensures that any difference in comprehension between the two groups is due to the reading materials rather than the students' prior knowledge.

By utilizing the analysis of covariance, the researchers can determine if tailoring the content to students' experiences does improve comprehension. Analyzing the differences between the two groups, while controlling for prior knowledge, allows researchers to assess the true impact of tailoring reading materials to students' experiences.

FINDINGS AND DISCUSSION

The pre-test results provide insights into the learners' baseline knowledge and understanding of the science concepts related to projectile motion, impulse, and momentum before the intervention. As presented in Table 1, the descriptive statistics of the pre-test mean scores for the LBRR and control groups are shown.

The pre-test results indicate that learners in both groups had limited prior knowledge of these science concepts, which is common in ninth-grade students who have yet to be exposed to these topics in depth. The low mean pre-test score of 7.51 (SD = 2.39) across both groups suggests that the learners needed a stronger foundation in these concepts before the intervention.

The more significant standard deviation in the control group's pre-test scores (SD = 2.78) compared to the LBRR group (SD = 1.98) implies more significant variability in prior knowledge levels within the control group. This variability could stem from differences in individual learning experiences, exposure to related concepts, or varying levels of engagement with science subjects.

After the intervention, the post-test results revealed a notable difference in mean scores between the LBRR group and the control group, as shown in The significant difference in mean post-test scores between the LBRR group (M = 14.57, SD = 4.60) and the control group (M = 12.17, SD = 3.70) suggests that the locally-based reading resources played a crucial role in enhancing learners' comprehension of science

Table 1. Descriptive Statistics of Pre-test Mean Scores of Grade 9 Learners Exposed to LBRR and DepEd Learning Material in Science (Control)

Group	Mean	SD	N
LBRR	7.400	1.9758	30
Control	7.6207	2.7828	29
Total	7.5085	2.3880	59

Table 2. Descriptive Statistics of Post-test Mean Scores of Grade 9 Learners Exposed to LBRR and DepEd Learning Material in Science (Control)

Group	Mean	SD	N
LBRR	14.567	4.600	30
Control	12.172	3.704	29
Total	13.390	4.319	59

concepts. The higher mean post-test score for the LBRR group indicates that incorporating locally based reading resources can significantly enhance students' understanding of complex science concepts. This finding underscores the importance of developing and using localized educational materials that resonate with students' backgrounds and experiences.

However, the more significant standard deviation in the LBRR group's post-test scores suggests that while the intervention was effective for many learners, others may require additional support or alternative instructional strategies to achieve similar improvements. The variability in post-test scores could be attributed to factors such as individual learning styles, engagement levels, and the effectiveness of LBRR in addressing the diverse needs of different types of learners.

Significance and Effect Size To determine the statistical significance of the difference between the post-test mean scores of the LBRR group and the control group while controlling for pre-test scores as covariates, an analysis of covariance (ANCOVA) was conducted. The results of the ANCOVA are presented in Table 3.

The ANCOVA results reveal a statistically significant difference between the post-test mean scores of the LBRR group and the control group ($F(1, 56) = 5.173$, $p = 0.027$), even after controlling for pre-test scores as covariates. This finding provides strong evidence for the effectiveness of the LBRR intervention in improving learners' comprehension of science

concepts related to projectile motion, impulse, and momentum.

Furthermore, the partial eta squared value of 0.085 indicates a medium effect size, suggesting that the LBRR practically impacted learners' comprehension. After accounting for pre-test scores, approximately 8.5% of the variance in post-test scores can be attributed to the difference between the LBRR and control groups. This effect size supports the practical significance of the LBRR intervention in enhancing learners' performance in science.

Theoretical Framework Integration

The study's results align with and support schema theory by demonstrating that students' comprehension improves when new information is connected to their existing knowledge and experiences, facilitated by the localized context of the LBRR. By incorporating familiar elements and local contexts, the LBRR provided a scaffold for learners to build upon their prior knowledge, enhancing their ability to comprehend and engage with the scientific concepts presented.

The pre-test results indicate that learners initially had limited prior knowledge of the science concepts, as evidenced by the low mean scores. However, the post-test results suggest that the LBRR effectively tapped into learners' existing schema by presenting the scientific concepts within a familiar, local context. This connection facilitated the integration of new information with learners' prior knowledge, leading to improved comprehension and higher post-test scores in the LBRR group compared to the control group.

Practical Implications

The study's findings have practical implications for educators and policymakers in enhancing science education and promoting scientific literacy among learners.

For educators, the results underscore the importance of integrating localized reading materials into their curriculum, particularly in subjects that involve abstract or complex concepts. By leveraging learners' prior knowledge and experiences through locally relevant contexts, educators can create more engaging and relatable learning experiences, potentially

Table 3. ANCOVA Results for Post-test Scores with Pre-test Scores as Covariates

Source	SS	df	MS	F	p	Partial η^2
Corrected Model	116.114[a]	2	58.057	3.366	.042	.107
Intercept	649.497	1	649.497	37.655	<.001	.402
Pretest	31.584	1	89.225	1.831	.181	.032
Posttest	89.225	1	17.249	5.173	.027	.085
Error	965.920	56				
Total	11660.000	59				
Corrected Total	1082.034	58				

Note. $R^2 = .107$ (Adjusted $R^2 = .075$)

improving learners' comprehension and academic performance.

Educators should consider developing or adapting reading materials that incorporate familiar settings, characters, and situations that resonate with their learners' backgrounds. This localization can be achieved through collaborative efforts with subject matter experts, writers, and local community members.

For policymakers, the study's findings highlight the need to support developing and implementing localized educational materials. Policymakers could allocate funding and resources for creating such materials and provide professional development opportunities for educators to integrate localized resources into their instructional practices effectively.

Additionally, policymakers might consider establishing guidelines or frameworks that encourage the integration of local contexts and culturally relevant elements into educational materials, promoting inclusive and equitable learning experiences for learners from diverse backgrounds.

CONCLUSION AND RECOMMENDATIONS

The study demonstrates the potential of locally-based reading resources in enhancing science concept comprehension among ninth-grade learners at Odiongan National High School. By leveraging learners' prior knowledge and experiences through localized contexts, the LBRR intervention facilitated an improved understanding of complex scientific concepts related to projectile motion, impulse, and momentum.

The statistically significant difference in post-test scores between the LBRR and the control group, even after controlling for pre-test scores, provides quantitative solid evidence for the effectiveness of the intervention. The medium effect size further supports the practical significance of the LBRR in enhancing learners' performance in science highlighting the potential of localized materials to foster engagement and comprehension by connecting abstract concepts to learners' lived experiences and prior knowledge. This alignment with schema theory underscores the theoretical foundation of the LBRR approach.

While the study demonstrates the effectiveness of LBRR, the variability in post-test scores within the LBRR group suggests that a multi-faceted approach combining localized materials with other instructional strategies may be necessary to cater effectively to diverse learning needs.

The study's findings have practical implications for educators and policymakers, emphasizing the importance of integrating localized reading materials into curricula and supporting the development and implementation of such resources.

Future research could further validate and expand upon the findings by examining the effectiveness of LBRR across different educational settings and subject areas and in combination with other interventions. Additionally, longitudinal studies and larger sample sizes could enhance the generalizability and understanding of LBRR's long-term impact.

The study's findings underscore the impact of locally-based reading resources (LBRR) on enhancing science concept comprehension among ninth-grade learners. Given the promising results, it is imperative to implement practical and actionable recommendations to maximize the benefits of LBRR. These recommendations are designed to support educators, policymakers, and researchers in their efforts to improve science education through the integration of localized and culturally relevant materials. By focusing on the development, implementation, and continuous assessment of LBRR, we can ensure that students receive engaging, relatable, and practical instruction that bridges the gap between abstract scientific concepts and their lived experiences. The following matrix outlines targeted actions and quantifiable outcomes for each stakeholder group aimed at fostering a more inclusive and effective educational environment.

AUTHORS' CONTRIBUTIONS

I declare that I am responsible for conceptualizing the research, designing the methodology, conducting the experiments, analyzing the data, and writing the manuscript.

Co-author, Dr. John Philip I. Ramos, provided all the technical assistance all throughout the thesis writing.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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ABOUT THE COVER

THE QUARRY OF DISCOVERY: Like master sculptors carving beauty from raw stone, researchers chisel away at the unknown, shaping knowledge with precision and care. The cover of this issue captures the tireless hands of Romblon's marble workers, whose craft mirrors the pursuit of discovery — both requiring patience, skill, and an unyielding dedication to refinement. Just as marble is quarried, cut, and polished into something enduring, so too is research a process of extracting truth, shaping ideas, and polishing insights into lasting contributions.

📷 James Patrick Mesana/Faculty, Romblon State University – Romblon Campus