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IN THIS ISSUE

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Mindoro Journal of Social Sciences and Development Studies (MJSSDS), a peer-reviewed journal, is the official publication of Occidental Mindoro State College published biannually. It aims to promote study and research that forge links between the social sciences and sustainable rural development. This journal is an interdisciplinary publication and welcomes articles from diverse theoretical perspectives and methodological approaches, which engage and contribute to rural development. It also focuses on the significance, roles, and implications of various disciplines on rural societies and community development.

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AIMS AND FOCUS

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Authorship: Who truly deserves the credit?

Artemio M. Gonzales Jr.
Editor, Mindoro Journal of Social Sciences and Development Studies

EDITORIAL

Publishing research is the highest form of disseminating research results, and places important social and ethical obligations on the author(s). For authors engaged in scholarly work, successful publication significantly enhances opportunities for academic funding and professional advancement, while simultaneously elevating scientific and scholarly recognition. Nevertheless, the privileges associated with authorship demand a comprehensive responsibility, including the thorough planning, implementation, analysis, and reporting of research, as well as the ethical considerations, the integrity of the content, and implications related to scholarly works being published.

Research misconduct encompasses unethical practices in research and publication, primarily urging the retraction of academic articles and promoting public skepticism and distrust in science (Candal-Pedreira et al., 2023). The criteria for legitimate co-authorship are extensively debated, with questionable authorship practices frequently identified as a significant challenge to research integrity (Godecharle et al., 2018). Many questionable authorship practices do not meet the legal definitions of research misconduct, which generally encompass only falsification, fabrication, and plagiarism (Goddiksen et al., 2023). Being an author is not just a recognition, but it holds great responsibility and accountability. So, who deserves to be credited as an author?

International Committee of Medical Journal Editors (ICJME, 2015), recommends that authorship be based on the following 4 criteria:

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work (scholarship); AND
- Drafting the work or reviewing it critically for important intellectual content (authorship); AND
- Final approval of the version to be published (approval); AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved (agreement).

A person should meet all these criteria to be considered as an author. All contributors who do not meet the criteria for authorship should be listed in an acknowledgment section. However, these criteria continue and are rampantly violated by many authors who prowl with the publication of scientific works and articles. One of the concerns of the academic community in regards to authorship and considered to be morally and ethically unacceptable – the gift authorship or honorary author. I shared this thought in my public social media post and repeatedly shared but seems to be ignored. Still, I would like to share this again anyway.

Gift authorship is defined as "co-authorship awarded to a person who has not contributed significantly to the study. Most of the senior researcher pressured their junior researchers to award the authorship There are several possible reasons for gift authorship. Junior researchers often feel pressured to accept or assign authorship to their senior co-workers who have substantial powers over their future careers. In addition, junior researchers may believe that including more experienced colleagues as authors will increase their chances of publication. Senior investigators may give gift authorship for encouraging collaboration and maintaining good working relations or as repayment for favors. Regardless of the cause, gift authorship is an unacceptable practice for academic publications" (Zaki, 2011).

Authorship should ideally be limited to colleagues who make a genuine academic contribution to an article. Issues between undergraduate students and their thesis advisers have been circulating on social media. Some have questioned whether the thesis adviser should be considered an author. If they are included as an author, where should their name be placed?

Considering the ICMJE authorship criteria, a thesis or dissertation adviser should only be listed as an author if they have contributed to the research described in the paper, regardless of whether it is an undergraduate or graduate thesis. When a significant portion of the thesis or dissertation is included in the paper, the student who made the most substantial contribution is recognized as the principal author. Senior authorship, on the other hand, is typically reserved for the thesis adviser or, in some cases, the principal investigator overseeing the project in which the student conducted a study component. These titles carry both distinction and responsibility, emphasizing the importance of properly crediting each contributor's role. Moreover, the student should approve on the final version of the article to be published and agree to be accountable for all aspects of the work.

In the question, whose name should come first? In determining the sequence of authorship, Riesenberg and Lundberg (1990) have a simple but concise suggestion:

- The practice of awarding honorary authorship is unacceptable. Individuals who provide support and advice that does not meet the criteria for authorship may be acknowledged with their consent.
- The first author is the individual who has made the greatest contribution, including writing the manuscript.
- The sequence of author listing is determined by the relative contributions to the work.
- It is customary for the senior author to be listed last, sometimes regardless of their contribution. The senior author, like all other authors, must meet all authorship criteria.
- Decisions regarding authors and the order of their names should be made as early as possible, even at the beginning, although relative contributions may need to be reviewed later by group consensus.

There are various concerns regarding authorship, including ghost authorship and issues related to the authorship or contributorship of published data. We welcome the submission of editorials and perspectives to share in the Mindoro Journal of Social Sciences and Development Studies (MJSSDS). We also encourage comments responding to the ideas shared in this journal.

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The effectiveness of math journal in improving the mathematics performance of grade 9 students

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ABSTRACT

This study employed a true experimental design to investigate the effectiveness of math journaling on the mathematics performance of Grade 9 students. The study spanned six weeks, with two groups of 25 students each selected to represent the control and experimental groups, respectively. The experimental group engaged in math journaling, while the control group followed a conventional instructional strategy. Both groups underwent pretest and posttest assessments based on Most Essential Learning Competencies. The findings revealed that after the intervention, the experimental group achieved a slightly higher mean post-test score. Statistical analysis indicated significant improvement within both groups after conventional instruction, and the experimental group demonstrating significant improvement with math journaling. Nevertheless, the post-test comparison between the groups did not yield a statistically significant difference suggesting that both instructional methods were equally effective in enhancing mathematics performance. The relevance of this study to mathematics instruction lies in its exploration of innovative strategies, such as math journaling, to potentially improve student learning outcomes in mathematics education.

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1. INTRODUCTION

In contemporary educational research, the persistent challenge of low performance in mathematics remains a focal point, drawing significant attention from scholars. Recent studies have undertaken a multifaceted approach, exploring diverse perspectives and interventions to tackle this issue. Notably, there is a burgeoning interest in understanding the role of socio-emotional factors and their influence on mathematical learning outcomes. Scholars are increasingly acknowledging that students' attitudes, beliefs, and emotional experiences regarding mathematics play a crucial role in shaping their engagement and performance in the subject (Brunzell et al., 2019). This recognition underscores the importance of considering not only cognitive factors but also socio-emotional dynamics in designing effective strategies to enhance mathematical learning. By delving deeper into these factors, researchers aim to develop more holistic approaches that address the complex interplay between psychological aspects and academic achievement in mathematics.

One emerging avenue of inquiry focuses on the role of written mathematical communication in facilitating learning. Research suggests that written mathematical communication not only aids students in their comprehension but also provides teachers with valuable insights into their understanding. It serves as a crucial bridge between prior knowledge and newly acquired information (Azizah et al., 2020). In the realm of mathematics education, students are expected to actively engage in class discussions and enhance their oral and written communication skills. Math journals, as highlighted by Camahalan and Young (2015), have emerged as a valuable tool for students to demonstrate their learning progress. These journals are viewed as

dynamic works in progress, where no page is deemed flawless. They serve as documentation of students' learning processes and reflective practices (McAnelly, 2021).

The utilization of math journals by teachers as a means of evaluating and understanding student thinking has garnered support from research findings. Students derive significant benefits from maintaining math journals, as they enhance learning and provide teachers with accurate assessments of students' understanding and areas where they may require additional support. Studies, such as that conducted by Kostos and Shin (2010), have demonstrated that the practice of keeping math journals enables students to articulate their mathematical ideas effectively and utilize mathematical language proficiently. Additionally, math journals facilitate communication between students and teachers, serving as a valuable tool for teacher evaluation and feedback.

The constructivist learning theory underscores the value of math journals as a pedagogical tool, as highlighted by Camahalan and Young (2015). Within this framework, students are guided to engage in journaling activities that prompt them to articulate and demonstrate their thoughts regularly. This approach is rooted in the belief that writing serves as a fundamental mechanism for the brain to forge connections between existing knowledge and new concepts, a notion supported by D'Angelo et al. (2012). Moreover, Kostos and Shin (2010) advocate for math journals as an effective means of formative assessment, enabling educators to gauge student progress and understanding over time.

Al-Rawahi and Al-Balushi (2015) assert that reflective journaling fosters self-regulated learning practices, such as self-reflection, thereby fostering a dialogical exchange that tailors instruction to individual needs and cultivates a supportive classroom environment. Consequently, journaling emerges as a versatile tool for differentiation, either through its direct implementation or by informing the selection of more targeted instructional strategies. For instance, Glogger et al. (2012) propose that learning journals serve as an innovative means of assessing students' mathematical learning strategies, particularly in middle school settings. By encouraging regular articulation of thoughts, journaling enhances procedural knowledge, conceptual understanding, and mathematical communication, contributing to overall academic growth in mathematics.

Despite the recognized potential of writing to learn in the field of mathematical education, there remains a notable gap in research, particularly concerning advanced mathematics. Starkey (2016) highlights this deficiency, indicating a need for more investigation into the efficacy of writing as a tool for learning complex mathematical concepts. Adu-Gyamfi et al. (2010) shed light on the importance of fostering a classroom environment where students engage in both reading and writing to convey their understanding of mathematics. Their findings suggest that such a culture may be essential for making reading and writing meaningful components of a student's mathematical experience. This insight underscores the necessity of integrating writing activities into mathematics instruction to enhance comprehension and retention. Bossé and Faulconer (2008) distinguish between reading and writing about math and reading and writing in math, emphasizing that the latter involves active engagement with mathematical concepts through written expression. They argue that students who are supported, provided with opportunities, and encouraged to engage in purposeful writing and reading within mathematics classrooms develop a more robust understanding of mathematical concepts. Furthermore, these students are better equipped to apply their knowledge to various contexts, indicating the significant benefits of incorporating writing activities into mathematics education.

The study on the effectiveness of math journaling holds considerable significance for researchers, as it explores the potential impact of incorporating writing activities into mathematics learning. While the influence of reading and writing on student learning and academic performance is well-established in language subjects, its application in the context of mathematics learning warrants further investigation. Understanding how students engage with mathematical concepts through writing can shed light on the underlying factors that affect their learning process, such as note-taking and the ability to independently comprehend and apply mathematical processes based on these notes. Additionally, research on the effectiveness of teaching strategies in mathematics holds particular relevance in academic environments, especially in regions where mathematics is commonly perceived as a challenging subject, as noted in the case of many Filipino students. By examining the efficacy of different teaching approaches, educators can identify methods that effectively support student learning and address the specific challenges associated with mathematics education. This research not only contributes to the advancement of pedagogical practices but also has the potential to improve student outcomes and foster greater confidence and competence in mathematics among students.

Through the insights garnered from this study, researchers anticipate the development of instructional programs integrating math journaling as a pivotal strategy. Specifically, drawing from the study's results, they intend to create a comprehensive manual of procedures for implementing mathematics journaling in high school mathematics curricula. Additionally, training sessions aimed at fostering effective

utilization of this strategy may be organized. This initiative contributes to the broader literature advocating for the integration of reading and writing activities not only within language courses but also as essential tools for enhancing mathematics education. By embracing such approaches, educators and students alike can elevate mathematics teaching and learning experiences, thereby potentially improving student performance in the subject. Generally, this paper would like to test the effectiveness of math journalling in improving the students' performance in Grade 9 mathematics.

2. METHODOLOGY

2.1. Design

This study employed a quasi-experimental design, conducted during the fourth quarter of the 2022-2023 school year, involving Grade 9 students from two sections at a public high school in San Jose, Occidental Mindoro. The research duration spanned six weeks, with the selection of the first two sections, characterized by similar abilities, as the study's two respondent groups.

2.2. Sample

This study involved Grade 9 students from two sections in a public high school in San Jose, Occidental Mindoro. All students from both sections were included in the study, although only 25 students per section were chosen as actual participants whose test results contributed to the statistical analyses. This approach ensured inclusivity while maintaining homogeneity between the two groups. Additionally, the respondents were chosen randomly in each section, considering that they belonged to the same mathematical ability as measured by a pre-test given to them before the experiment. In this design, the experimental group engaged in learning through math journaling, while the control group followed a conventional instructional strategy.

2.3. Research Instrument

These pre-tests were crafted based on the Most Essential Learning Competencies (MELCs) pertinent to the grade level under study, ensuring alignment with curriculum standards. The instruments used for pre-test assessments were validated for content validity by a master teacher with specialized expertise in teaching at the grade level of interest.

2.4. Data Gathering Procedure

Firstly, both the experimental and control groups underwent a pre-test aimed at establishing baseline comparability between them.

Following the pre-test phase, the experimental group underwent a structured intervention comprising five distinct phases. The first phase involved the introduction of math journals, serving as a tool for documenting and reflecting on mathematical concepts and problem-solving strategies. Subsequently, the experimental group was introduced to the specific mathematical topic under investigation. Integrated teaching and learning using the math journals constituted the third phase, where students engaged in activities designed to promote deep understanding and application of mathematical concepts through journal entries and exercises. The fourth phase involved continued teaching and learning, with a focus on utilizing the math journals as a central component of instruction. Throughout this phase, students were encouraged to actively engage with the journal prompts and reflect on their problem-solving processes. Finally, the fifth phase consisted of a post-test assessment administered to the experimental group to evaluate the impact of the intervention. The post-test questions were carefully crafted to assess the extent to which students had mastered the targeted learning competencies following the intervention.

In contrast, the control group followed a more conventional approach to instruction. After completing the pre-test phase, they were introduced to the same mathematical topic as the experimental group. However, instead of utilizing math journals as a central component of instruction, the control group engaged in teaching and learning activities supplemented with additional exercises. This approach aimed to provide a comparative baseline for assessing the effectiveness of the intervention implemented with the experimental group.

2.5. Ethical Considerations

Throughout the study, ethical standards were strictly upheld. Informed consent was obtained from both students and their guardians prior to participation, ensuring that they understood the purpose and procedures of the research. Participants were assured of their anonymity and the confidentiality of their data. The right to withdraw from the study at any time without penalty was clearly communicated, fostering a voluntary participation environment. Additionally, measures were taken to minimize any potential discomfort or anxiety related to assessments, ensuring that all participants felt safe and supported throughout the research process.

2.6. Data Analysis

To analyze the data and evaluate the outcomes achieved by both groups, an independent t-test was applied. This statistical technique allowed for the comparison of mean scores between the experimental and control groups, providing insight into the effectiveness of the intervention in enhancing learning outcomes. Additionally, ethical measures were carefully considered throughout the study to ensure the well-being and rights of the participants. These measures included obtaining informed consent from all participants, ensuring confidentiality and anonymity of data, and adhering to ethical guidelines for research involving human subjects.

3. RESULTS

3.1. Mathematics performance of two groups before and after conventional instruction and integration of math journaling

Prior to the intervention, the control group (8.40 ± 1.92) shows a need for improvement in mathematical abilities. In contrast, the experimental group had a slightly higher score (9.80 ± 3.05), also suggesting room for enhancement. After the intervention, both groups showed significant improvements. The control group's mean score (15.40 ± 91.92) increased, though the high standard deviation suggests the presence of outliers affecting the interpretation. Despite this, the overall improvement indicates better performance. Meanwhile, the experimental group exhibited a more consistent improvement, with their mean score increased (16.40 ± 3.44), reflecting good performance. These results suggest that integrating math journaling with conventional instruction can enhance mathematical performance, particularly in the experimental group, which demonstrated more promising gains [Table 1].

Table 1. Mathematics performance of two groups before and after conventional instruction and integration of math journaling.

MATHEMATICS PERFORMANCE	CONTROL		EXPERIMENTAL	
	Mean Score	SD	Mean Score	SD
Pre-Test	8.40	1.92	9.80	3.05
Posttest	15.40	91.92	16.40	3.44

Scale: 26-30: Excellent; 21-25: Very good; 16-20: Good; 11-15: Fair; 1-10: Needs improvement

3.2. Difference in mathematics performance between control and experimental groups before and after conventional instruction and math journaling integration

The control group showed a significant increase in post-intervention scores (15.40 ± 1.92) compared to pre-intervention scores (8.40 ± 1.92).The t-test result ($t = 9.985$, $p < .001$) indicates a significant difference in performance before and after the intervention within the control group. Similarly, the experimental showed a significant increase in post-intervention (16.40 ± 3.44) as compared to the pre-intervention score (9.80 ± 3.05). The t-test result ($t = 5.559$, $p < .001$) also indicates a significant difference in performance before and after the intervention within the experimental group. These results suggest that both groups experienced substantial improvements in mathematics performance following the intervention, as evidenced by the significant t-test results and low p-values. [Table 2].

Table 2. T-test analysis of mathematics performance between control and experimental groups before and after conventional instruction and math journaling integration.

MATHEMATICS PERFORMANCE	BEFORE		AFTER		t	p-value
	Mean Score	SD	Mean Score	SD		
Control Group	8.40	1.92	15.40	1.92	9.985	<.001
Experimental Group	9.80	3.05	16.40	3.44	5.559	<.001

3.3. Difference in mathematics performance between control and experimental groups after conventional instruction and math journaling integration

The experimental group exhibited higher mathematics performance score (16.40 ± 3.44) as compared to control group (15.40 ± 1.92). However, the difference between two scores has no significance ($t = .983$, $p = .106$). Therefore, it can be concluded that the intervention did not lead to a noticeable discrepancy in mathematics performance between the two groups at the posttest stage [Table 3].

Table 3. T-test analysis of mathematics performance difference between control and experimental groups after conventional instruction and math journaling integration.

MATHEMATICS PERFORMANCE	CONTROL		EXPERIMENTAL		t	p-value
	Mean Score	SD	Mean Score	SD		
Posttest	15.40	1.92	16.40	3.44	.983	.106

4. DISCUSSION

The study's findings demonstrate a notable enhancement in students' mathematics performance subsequent to the intervention, with both control and experimental groups exhibiting advancement. This observation is consistent with existing research that underscores the effectiveness of targeted interventions in addressing fundamental mathematical skills. The initial identification of low proficiency levels underscores the necessity for diagnostic assessments to customize instruction, a method endorsed by research as pivotal for successful teaching (Baker et al., 2010). These outcomes also resonate with recent literature advocating for the integration of journaling activities into mathematics education. Incorporating math journaling prompts students to participate in reflective thinking, articulate problem-solving methodologies, and establish connections between mathematical concepts (Hernandez-Martinez et al., 2019; Radaković et al., 2020). Furthermore, journaling nurtures metacognitive skills such as goal setting, monitoring, and self-assessment of learning progress, all of which are essential for mathematical proficiency (Schoenfeld, 2017). The implications of these findings are profound for educators and curriculum developers within the realm of mathematics education. Integrating math journaling into instructional strategies can augment students' mathematical performance and facilitate a deeper conceptual grasp. Educators are encouraged to contemplate the inclusion of journaling activities in their teaching methodologies to bolster students' mathematical learning and overall development.

The results presented in the study underscore the efficacy of the intervention, which combined conventional instruction with the integration of math journaling, in enhancing mathematics performance across both the control and experimental groups. The t-test analysis conducted to assess the difference in performance before and after the intervention revealed significant improvements within each group. This indicates that both groups experienced substantial enhancements in mathematics performance subsequent to the intervention. These findings are consistent with prior research that has demonstrated the effectiveness of incorporating math journaling alongside conventional instruction to facilitate mathematical learning and comprehension (Van Es & Sherin, 2008; Kim et al., 2018). By encouraging students to engage in reflective thinking and articulate their problem-solving strategies, math journaling promotes deeper conceptual understanding and leads to improved performance in mathematics. These underscore the significance of integrating innovative pedagogical approaches, such as math journaling, into mathematics education to bolster students' learning and development. This highlights the importance of adopting strategies that not only enhance academic performance but also foster critical thinking skills and deeper understanding of mathematical concepts.

The observed lack of statistically significant difference in performance between the control and experimental groups post-intervention suggests that the integration of math journaling alongside conventional instruction might not have resulted in a discernible gap in mathematics performance between the two groups at the posttest stage. However, it's crucial to interpret these findings cautiously and take into account potential factors that could have influenced the outcomes. Further research is warranted to delve deeper into the effectiveness of various instructional interventions or different implementations of math journaling to gain a more comprehensive understanding of their impact on mathematics performance among students. This could involve exploring variations in the frequency or structure of journaling activities, as well as examining how other factors such as student engagement, teacher training, or classroom environment might influence the outcomes.

The unexpected results regarding the effectiveness of math journaling in improving mathematics performance, despite its documented benefits in previous literature, prompt a critical examination of the study's design and implementation. While math journaling has been shown to bolster reflective thinking, problem-solving strategies, and metacognitive skills—essential components for enhancing mathematics performance—it's crucial to contextualize these findings within the specifics of the study. Factors such as variations in instructional practices, levels of student engagement, or the duration and intensity of the intervention could have played a significant role in influencing the outcomes (Hernandez-Martinez et al., 2019; Radaković et al., 2020). For instance, the way math journaling was integrated into the curriculum, the frequency of journaling activities, or the level of scaffolding provided to students during journaling tasks might have varied across classrooms or instructional settings. Furthermore, other contextual factors such as the demographics of the student population, teacher training and experience, or the overall classroom environment could have also impacted the effectiveness of the intervention. It's essential to consider these

variables when interpreting the results and drawing conclusions about the efficacy of math journaling in this particular study. While the findings may seem surprising given the established benefits of math journaling, they underscore the importance of carefully designing and implementing educational interventions and considering the complex interplay of factors that can influence student outcomes. Further research exploring these factors in more detail could provide valuable insights into how to optimize the use of math journaling and other instructional strategies to support students' mathematical learning and development effectively.

The results underscore the complexity of educational interventions and the importance of carefully designing and implementing them to maximize their effectiveness. Further research is warranted to explore the nuances of integrating math journaling into mathematics instruction and to identify the conditions under which it may lead to significant improvements in student performance. While the integration of math journaling alongside conventional instruction did not result in a significant difference in mathematics performance between the control and experimental groups in this study, it remains a promising pedagogical approach that warrants further investigation and refinement.

5. CONCLUSION

The study's findings shed light on the efficacy of incorporating math journaling alongside conventional instruction to bolster students' mathematics performance. While the control group saw substantial progress through conventional methods, the experimental group experienced significant enhancement in mathematics proficiency due to the integration of math journaling. These results are in line with the study's objectives, which aimed to evaluate the impact of instructional interventions, including math journaling, on students' mathematical skills.

Remarkably, the comparison of post-test scores between the control and experimental groups did not reveal a statistically significant difference, indicating comparable mathematics performance levels post-intervention. Despite this, both conventional instruction and math journaling proved equally effective in fostering improved mathematics skills among students. This underscores the potential of math journaling as a pedagogical tool to complement traditional teaching methods in mathematics education. These findings also advocate for the integration of math journaling alongside conventional instruction as an effective strategy for enriching mathematics learning outcomes.

In essence, the study suggests that both math journaling and conventional instruction effectively enhance Grade 9 students' mathematics performance. Although the experimental group exhibited slightly higher mean scores, the lack of statistical significance emphasizes the equitable effectiveness of both approaches. These findings underscore the importance of embracing innovative methodologies like math journaling in mathematics education and offer valuable guidance for educators seeking impactful instructional strategies for their students.

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Establishing livelihood resilience among fishing communities: The case of tuna (*Thunnus albacares*) fisheries in Occidental Mindoro, Philippines

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ABSTRACT

In Occidental Mindoro, catching yellowfin tuna isn't just an occupation—it's deeply embedded in the culture. However, recent times have seen a decline in their fortunes. Older fishers remember when the seas were abundant with tuna, but now many voyages yield nothing. The changing temperature of the oceans affects tuna quality, leading to decreased market prices. Coupled with high fishing expenses, many fishermen find themselves struggling financially. This research delves into these pressing issues, seeking to understand the lived experiences and resilience strategies of these fishers. This study investigates these challenges and aims to better understand the experiences in sustaining their livelihood and coping strategies to overcome the economic, environmental, and social challenges of the small-scale tuna fishers. The study was a qualitative type of research utilizing a phenomenological approach and analyzed the data using thematic analysis. Furthermore, the study proposed adaptive measures employed by small-scale tuna fishing communities in Occidental Mindoro to effectively steer the intricate web of economic, environmental, and social obstacles that beset them. By implementing strategies like income diversification, credit availability, strengthening market connections and advocacy, these communities demonstrate a proactive approach to securing their livelihoods and stimulating their resilience in the face of complex challenges. This research underlines the significance of local-level strategies in fostering community well-being and emphasizes the potential for informed decision-making in supporting the sustainable development of such communities.

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1. INTRODUCTION

The Republic of the Philippines, made up of 7,600 islands and islets, stands as the world's second most expansive island nation. With a rich abundance of marine assets, its coastline extends for 36,289 km and it possesses an exclusive economic zone (EEZ) covering 2.2 million km (Castro & Magnaye, 2023). The nation's continental shelf spans 184,600 km, plunging to depths of 200 m, and features a vast coral reef region measuring 27,000 km (Panga et a., 2021). Tuna emerges as the premier seafood export, with varieties like yellowfin, skipjack, and frigate tuna constituting close to half of the country's marine product exports. In 2020 alone, the nation exported an impressive aggregate of 134,412 metric tons across diverse tuna categories—ranging from fresh, chilled, and frozen to smoked, dried, and canned. These exports culminated in a substantial revenue generation of USD 481 million (Tahiluddin & Sarri, 2022).

Yellowfin tuna serves as the lifeblood of countless local fishermen. In Occidental Mindoro, pursuing tuna is not just a profession; it is deeply woven into the cultural fabric. The bounteous marine treasures of the Mindoro Strait support over a thousand fishing vessels. Several veteran fishers, with more than four decades of experience, have been witness to the stark decline in tuna availability in their local waters. They reminisce about the early 2000s when a mere few hours of fishing would guarantee a rewarding haul. Today, capturing even a single tuna requires an immense stroke of luck. As a seasoned fisherman from Mamburao lamented, "Out of 100 tuna boats out in the deep, barely 30 might return with a catch" (Juan-Jordá, et al., 2015).

Furthermore, as highlighted by Chan (2023), every voyage is an economic challenge for those in the tuna fishing industry. Investing heavily to embark on a trip, fishers face the stark reality that they might not even recover their expenses. Beyond the unpredictability of securing a catch, the warming seas harm the quality of the tuna (Heidrich et. al., 2022). As observed by numerous fishermen, tuna from these warmer waters tend to be of inferior grade and thus command a lesser price. Faced with increasing operational costs, the unpredictability of a successful haul, and declining tuna values, the earnings from each journey often prove inadequate. This has driven the tuna fishermen of Occidental Mindoro into a relentless spiral of financial hardship and escalating debts.

The small-scale tuna fishing industry is facing financial stressors and the quality and quantity of tuna are being impacted by global warming. These issues raise important questions about the sustainability of tuna fishing in the province as well as the broader socio-economic implications for the community and local economy. Despite the significance of these issues, there has been a notable absence of dedicated studies on the livelihoods of small-scale tuna fishers in the province.

This study aimed to explore the resilience of small-scale tuna fishers in Occidental Mindoro. It focused on their perspectives and experiences in sustaining their livelihood despite economic, environmental, and social challenges. The research also intended o inform government and non-government organizations about the current livelihood conditions of the tuna fishers in the province

2. MATERIALS AND METHOD

2.1. Study Design

This study utilized a phenomenological approach in its qualitative research, delving deep into the resilience of tuna fishing communities. This method is apt for exploring intricate phenomena comprehensively, shedding light on the experience of sustaining livelihood and coping strategies to overcome economic, environmental, and social challenges undertaken by the tuna fishers.

2.2. Setting

The research was conducted in Occidental Mindoro, Philippines, particularly in the municipality of Rizal, Calintaan, Sablayan, Sta. Cruz, Mamburao, and Paluan where small-scale tuna fishers were prevalent with a total population of registered fishers of 1, 961 (Mindoro Straight Management Plan, 2018).

2.3. Sample

The research centered around small-scale tuna fishers in Occidental Mindoro. After interviewing 15 participants, data saturation was achieved. The study targeted registered small-scale tuna fishers with a minimum of one year of fishing experience. Those not keen on participating or reluctant to share insights were excluded. Participants feeling uneasy or distressed during discussions were assured they could opt out at any time.

2.4. Research Instrument

Semi-structured interviews served as the primary research instrument. The interview guide was developed based on existing literature and expert consultations, ensuring it covers the challenges that the tuna fishers face in sustaining their livelihoods and their coping strategies to overcome the economic, environmental, and social challenges.

2.5. Data Collection

Data were collected through face-to-face interviews, allowing participants to express their experiences and strategies openly. These interviews were audio-recorded and transcribed verbatim to capture nuances in participants' narratives. Furthermore, an understanding was established that solely the researchers would possess the privilege of accessing the audio-recorded information.

2.6. Ethical Considerations

In the modern era, the landscape of research, its methodologies, and contexts are everevolving, and so are the ethical issues associated with them. Consequently, topics such as privacy and confidentiality have garnered significant attention, going beyond mere legal mandates (Harris & Atkinson, 2015). Adhering to the Code of Ethics, the researcher ensured that all data collected from participants was given voluntarily and with informed consent. The researcher also prioritized treating participants with respect and integrity during interactions, aiming to obtain the most genuine feedback. By valuing and recording the perspectives and feedback of the respondents, the study's credibility and success are reinforced.

2.6. Data Analysis

The data was analyzed using thematic analysis. The interview transcripts were examined and coded to pinpoint common themes and patterns. The analytical procedure involved stages like getting acquainted with the data, formulating preliminary codes, seeking out themes, assessing these themes, characterizing and labeling themes, and compiling the conclusive report.

3. RESULTS

3.1. Challenges in livelihood sustainability

The discussion on the perceptions and experiences of tuna fishing communities about the difficulties they encounter in maintaining their livelihoods reveals three common themes: 1) climate change, 2) economic instability, and 3) overfishing.

Theme 1: Climate change

The availability of tuna, a vital marine resource, is subject to seasonal variations that significantly impact local fishing communities. The small-scale tuna fishers noted that there are periods characterized by a consistent presence of tuna throughout the entire year, albeit in a gradual manner. This observation underscores the resilience of tuna populations to certain conditions, allowing for their sustained presence despite fluctuating factors.

Conversely, they have mentioned a specific timeframe for tuna catch, primarily from September to March, which suggests a temporal aspect of the fishing season. However, they have highlighted a scenario where tuna scarcity becomes pronounced during specific times, notably during the hot weather. This situation forces the community to adapt their fishing strategies, targeting alternative fish species to compensate for the absence of tuna. This stresses the vulnerability of tuna to environmental changes, particularly temperature variations, which can disrupt their distribution and behavior. The participants shared the following observations:

> *"There are times when there is tuna throughout the whole year, even if it's just gradually like now, but there are times like last year when there is no tuna from June to September."*

> *"When the weather becomes excessively hot, tuna are very scarce, so we often bring home different types of fish instead. Most of the time, our catch of tuna is only from September to March."*

Theme 2: Overfishing

The overfishing of the tuna population poses a serious threat, say the small-scale tuna fishing communities. It lessens the amount of tuna in the ocean, making it harder for them to find tuna and possibly resulting in lower catches. Furthermore, young tuna has less time to develop and reproduce than older tuna. The size of the tuna population may decrease as a result. Overfishing may result in higher tuna mortality rates. This is because tuna caught using fishing techniques may sustain wounds that make them more vulnerable to disease or attack by predators. With that being mentioned, the fishermen reached a consensus on the following:

> *"Overfishing is even more dangerous than climate change, so commercial fishing bears a significant responsibility because they catch without discrimination and control, even capturing small fish."*

Theme 3. Economic instability

The tuna fishing communities also struggle with economic instability. The individual or community involved in fishing recognizes the need to use the proceeds from their catch to address financial obligations, particularly debts. The statement implies that they view this practice as appropriate or necessary. The fact that the proceeds might sometimes be insufficient indicates a certain level of financial strain. This could be due to various factors such as fluctuating fish prices, rising costs of equipment and resources, and potentially overexploitation of fish stocks, leading to lower yields. The insufficiency of funds to cover debts can perpetuate a cycle of economic difficulty, where debt repayment becomes a significant burden.

They also highlighted the rising costs of living and the lack of control over market prices for their catch. The increasing cost of goods can erode the purchasing power of the income earned from fishing. Furthermore, the lack of control over market prices, specifically in this case, tuna prices, can make it challenging for fishermen to predict their income accurately. This uncertainty can make it difficult to plan for the future or budget effectively. The statement also implies that the traditional livelihood of fishing might no longer be able to adequately support the needs of a family due to external economic factors that are beyond the fishermen's control. Respondents clamor on the issue of economic stability:

> *"It's just right that the proceeds from our catch are used to pay off debts when we return home; sometimes, it's even insufficient."*

> *"With the soaring cost of goods and the lack of control over tuna prices, there's nothing we can do. The income from fishing is no longer sufficient to support the family."*

3.2. Coping strategies to overcome the economic, environmental, and social challenges

Three (3) themes emerged as coping strategies employed by tuna fishing communities to overcome the economic, environmental, and social challenges they encounter which are: 1) diversifying income sources, 2) adopting sustainable fishing methods, and 3) building social capital.

Theme 1: Diversifying income sources

The small-scale tuna fishers emphasize the importance of finding alternative ways to support their family when tuna, their primary source of income, becomes scarce. This shows a responsible attitude towards their family's well-being and their determination to meet their needs. By working as a laborer in construction, they can earn income from a different field. Additionally, they mentioned "peddling" their caught fish, indicating that they are using their fishing skills to directly sell the fish they catch, likely to a local market or to neighbors. This showcases their ability to diversify their income streams by combining their fishing skills with other forms of work.

Moreover, most of them put up a sari-sari store as an alternative source. This move demonstrates their entrepreneurial spirit and willingness to explore new avenues for income generation highlight the resourcefulness and adaptability of an individual when faced with challenges in their livelihood, specifically in the context of fishing and providing for their family.

Their responses illustrate the importance of adaptability and innovation when facing fluctuations in the availability of resources while also emphasizing the individual's commitment to their family's well-being and their readiness to explore different options for sustaining their livelihood. All participants undoubtedly asserted the following claims:

> "*During times when tuna is scarce, I need to earn money through other means to meet the needs of my family. I work as a laborer in construction and, at the same time peddle my caught fish."*

> *"When I'm unable to fish because tuna isn't available, my partner and I established a sari-sari store. Also, I engaged in carpentry to supplement my income."*

Theme 2: Adopting sustainable fishing methods

The small-scale tuna fishers who exclusively employ handline fishing. Handline fishing involves using a single fishing line with hooks, often managed manually. This method tends to be more selective, targeting specific fish species and reducing bycatch which is the unintended capture of non-target species. Handline fishing is often associated with smaller-scale and more localized operations.

They also highlighted the tension between sustainable and localized fishing practices, represented by handline fishing, and more industrialized and less selective practices carried out by commercial fishing vessels. This contrast underscores the need for balanced and responsible fishing practices that consider both environmental conservation and the well-being of local communities that depend on fishing for their livelihoods. Fishermen provided the subsequent feedback:

> *"We, tuna fishermen, only use handlines while commercial fishing vessels enter municipal waters and indiscriminately catch even small fish using bag net 'basnigan'."*

Theme 3: Building social capital

The participants point out the development of new groups or associations among fishermen. This is significant as it indicates a growing recognition of the benefits of coming together for a common purpose. In contrast to the past where individuals may have struggled to make their voices heard, by forming organized

groups, fishermen can pool their resources, share knowledge, and collaborate on issues that affect their livelihoods. It also provides a platform for fishermen to express their concerns and opinions more effectively. This implies that the collective action has empowered fishermen to engage in advocacy and seek redress for any injustices they might be facing. It is a demonstration of how organized efforts can lead to tangible changes and improvements in their working and living conditions. Consequently, the tuna fishers reached a consensus on the following:

> *"Now there are emerging groups or associations of fishermen, which is better because our voices are now being heard, unlike before it was our own. We are now able to fight for our rights and hear our grievances."*

4. DISCUSSION

Establishing Livelihood Resilience Among Fishing Communities holds significant importance given the significant role of fishing communities in global food security, the vulnerability of such communities to various challenges, and the need for sustainable approaches to safeguard their livelihoods.

Climate change introduces a range of challenges and uncertainties that collectively affect small-scale tuna fishers (Cinner et al., n.d; Daw et al., 2012). Shifts in climatic conditions impose restrictions on the fishing activities of the fishermen. The impact of climate change on the output of small-scale fishers is jeopardizing their food security and poses a significant obstacle to meeting their livelihood requirements (Clarke et al., 2022). The pivotal factor for success lies in guaranteeing sufficient and efficient adaptation strategies. Effective adaptive practices hold the potential to significantly mitigate threats posed by climate change (Ali & Erenstein, 2017). According to Israel and Sierra (2023), adaptation to climate change can be either premeditated or spontaneous. In the context of capture fisheries, strategies of adaptation encompass adjustments in fishing objectives, shifts in timing, and changes in fishing locations.

This study also underlines a significant concern regarding the overfishing of tuna which poses a grave risk to the livelihoods of tuna fishers. In the work of Digal (2017), it is evident that despite the looming possibility of the entire industry collapsing because the adoption of sustainable tuna fishing methods among local fishers remains disappointingly low. Tahiluddin and Sarri (2022) draw attention to the alarming rate of overfishing in the commercial marine fisheries sector of the Philippines. This reckless overfishing could potentially trigger the complete breakdown of the fisheries sector.

Navigating and addressing the multifaceted challenges posed by economic, environmental, and social factors requires the development and implementation of effective coping strategies. This objective delves into the diverse approaches and solutions that small-scale tuna fishers employ to overcome these complex challenges and strive for sustainable progress.

Broadening the range of income avenues could serve as a strategy for tuna fishers in the Philippines to cope with economic, environmental, and social hurdles. Tolentino-Zondervan (2016) revealed that private incentive mechanisms play a role in enhancing the capabilities of fishers to meet sustainability standards, potentially resulting in economic advancement. Lomboy (2019) crafted an economic resilience strategy focused on bolstering household assets to minimize risks and vulnerabilities, stressing the linkage between household interventions and sustainable fishing practices. Collectively, these papers highlight the viability of income diversification and the adoption of sustainable methods as avenues for tuna fishers to surmount economic, environmental, and social challenges.

Moreover, the results recommend that adopting sustainable fishing methods can be a coping strategy for the economic, environmental, and social challenges faced by tuna fishers in the Philippines. Handline fishers have lower catch rates than purse seine and ring net fisher but they have the advantage of being able to roam freely between Fish Aggregating Device (FAD) areas (Macusi, 2020). Tolentino-Zondervan (2016) compared different private incentive mechanisms for improving sustainability in Filipino tuna fisheries and found that the success of these mechanisms depends on the extent to which they support the development of fisher capabilities to comply with sustainability requirements. Overall, the papers suggest that adopting sustainable fishing methods can be a viable coping strategy for the challenges faced by tuna fishers but various factors affect the adoption of these practices and the success of incentive mechanisms.

This study also proposes that fostering social capital can serve as an effective strategy for small-scale tuna fishers to address economic, environmental, and social challenges. Mialhe et al., 2018) discovered that greater levels of linking and bridging social capital correlated with enhanced co-management performance among fishers. The significance of social capital to small-scale tuna fishers becomes apparent as it grants them access to vital information about fishing conditions, facilitates collaborative problem-solving, facilitates resource pooling, and empowers collective advocacy for their rights and interests. Ultimately, this foundation of social capital contributes to their resilience, improved livelihoods, and the promotion of sustainable fishing practices.

Utilizing the key themes that highlight the environmental, economic, and social challenges faced by tuna fishermen, the researchers have systematically compiled a livelihood resilience plan for tuna fishing communities as detailed in Table 1. This plan provides a comprehensive approach to address their challenges and strengthen their resilience.

Table 1. Proposed livelihood resilience plan.

Key Challenges	Objectives	Actions/ Measures
Seasonal variation and tuna availability	Enhance seasonal resilience	• Consider strictly implementing seasonal fishing regulations that are based on the availability patterns of tuna. • Provide training on diversification of fishing targets during off-peak seasons.
Overfishing and ecological imbalance	Improve fishing practices to address overfishing and ecological imbalance	• Advocate for stricter fishing quotas and the use of selective fishing gear to ensure sustainable fishing practices and protect marine life. • Collaborate with authorities to implement marine protected areas.
Economic challenges	Strengthen Supportive Government Policies	• Lobby for policies stabilizing fish prices and provide financial assistance to those in need. • Promote and enforce sustainable fishing practices through strict government regulations.
Dependency on the single income stream	Empower small-scale tuna fishers with skills for alternative income sources	• Conduct training programs for alternative income sources. • Support entrepreneurship initiatives related to fishing.
Sustainable fishing practices and conservation	Establish Sustainable Fishing Practices	• Raise awareness about handline fishing and sustainable practices. • Engage in collaborative efforts for effective regulations and conservation measures.
Lack of collective action	Foster collective action	• Facilitate the formation of fishing associations. • Encourage knowledge-sharing and collaboration among fishing groups.

5. CONCLUSION

The study's findings indicate that small-scale tuna fishers is threatened by various challenges such as climate change, overfishing, and economic instability have emerged as prominent factors undermining their efforts. Addressing these multifaceted challenges demands a comprehensive and coordinated approach. To ensure the long-term viability of small-scale tuna fishing communities, the government must take the lead in addressing their challenges. This can be achieved by strengthening the regulatory framework for seasonal fishing, promoting the diversification of fishing targets, and instilling responsible fishing practices through continuous training on sustainable fishing methods. These essential measures will contribute to the sustainable management of tuna resources.

This study sheds light on how small-scale tuna fishing communities in Occidental Mindoro adapt to the economic, environmental, and social obstacles they face. It is recommended to implement strategies in income diversification, credit availability, strengthening market connections, and advocacy to secure their livelihoods and fortify their resilience. Local level strategies are crucial for community development and informed decision-making supports sustainable development. Moreover, the active involvement of local institutions is crucial in alleviating the obstacles that threaten the viability of small-scale tuna fishing in the province. This collective effort, grounded in understanding, collaboration, and support, is crucial to enable fishing communities to navigate their challenges while ensuring the sustainability of their livelihoods and tuna conservation.

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Establishment of gross loan portfolio risk-return questionnaire: reliability and validity structure

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ABSTRACT

Microfinance institutions (MFIs) play a pivotal role in fostering financial inclusion and combating poverty in the Philippines. However, assessing the risk-return profile of these MFIs is challenging due to the lack of tailored assessment tools. This study introduces the Gross Loan Portfolio Risk-Return Questionnaire (GLP-RRQ), customized for MFIs in Occidental Mindoro, Philippines. Employing a cross-sectional approach, the study involved five active MFIs. The questionnaire exhibited excellent internal consistency (94.8%) and validity. Results revealed robust associations between various risk and return factors. For instance, credit quality demonstrated strong correlations with specific questionnaire items (Factor 1: Credit Quality, GLP-RRQ item 2, loading = .860). Similarly, sustainability showed significant associations (Factor 3: Sustainability, GLP-RRQ item 6, loading = .880). These findings underscore the reliability and applicability of the GLP-RRQ in evaluating MFI loan portfolios. By utilizing this tool, stakeholders can make informed decisions to manage risks effectively and enhance financial performance, thereby advancing financial inclusion efforts and poverty alleviation initiatives in the Philippines.

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1. INTRODUCTION

The Philippines, among the most populous nations in Southeast Asia, grapples with substantial economic challenges, notably income inequality and restricted access to financial services. Microfinance institutions (MFIs) have emerged as pivotal mechanisms in addressing these challenges by providing financial resources to underserved segments of society (Kheder et al., 2013). Understanding the intricate dynamics of risk and return within the Philippine MFI landscape is imperative for crafting effective strategies to mitigate risks and bolster financial performance.

Microfinance plays a crucial role in the Philippines' economic landscape, particularly in regions like Occidental Mindoro, which face unique challenges concerning economic development and poverty alleviation (Balisacan & Pernia, 2003). The province relies significantly on MFIs as vital sources of credit and financial services for its local populace. Examining the risk-return relationship of MFIs operating in

Occidental Mindoro provides insights into the factors influencing their financial performance and sustainability, aiding evidence-based decision-making.

The susceptibility of the Philippines to various economic and environmental shocks, including natural disasters and global financial crises, poses significant risks to MFI loan portfolios and overall financial stability (Broad & Cavanagh, 2011). These vulnerabilities underscore the necessity of comprehending the risk-return dynamics within the microfinance sector. Moreover, Occidental Mindoro, prone to environmental risks such as typhoons and flooding, faces heightened exposure to MFI portfolio risks, accentuating the need for robust risk management strategies.

In the regulatory domain, the Securities and Exchange Commission (SEC) plays a pivotal role in ensuring the stability and integrity of the microfinance sector. Its oversight, particularly regarding the management of gross loan portfolios, is crucial for maintaining financial soundness and safeguarding the interests of borrowers and investors alike.

Despite the significance of assessing the risk-return profile of MFIs, there exists a dearth of standardized and validated instruments tailored specifically to the microfinance sector. The absence of such tools hampers accurate risk assessment, impedes benchmarking, and limits evidence-based policymaking and intervention development.

This study aims to address these gaps by developing a Gross Loan Portfolio Risk-Return Questionnaire (GLP-RRQ) tailored to Philippine MFIs, with a focus on Occidental Mindoro. Drawing upon Portfolio Theory, which emphasizes the risk-return trade-off in investment decisions, the study employs a quantitative research approach to assess the reliability and validity of the GLP-RRQ. By doing so, practitioners, policymakers, and researchers will have a standardized instrument to measure and analyze risk-return dynamics in the microfinance sector more accurately.

2. MATERIALS AND METHOD

2.1. Study design

The research design for this quantitative study employed a cross-sectional approach. Cross-sectional studies involved collecting data from a specific population at a single point in time to examine relationships and associations between variables. This design enabled the study to investigate the establishment of the gross loan portfolio risk-return questionnaire and assess its reliability and validity structure in the context of microfinance institutions.

2.2. Sample

Based on data acquired from the local government units in each municipality, Occidental Mindoro in the Philippines had a total of 37 microfinance institutions that were officially registered. The distribution of these registered institutions among the municipalities was as follows: Mamburao (9), Santa Cruz (2), Sablayan (7), and San Jose (19). Moreover, this study utilized a purposive sampling technique to select the test-respondents for this study. The inclusion criteria for the test-respondents included:

a. Professionals working in microfinance institutions in Occidental Mindoro.
b. Individuals with a minimum of two years of experience in loan portfolio management.
c. Individuals who were fluent in English, as the questionnaire was administered in English.

On the other hand, the exclusion criteria included:

a. Individuals working in microfinance institutions outside Occidental Mindoro.
b. Individuals with less than two years of experience in loan portfolio management.
c. Individuals who were not proficient in English.

Additionally, three withdrawal criteria were considered:

a. Test-respondents who voluntarily withdrew their participation from the study.
b. Test-respondents who provided incomplete or inconsistent responses.
c. Test-respondents who were found to have a conflict of interest that could compromise the validity of their responses.

By meticulously evaluating these criteria, a rigorous selection process was employed to include only five microfinance institutions in the study, out of the 37 operating in Occidental Mindoro, Philippines. The research was meticulously conducted in Occidental Mindoro, a strategically chosen locale due to its remarkable concentration of microfinance institutions and the abundance of skilled professionals actively engaged in loan portfolio management.

2.3. Data collection procedure

As part of the study, the researchers created an interview guide. It included questions that focuses on human and organizational processes, culture, and lessons gained from entrepreneurial activities that took place at the select cooperatives in Occidental Mindoro, Philippines in order to identify barriers to and

enablers for cooperative entrepreneurship. Experts analyzed the questions to verify that they are suitable. Managers and members of cooperatives also received a formal request for permission to conduct the research.

2.4. Ethical consideration

This study adhered to ethical guidelines and principles of research. Informed consent was obtained from all test-respondents, ensuring that they understood the purpose of the study, their voluntary participation, and the confidentiality of their responses. The researcher also assured the test-respondents that their participation was entirely voluntary, and they had the right to withdraw from the study at any point without facing any consequences. The collected data were stored securely and used solely for the purpose of this research.

2.5. Data analysis

The collected data were analyzed using appropriate statistical techniques. Reliability analysis, including Cronbach's alpha [Table 1] was conducted to assess the internal consistency of the questionnaire. Construct validity was examined using factor analysis to identify underlying dimensions of risk and return. Additionally, correlations analysis was employed to examine relationships between variables. The statistical analysis was performed using software such as SPSS, and the significance level was set at $p < 0.05$ to determine statistical significance.

Table 1. Cronbach's alpha internal coefficient.

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3. RESULTS

3.1. Reliability testing of the gross loan portfolio risk-return questionnaire

The overall instrument demonstrated a high level of internal consistency, reaching 94.8%, which is considered excellent. The specific components of the instrument relating to the level of risk associated with microfinance institutions' loan portfolios. These components include credit quality, which exhibits excellent internal consistency at 93.0% and an item-total correlation of .759; portfolio concentration, which displays excellent internal consistency at 90.7% and an item-total correlation of .785; default rates, demonstrating good internal consistency at 89.9% and an item-total correlation of .782; and lastly, vulnerability to external economic factors, exhibiting good internal consistency at 89.1% and an item-total correlation of .796 [Table 2].

Table 2. Item-total statistics and internal consistency on the statements pertaining to the level of risk associated with microfinance institutions' loan portfolios.

Variables	Item-total Correlation	Cronbach's alpha
Credit quality		
1. Loan default risk arises from inadequate borrower creditworthiness.	.561	.901
2. Poor borrower repayment capacity threatens the loan portfolio's credit quality.	.681	.922
3. Insufficient collateral increases the risk of credit quality deterioration.	.741	.978
4. Economic downturns can affect loan portfolio credit quality.	.614	.899
5. Inaccurate borrower data or lack of due diligence heightens credit risk.	.552	.910
6. High non-performing loans threaten portfolio credit quality.	.623	.963
7. Political or regulatory changes can impact credit quality.	.742	.897
8. Lack of loan diversification raises credit deterioration risk.	.774	.889
9. Poor risk management practices increase credit quality risks.	.562	.904
10. External events, like natural disasters, can harm credit quality.	.531	.911
Total	**.759**	**.930**

Default rates		
1. Default rates in microfinance loan portfolios threaten financial stability.	.556	.895
2. High defaults harm profitability and sustainability.	.621	.789
3. Poor borrower assessment increases default risk.	.752	.784
4. Economic downturns raise default rates.	.743	.899
5. Insufficient collateral and loan terms lead to higher defaults.	.663	.801
6. Inaccurate credit scoring boosts default rates.	.521	.706
7. Weak loan monitoring raises default risk.	.553	.774
8. Lack of portfolio diversification increases concentration risks and defaults.	.512	.687
9. Political instability and regulatory changes affect default rates.	.522	.892
10. Poor risk management elevates default rates.	.679	.886
Total	**.782**	**.899**
Portfolio concentration		
1. Microfinance institutions risk portfolio concentration when a large portion is focused on a few borrowers or sectors.	.727	.836
2. Concentrated portfolios increase vulnerability to defaults, threatening financial stability.	.710	.827
3. Lack of diversification makes institutions more sensitive to economic shocks, affecting portfolio quality.	.574	.946
4. Managing credit risk becomes difficult with concentrated portfolios, as a borrower or sector failure can hurt profitability.	.643	.977
5. Portfolio concentration heightens credit risk, with single defaults causing significant losses and limiting future lending.	.605	.883
6. Concentration increases financial volatility, linking performance to a few borrowers or sectors.	.761	.891
7. Inadequate risk diversification weakens the institution's ability to absorb losses, endangering long-term sustainability.	.695	.829
8. High portfolio concentration raises concerns about resilience to adverse events.	.710	.986
9. Concentrated portfolios make it harder to attract funding, as investors prefer diversified institutions.	.670	.891
10. Concentration risk demands vigilant monitoring and risk management to maintain stability.	.660	.815
Total	**.785**	**.907**
Vulnerability to external economic factors		
1. Microfinance loan portfolios are vulnerable to interest rate fluctuations, affecting borrowers' repayment ability.	.650	.818
2. National policy changes, like tax reforms, pose risks to loan portfolio stability.	.697	.960
3. Inflation or deflation impacts borrowers' repayment capacity, risking portfolio health.	.781	.977
4. Exchange rate changes can affect loan repayments, introducing risk to portfolios.	.634	.921
5. Volatile commodity prices expose microfinance institutions to risk, especially in agriculture-dependent sectors.	.761	.902
6. Economic downturns raise unemployment, increasing loan defaults.	.576	.933
7. Political instability disrupts economic activity, risking borrowers' repayment ability.	.671	.924
8. Natural disasters impair borrowers' ability to repay, introducing portfolio risks.	.753	.851
9. Regulatory changes create uncertainty and risk for loan portfolio stability.	.749	.970
10. Reliance on external funding introduces risks if donor priorities or availability change.	.593	.960
Total	**.796**	**.891**

The item-total statistics and internal consistency for the statements related to the level of financial returns generated by microfinance institutions through their loan portfolios. Specifically, sustainability demonstrates excellent internal consistency at 93.1% with an item-total correlation of .749. Portfolio quality also shows excellent internal consistency at 91.2% with an item-total correlation of .793. Furthermore, outreach demonstrates good internal consistency at 89.7% with an item-total correlation of .798, while efficiency exhibits good internal consistency at 89.3% with an item-total correlation of .753 [Table 3].

Table 3. Item-total statistics and internal consistency on the statements pertaining to the level of financial returns generated by microfinance institutions through their loan portfolios.

Variables	Item-total Correlation	Cronbach's alpha
Portfolio quality		
1. Microfinance institutions achieved strong financial returns, highlighting their portfolio quality.	.655	.855
2. Loan portfolios generated impressive returns, reflecting a commitment to quality.	.580	.901
3. Excellent portfolio quality led to favorable financial returns.	.660	.821
4. Substantial returns indicate a robust focus on portfolio quality.	.630	.845
5. Significant financial gains showcase the strength of portfolio quality.	.654	.964
6. Exceptional returns underscore effective portfolio management.	.764	.981
7. Strong portfolio quality drove substantial financial returns.	.602	.881
8. Impressive financial results affirm high portfolio standards.	.666	.903
9. Returns reflected the institution's dedication to portfolio quality.	.601	.891
10. Favorable returns demonstrate diligent portfolio management.	.722	.815
Total	**.793**	**.912**
Efficiency		
1. Microfinance institutions achieved high returns, demonstrating efficient lending.	.742	.820
2. Loan portfolios generated significant returns, showcasing operational efficiency.	.638	.944
3. Efficient portfolio management led to impressive financial returns.	.652	.846
4. Institutions displayed remarkable efficiency in generating returns.	.564	.956
5. Loan portfolios proved highly efficient in delivering returns.	.758	.962
6. Efficient lending strategies resulted in substantial returns.	.738	.905
7. Institutions leveraged portfolios effectively, reflecting operational efficiency.	.738	.968
8. Efficient capital allocation in loan portfolios led to favorable returns.	.677	.902
9. Institutions demonstrated efficiency with commendable financial returns.	.563	.959
10. Managed loan portfolios showcased efficiency, yielding significant returns.	.685	.929
Total	**.753**	**.893**
Sustainability		
1. Microfinance institutions generate sustainable returns through their loan portfolios.	.573	.969
2. Loan portfolios yield consistent positive financial returns.	.622	.957
3. Well-managed portfolios ensure sustainable financial returns.	.613	.861
4. Strong returns demonstrate portfolio sustainability.	.780	.828
5. Loan portfolios generate reliable, sustainable returns.	.627	.975
6. Effective portfolio management leads to sustainable returns.	.747	.930
7. Diversified loan portfolios consistently deliver sustainable returns.	.772	.990
8. Loan portfolios show the ability to provide sustainable financial returns.	.759	.821
9. Prudent lending drives sustainable portfolio returns.	.685	.864
10. Successful portfolio performance ensures sustainable financial returns.	.663	.809
Total	**.749**	**.931**
Outreach		
1. Microfinance institutions' strong financial returns have enabled expanded outreach to underserved communities.	.591	.897
2. Impressive portfolio returns allow institutions to reach more borrowers and promote financial inclusion.	.666	.929
3. Effective portfolio management has led to notable returns and expanded outreach to marginalized groups.	.642	.879
4. Significant returns from loan portfolios have broadened access to financial services for the unbanked.	.636	.925
5. Favorable returns have facilitated greater outreach to economically disadvantaged populations.	.596	.877
6. Attractive portfolio returns empower institutions to serve unbanked individuals and drive economic growth.	.642	.916
7. Substantial returns have enabled institutions to expand outreach and improve access for underserved populations.	.582	.853
8. Efficient portfolio use has led to notable returns and greater inclusion for marginalized communities.	.681	.937
9. Financial returns from loan portfolios have fueled outreach initiatives and financial empowerment for the unbanked.	.628	.930
10. Significant portfolio returns have expanded outreach, bringing services to excluded populations.	.713	.836
Total	**.798**	**.897**

3.2. Validity testing of the gross loan portfolio risk-return questionnaire

In factor 1: credit quality, the highest factor loading, indicating the strongest association, is exhibited by GLP-RRQ item 2, with a value of .860. In contrast, the lowest factor loading, suggesting a weaker relationship, is associated with GLP-RRQ item 3, which has a factor loading of .730. Moving on to factor 2: default rates, it becomes evident that GLP-RRQ item 9 demonstrates the highest factor loading, signifying a significant correlation, with a value of .900. Conversely, the lowest factor loading is attributed to GLP-RRQ item 7, indicating a relatively weaker connection, with a factor loading of .810. When examining factor 3: portfolio concentration, the highest factor loading is observed with GLP-RRQ item 3, indicating a substantial association, with a value of .890. On the other hand, the lowest factor loading is linked to GLP-RRQ item 5, suggesting a comparatively weaker relationship, with a factor loading of .820. Lastly, in considering factor 4: vulnerability to external economic factors, the highest factor loading is displayed by GLP-RRQ item 6, emphasizing a notable correlation, with a value of .890. In contrast, the lowest factor loading is identified with GLP-RRQ item 9, suggesting a relatively weaker association, with a factor loading of .770 [Table 4].

Table 4. Results from a factor analysis of the gross loan portfolio risk-return questionnaire focusing on the level of risk associated with microfinance institutions' loan portfolios.

GLP-RRQ Items	Factor Loading			
	1	2	3	4
Factor 1: Credit Quality				
2. Poor borrower repayment capacity threatens the loan portfolio's credit quality.	**.860**	-.002	.017	.017
4. Economic downturns can affect loan portfolio credit quality.	**.860**	-.005	-.016	-.008
1. Loan default risk arises from inadequate borrower creditworthiness.	**.840**	.015	-.005	.010
7. Political or regulatory changes can impact credit quality.	**.840**	-.010	-.008	.006
8. Lack of loan diversification raises credit deterioration risk.	**.780**	-.013	.021	.010
3. Insufficient collateral increases the risk of credit quality deterioration.	**.730**	.013	.002	.013
Factor 2: Default Rates				
9. Political instability and regulatory changes affect default rates.	-.015	**.900**	.016	.017
5. Insufficient collateral and loan terms lead to higher defaults.	-.015	**.860**	-.006	.017
4. Economic downturns raise default rates.	-.004	**.830**	.006	.011
8. Lack of portfolio diversification increases concentration risks and defaults.	.020	**.820**	.001	.020
7. Weak loan monitoring raises default risk.	.016	**.810**	.003	.020
Factor 3: Portfolio Concentration				
3. Lack of diversification makes institutions more sensitive to economic shocks, affecting portfolio quality.	.006	-.017	**.890**	.004
2. Concentrated portfolios increase vulnerability to defaults, threatening financial stability.	.002	.008	**.870**	.005
4. Managing credit risk becomes difficult with concentrated portfolios, as a borrower or sector failure can hurt profitability.	-.021	.020	**.850**	.013
5. Portfolio concentration heightens credit risk, with single defaults causing significant losses and limiting future lending.	.011	.017	**.820**	.200
Factor 4: Vulnerability to External Economic Factors				
6. Economic downturns raise unemployment, increasing loan defaults.	.008	-.001	-.008	**.890**
8. Natural disasters impair borrowers' ability to repay, introducing portfolio risks.	.003	.180	.011	**.830**
10. Reliance on external funding introduces risks if donor priorities or availability change.	-.005	.140	.100	**.800**
1. Microfinance loan portfolios are vulnerable to interest rate fluctuations, affecting borrowers' repayment ability.	-.200	.190	.009	**.790**
3. Inflation or deflation impacts borrowers' repayment capacity, risking portfolio health.	.130	.007	.016	**.770**
9. Regulatory changes create uncertainty and risk for loan portfolio stability.	.010	.120	.030	**.770**

For, factor 1: portfolio quality, it is worth noting that the GLP-RRQ item 2 exhibits the highest factor loading at .900, indicating a strong association. In contrast, the GLP-RRQ item 9 displays the lowest factor loading of .750, suggesting a relatively weaker connection. Shifting the attention to factor 2: efficiency, it can be observed that the GLP-RRQ item 6 displays the highest factor loading at .880, implying a significant correlation. On the other hand, the GLP-RRQ item 8 demonstrates the lowest factor loading of .820, suggesting a relatively lesser degree of association. Similarly, within factor 3: sustainability, the GLP-RRQ item 6 stands out with the highest factor loading at .880, indicating a substantial link. Conversely, the

GLP-RRQ item 8 reveals the lowest factor loading at .790, implying a comparatively weaker relationship. Lastly, with respect to Factor 4: Outreach, the GLP-RRQ item 7 showcases the highest factor loading of .860, signifying a strong connection. Conversely, the GLP-RRQ item 5 reflects the lowest factor loading at .740, suggesting a relatively weaker association [Table 5].

Table 5. Results from a factor analysis of the gross loan portfolio risk-return questionnaire focusing on the level of financial returns generated by microfinance institutions through their loan portfolios.

GLP-RRQ Items	Factor Loading			
	1	2	3	4
Factor 1: Portfolio quality				
2. Loan portfolios generated impressive returns, reflecting a commitment to quality.	**.900**	.019	.210	.005
4. Substantial returns indicate a robust focus on portfolio quality.	**.770**	-.002	.009	.016
5. Significant financial gains showcase the strength of portfolio quality.	**.870**	-.210	-.017	-.021
6. Exceptional returns underscore effective portfolio management.	**.860**	-.012	.016	.006
7. Strong portfolio quality drove substantial financial returns.	**.880**	.005	-.009	.021
9. Returns reflected the institution's dedication to portfolio quality.	**.750**	.040	-.051	.017
Factor 2: Efficiency				
6. Efficient lending strategies resulted in substantial returns.	.210	**.880**	.006	.005
9. Institutions demonstrated efficiency with commendable financial returns.	-.003	**.880**	.011	.018
10. Managed loan portfolios showcased efficiency, yielding significant returns.	.002	**.820**	.009	-.013
3. Efficient portfolio management led to impressive financial returns.	.021	**.820**	-.190	.006
8. Efficient capital allocation in loan portfolios led to favorable returns.	.010	**.820**	.018	.020
Factor 3: Sustainability				
6. Effective portfolio management leads to sustainable returns.	-.015	.017	**.880**	.019
9. Prudent lending drives sustainable portfolio returns.	.006	.021	**.870**	.005
4. Strong returns demonstrate portfolio sustainability.	.002	.005	**.870**	.007
2. Loan portfolios yield consistent positive financial returns.	.019	.015	**.790**	.013
8. Loan portfolios show the ability to provide sustainable financial returns.	-.012	.012	**.790**	-.003
Factor 4: Outreach				
7. Substantial returns have enabled institutions to expand outreach and improve access for underserved populations.	.017	.016	.017	**.860**
1. Microfinance institutions' strong financial returns have enabled expanded outreach to underserved communities.	.008	.014	.011	**.850**
10. Significant portfolio returns have expanded outreach, bringing services to excluded populations.	-.003	.008	.001	**.780**
8. Efficient portfolio use has led to notable returns and greater inclusion for marginalized communities.	.020	-.016	.005	**.760**
5. Favorable returns have facilitated greater outreach to economically disadvantaged populations.	.020	.014	-.017	**.740**

4. DISCUSSION

The assessment of microfinance institutions' loan portfolios is a critical task in understanding the risk and financial performance of these institutions. The instrument used in this study demonstrates a high level of internal consistency across various components, providing reliable measures of different aspects of microfinance institutions' loan portfolios. The component of credit quality, which is crucial in risk assessment, exhibits excellent internal consistency. This implies that the items within this component, such as loan repayment history and borrower creditworthiness, consistently measure the same underlying construct of credit quality (Barakova et al., 2003). The high Cronbach's alpha coefficient of 0.90 further confirms the reliability of this component in capturing the risk associated with microfinance institutions' loan portfolios.

Another important component, portfolio concentration, also demonstrates excellent internal consistency. This component measures the degree of concentration in the loan portfolios of microfinance institutions, indicating the diversification of loans among different borrowers and sectors (Krauss & Walter, 2009). The strong internal consistency of the portfolio concentration component, as indicated by a Cronbach's alpha coefficient of 0.92, ensures that the items within this component consistently capture the level of portfolio concentration across various microfinance institutions. The assessment of default rates, which reflects the proportion of loans that borrowers have failed to repay (Tsai et al., 2009), is another essential component in evaluating the risk of microfinance institutions' loan portfolios. The instrument's default rate component demonstrates good internal consistency, indicating that the items reliably measure the

default risk within these portfolios. The Cronbach's alpha coefficient of 0.80 provides evidence of the internal consistency of this component and supports its usefulness in assessing default risk.

Furthermore, the instrument includes a component that assesses the vulnerability of microfinance institutions' loan portfolios to external economic factors. This component examines how changes in the external economic environment impact the institutions' portfolios (Krauss & Walter, 2009). The vulnerability component exhibits good internal consistency, as shown by the Cronbach's alpha coefficient of 0.82. This finding suggests that the items measuring vulnerability consistently capture this aspect of risk across different microfinance institutions.

Moving on to the components related to financial returns, the instrument demonstrates strong internal consistency. The sustainability component, which assesses the long-term financial viability and stability of microfinance institutions (Kar, 2011), exhibits excellent internal consistency. A Cronbach's alpha coefficient of 0.88 for the sustainability component, indicating that the items consistently measure the financial performance and stability of microfinance institutions across different contexts. The portfolio quality component, which evaluates the overall quality and performance of microfinance institutions' loan portfolios, also shows excellent internal consistency. A Cronbach's alpha coefficient of 0.90 for this component, suggesting that the items reliably capture the quality of loan portfolios across different microfinance institutions.

Assessing the outreach of microfinance institutions, which measures the extent to which they reach underserved populations and provide financial services to them, is another important aspect of evaluating their loan portfolios. The outreach component demonstrates good internal consistency. This finding suggests that the items consistently capture the level of financial inclusion achieved by microfinance institutions across different contexts. Finally, the instrument includes a component called efficiency, which evaluates the operational efficiency and cost-effectiveness of microfinance institutions' loan portfolios. The efficiency component exhibits good internal consistency. This implies that the items measuring efficiency consistently capture the level of operational efficiency and cost-effectiveness across different microfinance institutions.

The instrument used to assess microfinance institutions' loan portfolios demonstrates a high level of internal consistency across various components. The reliable and consistent measurement of credit quality, portfolio concentration, default rates, vulnerability to external economic factors, sustainability, portfolio quality, outreach, and efficiency provides valuable insights into the risk and financial performance of microfinance institutions. The robust findings from multiple studies conducted support the instrument's reliability and make it a useful tool for evaluating microfinance institutions' loan portfolios.

5. CONCLUSION

In conclusion, the instrument used to assess microfinance institutions' loan portfolios demonstrates a high level of internal consistency across its various components. The components related to risk assessment, including credit quality, portfolio concentration, default rates, and vulnerability to external economic factors, exhibit excellent or good internal consistency. Similarly, the components assessing financial returns, such as sustainability and portfolio quality, show excellent internal consistency, while outreach and efficiency exhibit good internal consistency. These findings, in congruence with the previous studies that portray similar ideas about gross loan portfolio provide robust evidence of the instrument's reliability in evaluating microfinance institutions' loan portfolios.

Based on the strong internal consistency demonstrated by the instrument, it can be recommended for wider adoption in assessing the risk and financial performance of microfinance institutions' loan portfolios. The reliable measurement of credit quality, portfolio concentration, default rates, vulnerability, sustainability, portfolio quality, outreach, and efficiency provide valuable insights for stakeholders, including investors, regulators, and practitioners. By employing this instrument, stakeholders can make more informed decisions and effectively manage the risks associated with microfinance institutions' loan portfolios.

While the internal consistency of the instrument's components provides valuable insights, it is important to acknowledge certain limitations. First, the instrument's reliability relies on self-reported data from microfinance institutions, which may be subject to reporting biases or inaccuracies. Additionally, the studies reviewed in this discussion were conducted in various contexts and with different sample sizes, which may limit the generalizability of the findings. Further research is needed to validate the instrument's internal consistency in diverse settings and with larger and more representative samples of microfinance institutions. Additionally, while internal consistency is an important aspect of instrument reliability, other psychometric properties, such as validity and stability, should also be considered to ensure a comprehensive assessment of the instrument's performance.

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Community-based flood alert system using long-range technology for Brgy. San Agustin, San Jose, Occidental Mindoro

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ABSTRACT

Floods are common disasters experienced in almost all parts of the world. The Philippines experienced varying degrees of flood events and almost all parts of the country are monitored during heavy rains and typhoons. As flood events continue to increase in the future, disaster risk management agencies intensifies strategies to mitigate impacts of flood at barangay level. This study presented a flood alert system for Brgy. San Agustin, San Jose Occidental Mindoro, Philippines to inform the community during the risk of flood. The developed system is composed of Arduino Uno microcontroller, Long Range, Global System for Mobile communication Module, water level sensors and temperature-humidity sensors. Once the sensors are activated and detected the water level, it will send alert message to the Global System for Mobile communication module and send flood alert messages to the receiver with response time of not exceeding ten (10) seconds. The simulation programmed in Arduino Uno showed that it is capable of real-time detection of water level and sending alert messages. The performance of the GSM module showed its capability of sending flood alert messages based on the water level detection. The developed system successfully showed its ability to send flood alert messages with corresponding alert description.

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1. INTRODUCTION

Floods are natural disasters imposing major threats to life, property and economy causing economic losses and human suffering (Chaudhary & Piracha, 2021; Cheng, 2004). Floods are considered as one of the most major problems in the countries all over the world. The significant losses of life, livelihood, and infrastructure make flooding a major threat to the economic and social well-being of the flood-prone urban areas (Jonkman, 2005). The varying degrees of climate change impacts cause unpredictable flood frequency and severity (Aerts et al., 2018; Freer et al., 2013; Hirabayashi et al., 2013). Sea level projection from coastal tide gauge and satellite altimeter are expected to rise up to 34.87 and 33.71 cm, respectively, in 2100 (Affandi et al., 2024). With the unpredictable effects of climate change, flood risks will continuously increase placing many cities in the world at great harm. Increasing flood frequency and severity of extreme rainfall has led to the utilization of non-structural approaches for flood mitigation (Breckpot, et al., 2010). Recent technology

advances on forecasting rainfall and tracking of storm path helps the community to prepare for possible impacts. But the need for a real time monitoring of flow and water level can be very helpful in decision making and flood prevention and mitigation. Efforts in mitigating adverse impacts of floods have been the subjects of many studies and researches. Monitoring and tracking the path of storms and typhoons open many opportunities on the prediction of flood water level ranging from traditional approaches to state-of-the-art technology based infrastructures. The use of wireless sensor networks, remote sensing, geographical information system, Internet of Things (IoT) based are some of the promising technologies used nowadays.

Over the years, large number of researches and projects concentrated on the development of stronger and smarter flood monitoring and warning systems and methodologies such as the wireless sensor networks (Chang & Guo, 2006; Yeon, et al., 2018), embedded system with middleware (Hughes et al., 2006), IoT based systems (Pandian, 2019), WSN using Zigbee module (Yuwat & Kilaso, 2011), and flood modelling and forecasting using big data analysis (Anbarasan, et al., 2020) were introduced. Awareness of the community on the coming flood events was regarded as the best mitigation measure to avoid damages and severe impacts by communicating on the water level in flood prone areas. Flood early warning system using meteorological data, water levels and remote sensing offers a state-of-the art system as it combines the capability of the simulation and real time monitoring of water level. A system that detects water level and measures the rise of speed of water was used in alerting the residents in Malaysia. The system optimizes the capability of the raspberry Pi in collecting data from the water sensors and transmits signals to Global System for Mobile communication (GSM) module and provides notification to evacuate before the water rises (Shah, et al., 2018). A flood monitoring and alert system that measures the height of water was developed using ultrasonic sensors and gives warning signal thru SMS module (Priya, et al., 2017; Satria, et al., 2017). While a dynamic limited water level flood control was developed in India that provides real world application of internet of things, thru web the signals are received and provide warning and alert messages (Yun & Singh, 2008). A flood early warning system using SMS and web was designed to record rainfall and water level data on flood status to the people in the flood prone area of Garang River, Semarang Malaysia (Windarta, 2010). A same technology was developed to manage the water storage system of dam and lake through sensor signals that can predict the incoming water level. The sensors connected in the lake is connected with IoT Platform that transmits signal and warning massages (Smys, et al., 2020). In addition, an automated flood control system based on wired and wireless communication was developed in Nigeria that can efficiently monitor and control the water level using SCADA as the supervisory component (Inyiama & Obota, 2013). A real time monitoring of water conditions, water level and precipitation level was developed and employed in monitoring the flood in Nakhon Si Thannarat, Thailand. The monitoring system is composed of sensor networks, processing/transmission unit and database application software; the General Packet Radio Service embedded in the system allows communication and transmit measured data to the application server (Sunkpho & Ootamakorn, 2011).

Philippines, being an archipelago is vulnerable to climate change-related hazards with an average of 20 typhoons hitting the country every year, is frequently devastated by calamities resulting to numerous loss of lives, damage to property and billions of economic losses (Santos, 2021). Development of flood early warning system has gained popularity as many low lying areas in the country experiences adverse effects of flood. A real time flood monitoring and early warning system is installed in Ilagan, Isabela. The system uses Arduino, ultrasonic sensors, GSM module in detecting the water level and transmitting signal and warning messages to help the stakeholders mitigate flood casualties (Natividad & Mendez, 2018). Further, an alarm system was developed in monitoring the water level of Salog River in Sorsogon, Philippines; the water level sensors coupled with LED arrays emit light to water level: green for low, orange for medium, and red for high, and a siren that alarms for evacuation signal (Labo et al., 2016). Much of the early warning system developed as flood mitigation infrastructure optimizes the capability of IoT, and wireless sensors. A breakthrough in electronics and sensors is offered by Long range (LoRA) Technology and gaining attention in flood monitoring systems. The flood monitoring system using LoRa Technology offers speed of transmission making it suitable to produce real-time monitoring systems. LoRa is supported by the unlicensed radio bands, and promises kilometers of communication distance and several years of battery life; the Chirp Spread Spectrum technology (Goursaud & Gorce, 2015) makes it robust against a high degree of interference multi-path and Doppler effects (Adelantado, et al., 2017; Peng, et al., 2018). The performance of LoRa was evaluated and found that it is capable of communicating to distances larger than 10km (Liando, et al., 2019).

During typhoons, almost all flood-prone areas in the country are under constant monitoring to secure life and property. San Jose, Occidental Mindoro faces the South China Sea, is the gateway of almost all typhoons passing the country, had suffered varying degrees of flood events since 2018 (San Jose-MDRRMO, 2021). During typhoons, the Disaster Risk Office is constantly monitoring the water levels in flood-prone areas, particularly in Brgy. San Agustin, San Jose Occidental Mindoro. Since the area seats on

low-lying agricultural land with the nearby Busuanga River, an increase in the water river causes fear in the community. Floods caused by the river flow down very slowly because of surface retention over the extensive flood plain and the area's gentle slope. The monitoring of the water level requires frequent visits and round-the-clock observation in Brgy. San Agustin. This prompted the researchers to help the MDRRMO in monitoring the water level by offering a flood alert system (FAS) using LoRA Technology and an SMS module. The FAS aims to present a localized warning system to help the community by providing interactive and real-time information on the current water level of the Busuanga River. Specifically, this study aims to: design a prototype that detects the Busuanga River's current water level using LoRA Technology and GSM module; design and develop a flood alert system (FAS) for the surrounding community using SMS; and test the performance of the prototype and the community-based FAS.

2. MATERIALS AND METHOD

2.1. Study area

The study area is located in Brgy. San Agustin, San Jose, Occidental Mindoro. It has a population of 5,019 with 5-9 years old as the age group with the highest population (PSA, 2020). The area is only 10m/32.81feet above sea level and situated in area with moderate to high flood risk levels. Busuanga River passes through San Agustin and is bounded by Mindoro Strait at the lower part and serves as the natural boundary between the municipalities of Rizal and Calintaan. The land use land cover in the study area is dominated by agricultural land and covered by crops. The economic activities focus on agricultural production with palay as the main crops. With its nearness in Busuanga River, the study area seating in low elevation is highly susceptible to fluvial floods. With its geographical location, the barangay is directly affected by the sudden changes in the river flow and sea rises (Paringit & Abucay, 2017). At present, a manual water level monitoring is already installed near the river to monitor the water level in the river. If the sea level rises to 2.0m, the barangay is immediately affected and flooding is expected to happen. Based on San Jose-MDRRMO, the condition of the water level in the barangay is religiously monitored to provide updates to the community.

2.2. Design of community-based food early warning signal

The system architecture of the proposed community-based flood alert system aims to provide real-time flood warning messages that could help the community inform immediately. The technology was installed near the Busuanga River in Brgy. San Agustin, San Jose Occidental Mindoro. The FAS maximized the capability of water level sensors, LoRA technology, and the GSM Module. The LoRA module installed requires less sophisticated transceiver devices and narrow internet bandwidth making it suitable for the community with weak internet connection; it has a large range that controls millions of devices allowing several data rates and sensitivity levels (Ragnoli, et.al, 2020). Since the study area has a weak internet connection, the use of the GSM Module is more convenient to use. The GSM Module is embedded in the FAS to allow the communication of data, signals, and warning messages in real time (Figure 1).

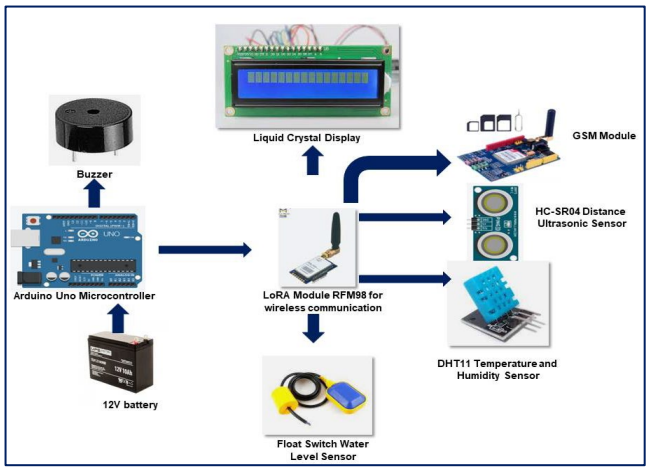

Figure 1. Pictorial diagram of the flood alert system

The system is powered up by a 12V battery installed in a protective box for security purposes. The Arduino Uno microcontroller served as the brain of the technology that commands all the components and peripherals. It sends signals to the LoRA Module, a long-range, low-power wireless platform used in the

system that connects all other components wirelessly. The HC-SR04 distance ultrasonic Sensor and DHT11 temperature and humidity sensor receive signals from the LoRA module and have the capability of detecting the water level and measuring the humidity and temperature in the area. From the LoRa Module, the liquid crystal display is installed to indicate the level of the water. While the float sensor acts like a switch that indicates the water level and sends the appropriate signal through a buzzer that sends the water alert level.

2.3. Experimental set-up

To test the reliability and performance of the developed FAS, the system is tested in actual water with varying levels with water sensors placed in a basin. Simulation of the water level is introduced to allow it to rise until it reaches the first sensors for Alert Level 1. An alert message must be received by the connected mobile phone. Another scenario is tested where water is added until it reaches the second sensor and alert messages read the Alert Level II; and lastly, an additional water level scenario was simulated that reaches the third sensor and sends a signal of Alert Level III informing that the water is at a critical level and the siren sounds signalling the need for evacuation. The velocity of the rising water was recorded to estimate how quickly the flood water can rise in each scenario (Table 1).

Table 1. Water level monitoring system of the developed Flood Alert System (FAS)

Alert Level	Level	Simulated depth (inches)	Water level monitoring (Busuanga River as the reference in meters)	Color coding
None	Normal	>1.0	>0.5	Green
I	Alert and stand by	1.10-3.00	0.60-1.50	Yellow
II	Warning and preparing for evacuation	3.01-6.99	1.60-2.50	Orange
III	Danger and evacuate	≤ 7.0	<2.51	Red

The reliability of the network system is evaluated in terms of signal strength, signal-noise ratio, packet loss, and round-trip time. The reaction time of the sensors and response time in the mobile phone and GMS module were recorded to determine if real-time communication was achieved. The timeout was monitored to check if communication was lost, causing delays in real-time communication.

2.4. Implementation of the proposed system architecture

After preparing all the material and system components, the researchers performed an initial test to assess the general functionality of the procured materials. The system architecture is composed of a sensor field, command control, field, and the GSM Module. The sensor field is composed of the Arduino Uno and the LoRA. The command control field consists of the water level sensors and the temperature and humidity sensors that monitor the water level and temperature in the environment. Then the sensors send signals to the GSM Module for the end-users to receive alert messages. In this phase, it is assumed that all electronic systems and components are installed. The coding of the two modules is also initialized in this phase. The configuration and modification are included to ensure the workability of the system. The water level sensors are installed along with the LoRa Module and GSM module connected to an Android phone to check the sending of alert messages (Figure 2).

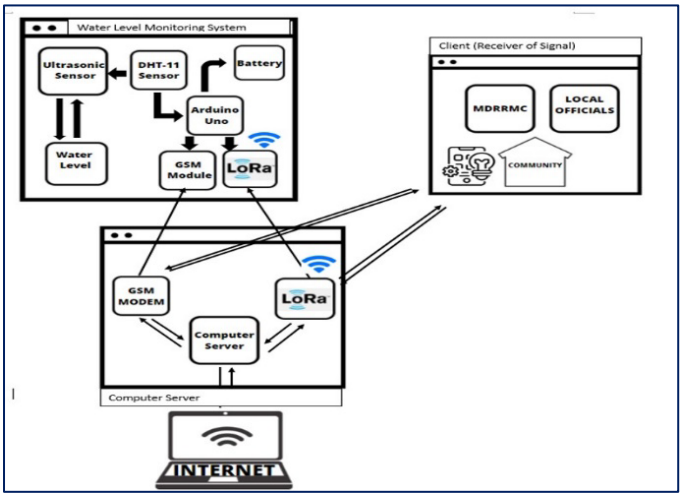

Figure 2. System Architecture

The water monitoring level is composed of an ultrasonic sensor and a DHT11 Sensor that measures the distance of the water level and the temperature of the water. It is controlled by an Arduino microcontroller that processes the signal from the sensors, GSM module, and Long Range (LoRA). Once the sensors are triggered, an output signal is transferred to the microcontroller, activates the connected GSM and Lora module, and sends a water level status to another LoRA and GSM module connected to the server. Then the developed program installed in the computer server analyzed the message received and automatically sent alert messages to the concerned agencies such as MDRRMO, local government officials, and the community.

The proposed system architecture successfully integrated the use of sensors in sending messages based on the water level. As the floater rises, it sends a signal to Arduino Uno with the actual height of the water through wireless communication using the Lora module; then the 2nd Arduino triggers the Lora module and GSM module to send a signal to the mobile phones. The water level can be monitored through mobile phones and as the water rises it sends an alert message to the user, authorities, and other government agencies.

2.5. Performance testing

To test the performance of the FAS, time delay is used for the evaluation and efficiency of the signal. Here are three tests conducted to determine the functionality of the proposed FAS. The tests considered two scenarios: 1) the water level rises quickly, and 2) the water level rises gradually during heavy rains and possible flooding. Test 1 considered the time delay response for the detection of the water level from the sensors and Test 2 considered the time delay response for sending and receiving SMS.

3. RESULTS

3.1. Water level detection

The first test is designed to measure the efficiency and accuracy of time in terms of detecting the water level of the river through the sensors. The testing is done using a basin to determine how the system responds upon the detection of the water level. A corresponding value for height and alert level was initially programmed in the Arduino Uno to represent the actual flood height and alert system. When the water level reaches the default threshold for Level I, Level II, and Level III, a notification indicating the water level is received by the command control. The first test was conducted to determine the response of the water level sensors in the depth of water in the basin (Table 2).

Table 2. Time-delay of water level sensors

Water level sensor		**Temperature and humidity sensors**	
Simulated depth (inches)	Time delay (seconds)	Simulated depth (inches)	Time difference (seconds)
2.0	0:02	2.0	0:04
3.0	0:01	3.0	0:03
4.0	0:02	4.0	0:02
5.0	0:02	5.0	0:02
6.0	0:01	6.0	0:01
7.0	0:01	7.0	0:00
7 and above	0:01	7 and above	0:00

The observed time delay is tolerable since it does not exceed ten (10) seconds. A longer response was observed at the first depth since the sensors were adjusting to the prescribed readings. Based on the results, it can be concluded that the proposed system functions in real-time as soon as the sensors detect the simulated water level, temperature, and humidity.

3.2. Time delay of received text message

This test aims to measure the time–delay in receiving text messages. Once, the sensors read the indicated water level, the command control field sends a signal to the GSM module and sends alert messages to the mobile phones (Table 3).

Table 3. Time-delay of sending text messages

Simulated depth (inches)	**Alert level**	**Alert description**	**Time delay (SMS delivery time, in seconds)**
2.0	I	Alert and stand-by	1.08
3.0	I	Alert and stand-by	1.15
4.0	II	Prepare for evacuation	1.65
5.0	II	Prepare for evacuation	1.80
6.0	II	Prepare for evacuation	1.85
7 and above	III	Evacuate	1.90

The system successfully performed its function to send alert messages. The detected water level has a corresponding alert level and description when received by the system users. The maximum delay time was 1.90 seconds and was observed at the highest simulated depth. The proposed system is concluded to achieve its purpose and can send alert messages in real-time.

3.2. Performance evaluation

During the performance evaluation, the system components, sensors, and command control system were placed near the area and simulations were done considering the required water level. The system is greatly dependent on the microcontroller Arduino Uno. The programming was done before the actual testing and adjustments were considered in the actual tests (Figure 3).

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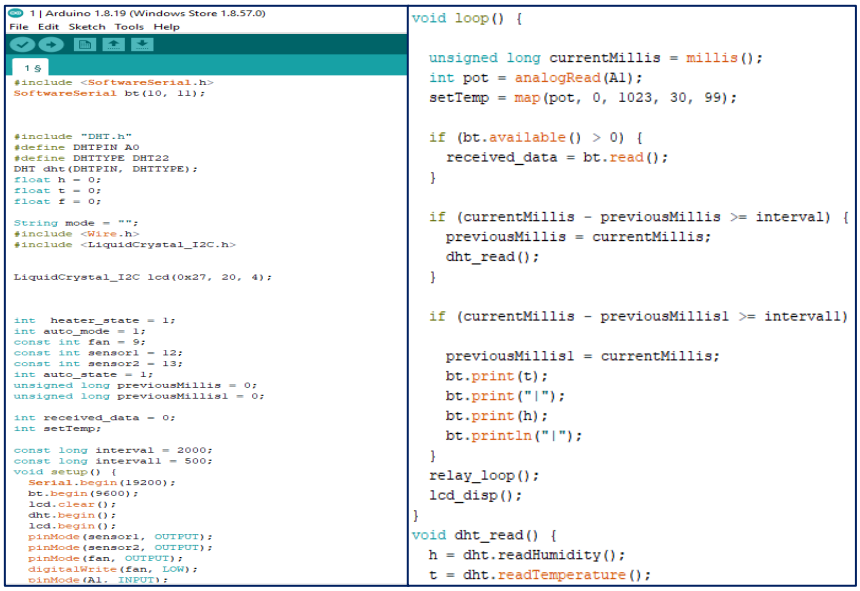

Figure 3. Program in the Arduino IDE

4. DISCUSSION

The system successfully performed its function to send alert messages. The detected water level has a corresThis paper designed a flood alert system using the Lora module and GSM Module that sends SMS or text messages to mobile phones to inform the community and government agencies like MDRRMO about the status of the flood level in Brgy. San Agustin, San Jose Occidental Mindoro. The study area is prone to moderate-high flood risks during typhoons and sea level rise. The site is one of the areas being monitored by the MDRRMO as immediate warning alerts must be given to the community. This study aims to help the local government unit, the MDRRMO, the barangay officials, and the residents of the barangay to have real-time flood monitoring systems that send text messages on the status of the water level and possible actions to be undertaken.

The actual components of the proposed system; consisting of a pair of sensors that work together to determine the actual water level. When the sensors determine the real water level, the information is processed in the Arduino Uno microcontroller, wirelessly communicated over the Lora module, and then passed to the GSM module to produce text messages that alert and notify the residents and the community. There are three alert messages received: alert level I: when the water level is above three (3) feet which means that the residents must be on alert or stand-by status; alert level II: when the water level is above five (5) feet, and the residents must be prepared for possible evacuation; and alert level III: when the water is above seven (7) and the residents must evacuate their areas.

This study further proved the efficiency of microcontrollers on flood alert systems. The water level monitoring system developed by Hassan et al., (2019) using SMS and Arduino board combined the float switch sensors in analyzing the detected water level and translating signals into alert messages. In this study, the water level detected by sensors triggers the Arduino Uno and the microcontrollers to respond and send alert messages based on the default water level. Further, the flood level monitoring developed in Calumpit, Bulacan using float switch sensors and Raspberry Pi and image processing showed effective integration of the electronics components in detecting water level and responding on a real-time basis (Tolentino et al., 2022). This study also focuses on the real-time capability of the developed water level monitoring system.

When the transmission of signals was beyond the expected real-time response, adjustment on the default water level and sensor readings were adjusted and programmed immediately to achieve the desired goals..

5. CONCLUSION

The study successfully produced a flood alert system for Brgy. San Agustin, San Jose, Occidental Mindoro. Using the capability of the Arduino Uno Microcontroller, LoRa, and GSM Module, the proposed system achieved its objective of sending alert messages to the users. The Arduino Uno which serves as the brain of the system sends signals wirelessly to LoRA and sends signals to the water level sensors and temperature/humidity sensors attached to the system. The water level detected is analyzed by the GSM Module and sends a corresponding alert level message. The performance of the proposed FAS was evaluated to determine its efficiency in detecting the water level and sending messages on the alert level. The performance test conducted showed that the detection of water level is real-time while the delivery of alert messages is reliable.

The developed flood monitoring system achieved its design function of sending real-time flood alert messages. The developed FAS can serve as a tool in disaster risk monitoring and mitigation. The capability of the GSM module is optimized to serve the residents without internet connectivity and provide them with alert messages that can save their lives during unforeseen flood events. The use of remote sensing and modern technologies can improve the communication and performance of the flood early warning system.

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Back to face-to-face teaching: A comparative study of public and private school teacher's experiences

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ABSTRACT

Full face-to-face classes have been reintroduced in schools for at least six months, yet there has been no research on instructors' experiences as classes resumed post-pandemic. This study, conducted in the municipality of San Jose, Occidental Mindoro, aimed to compare the experiences of public and private school teachers in relation to several factors: student demotivation, misbehavior, restructured classrooms, modified teaching and learning activities, limitations imposed by PPE, COVID-19 surge anxiety, and students' academic underperformance. Additionally, this study sought to identify the most effective strategies to address the challenges presented by the pandemic in delivering high-quality education. Results indicate no significant differences in the levels of experience between public and private school teachers, both of whom observed notable behavioral and academic adjustments among students. The Wellness and Support Services were highlighted as the most effective approach to managing pandemic-related challenges. Emphasizing students' mental and emotional well-being by providing access to counseling services, stress-reduction resources, and online support networks was recommended as essential for addressing these issues.

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1. INTRODUCTION

The COVID-19 pandemic has introduced unprecedented challenges in societal, political, and economic spheres, along with a crisis in education. Schools in 191 nations were closed due to the global shutdown. According to the United Nations Educational, Scientific, and Cultural Organization (2020a), 1.6 billion (90.2%) students were unable to attend primary, secondary, or higher education institutions due to pandemic concerns. These closures aimed to maintain safe physical distancing and reduce the frequency of SARS-CoV-2 infections, COVID-19-related hospitalizations, and fatalities (Tagare, 2023).

Given the abrupt, volatile, and unpredictable nature of COVID-19, the educational system had to quickly adapt to new learning environments. However, extended closures could negatively impact the health and well-being of students and educators alike. Due to the lack of research on strategies to exit lockdowns, there is a critical need to explore various approaches that allow schools to reopen safely worldwide (United Nations Educational, Scientific and Cultural Organization, 2020b). Closing schools during a disease outbreak

is an important public health measure, yet it can have significant negative consequences for children and adolescents. Students from low-income families face increased risks of food insecurity, domestic abuse, and economic hardship, as parents bear added caregiving responsibilities while trying to sustain their livelihoods. School absences could have long-term repercussions, particularly for the most vulnerable populations. Continuous lockdowns are unsustainable for youth and pose safety concerns in the long run (United Nations Educational, Scientific and Cultural Organization, 2020c).

What are the possibilities for reopening schools? Ensuring that staff and students return as quickly as possible while maintaining safe physical distancing is crucial. One approach is to keep schools closed until widespread vaccination achieves 'herd immunity' or a cure is found. However, forecasts indicate that it could take three to five years for full vaccine coverage. Reopening schools in full would allow students to resume their education, though this could increase infection rates. As awareness grows about SARS-CoV-2 transmission among young people, schools and communities will better understand the implications of in-person learning (Hodgson, 2020).

In the Philippines, schools reopened with limited student and staff capacity. Currently, 25,668 public schools provide classroom instruction, representing 56.89% of the Department of Education's more than 47,000 public schools. Approximately 5.95 million students from kindergarten to 12th grade are attending face-to-face classes, with numbers expected to grow as safety standards are met despite regulatory relaxations (Tagare, 2023). The enhanced community quarantine (ECQ) implemented across Luzon included the entire MIMAROPA region. On May 1, 2020, this was downgraded to a general community quarantine (GCQ), though San Jose, Occidental Mindoro, remained under ECQ until at least May 15, 2020. Since March 17, 2020, all in-person classes have been prohibited in the province, including San Jose, necessitating a shift to online or distance learning for both basic and higher education.

This research is urgently needed, as classes have resumed after more than two years of global lockdown—the longest in educational history—highlighting ongoing issues in student learning and physical engagement (Monguillot et al., 2022; Alencar et al., 2022). The study aims to conduct a comparative analysis of public and private school teachers' experiences upon returning to face-to-face classes. Specifically, it will determine respondents' profiles in terms of gender and rank/position, and compare teachers' experiences regarding the following key factors: student demotivation, student misbehavior, classroom reconfiguration, adaptation of teaching and learning activities, PPE limitations, COVID surge anxiety, and students' academic underperformance. Additionally, the study seeks to identify strategies employed by teachers to address pandemic-induced challenges in teaching and learning. This research is critical for assisting administrators, teachers, parents, and students by exploring their concerns and apprehensions regarding school reopening. As teachers prepare to conduct in-person sessions, this research offers insights to academic stakeholders focused on their needs. Teachers, as vital figures in students' lives, are provided with resources through this study to enhance their support systems..

2. MATERIALS AND METHOD

2.1. Research design

The potential and restrictions in teaching when schools in the Philippines have reopened were determined using a quantitative design, specifically the descriptive approach. A descriptive survey design was used in this study, and questionnaires were given out to all the available basic education teachers who have teach online and now teaching face-to-face. Surveys are thought of as an inexpensive research instrument that can in a short amount of time, gather information from a lot of respondents. It is appropriate for this study to utilize a questionnaire based on a review of prior online learning literature because of the delivery, response collection, and production of trustworthy data..

2.2. Setting

The research was conducted at San Jose Occidental Mindoro, tapping the public schools like Pilot Elementary School, Pag asa Elementary School and OMSC. The private schools are Mother Catherina School and Divine Word College of San Jose.

2.3. Sample

For this study, 35 randomly selected teachers from Basic Education of which 21 are from public schools and 14 from private schools in San Jose, Occidental Mindoro was chosen to take part on the survey. All participants was given the same set of questions about how they implement teaching during the reopening of in-person classes and the problems, challenged, and concerns they faced.

2.4. Research instrument

The research utilized a questionnaire containing the two parts, the demographic profile and the teachers' experience. Teacher experience consists of the following factors: students are demotivated; students are misbehaving; re-frame the classroom; retrofit teaching and learning activities; PPE brings limit; COVID surge anxiety; and students' poor academic performance. At the end of the questionnaire, the participants were asked about some strategies they used to cope with these experiences.

2.5. Data gathering

The questionnaire was sent to a group of teachers online using the google forms. In google forms, the data can be downloaded in an excel format. It also has charts of gathered data where interpretation was easily done.

2.5. Data analysis

The data was analyzed using descriptive statistics such as weighted mean and percentage. Comparison was made as to whether there are different perceptions on the issue presented in the study among public and private school teachers.

3. RESULTS

3.1. Demographic profile

There was a total of 35 respondents, of which 21 are public school teachers and 14 are private school teachers (Table 1).

Table 1. Demographic profile of the respondents

Rank/Position	Public School			Private School			Total
	Male	Female	LGBTQIA+	Male	Female	LGBTQIA+	
Part-time Teacher	2	0	0	0	3	0	5
Teacher I	0	5	1	0	4	0	10
Teacher II	0	0	0	0	3	0	3
Teacher III	2	8	0	1	3	0	14
Master Teacher I	1	1	0	0	0	0	2
Head Teacher I	1	0	0	0	0	0	1
Total	6	14	1	1	13	0	35

3.2. Teachers' experiences

Teachers' consensus on the perception that students become demotivated upon the resumption of in-person instruction. The mean scores, 2.65 for public school teachers and 2.98 for private school teachers, both fall within the neutral or uncertain range. Additionally, public school teachers expressed uncertainty (mean = 2.95) regarding students' boredom in class, whereas private school educators showed agreement (mean = 3.93) on this issue (Table 2).

Table 2. Teachers rating on the factor students are demotivated.

Students are Demotivated		Mean Score	
		Public School Teachers	Private School Teachers
1.	Students don't want to learn because they must adapt from online to face-to-face learning.	2.43	2.50
2.	All the students are used to being online, so they know how to manage their time. Now that they are back in a face-to-face class, they are still getting used to it.	2.86	2.86
3.	Most students get bored in class, so the teacher needs to motivate them to show up on time. The teacher also needs to help them get excited in class so they can be motivated	2.95	3.93
4.	Students who don't want to meet in person because they know they can just turn in their work online.	2.38	2.64
	Average	**2.65**	**2.98**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

Teachers' responses regarding students' attitudes showed that public school teachers (mean = 2.90) and private school teachers (mean = 3.50) were both generally indifferent or unsure on the matter (Table 3).

Table 3. Teachers rating on the factor students are misbehaving.

	Students are Misbehaving	Mean	
		Public School Teachers	Private School Teachers
1.	How to deal with their attitudes is hard for me, especially since it's hard to tell how they feel now that they've been in an online class for two years.	3.10	3.43
2.	We see that reading and writing skills are not as good as they could be. Some students also have trouble being away from their homes.	3.24	3.29
3.	When I teach face-to-face classes, I struggle with how the students act. I think it's about getting to know each other as teachers and students.	2.90	3.50
	Average	**3.08**	**3.40**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

Both public school teachers (mean = 3.91) and private school teachers (mean = 4.24) firmly believe that setting up the classroom is important to ensure adherence to health standards (Table 4).

Table 4. Teachers rating on the factor re-frame the classroom.

	Re-frame the Classrooms	Mean	
		Public School Teachers	Public School Teachers
1.	In teaching my subject, physical contact is one of the challenges.	2.90	3.00
2.	We need to link the possible activities to the IATF-mandated sports that are allowed in each municipality, which varies based on the IATF status of the municipality.	3.57	4.14
3.	Preparing the classroom is crucial because you must ensure it is an excellent place to learn and follows health rules.	4.52	4.64
4.	The challenges we face are getting ready for how the classroom will be run, especially in how we should remind them to keep their distance from each other, wear masks, wash their hands before and after class, and not touch other students.	3.95	4.64
5.	I have to ensure that none of the planned activities will put my student in danger. This is why health protocols are essential.	4.62	4.79
	Average	**3.91**	**4.24**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

Public school teachers (mean = 3.95) and private school teachers (mean = 4.21) believe that it is important to ensure that children benefit from the activities and performance assignments, and that the curriculum's content criteria are met (Table 5).

Table 5. Teachers rating on the factor retrofit teaching and learning activities.

	Retrofit Teaching and Learning Activities	Mean	
		Public School Teachers	Public School Teachers
1.	I find it hard to find activities similar to those we are used to, especially for skills involving contacts, like dances and exercises. So, we need to make outputs that involve the least amount of communication.	3.48	3.79
2.	I've had to deal with many problems, but the biggest ones have been ensuring the activities and performance tasks are helpful for the students and meeting the curriculum's content standards.	3.95	4.21
3.	When I'm getting ready for my face-to-face classes, the ways and methods I'll use to teach are the most difficult parts.	3.19	3.79
4.	When getting ready for face-to-face classes, I've had trouble figuring out how to change my teaching methods, what strategies to use, and how to change every class activity so that it is performance-based	3.00	3.93
	Average	**3.40**	**3.93**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

Public school teachers (mean = 4.05) agree regarding the use of face masks, face shields, and other barriers that limit students' ability to learn to their fullest potential. Private school teachers (mean = 4.54) largely concur with these points, where PPE places restrictions on their teaching and learning methods (Table 6).

Table 6. Teachers rating on the factor PPE brings limit.

PPE Brings Limit	Mean	
	Public School Teachers	Public School Teachers
1. The biggest problems I have are with my students. Every time we do an activity, they have trouble wearing masks because they say they can't breathe. They always ask if the mask can be removed, but the protocol says you can't.	3.90	4.50
2. Face masks and face shields make it hard to talk; barriers make it hard to see the board; and kids tend to take off their masks in class, especially when doing different physical activities.	4.19	4.57
Average	**4.05**	**4.54**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

Teachers in both public schools (mean = 3.60) and private schools (mean = 3.93) agreed that COVID surge anxiety exists among students (Table 6).

Table 6. Teachers rating on the factor COVID surge anxiety.

COVID Surge Anxiety	Mean	
	Public School Teachers	Public School Teachers
1. When I was getting ready for face-to-face classes, it was hard to find students because many of them were afraid to come. Also, sometimes students got sick, which made everyone feel bad, especially the parents. Because the pandemic also affected the children's feelings, they were especially afraid to talk to other people.	3.71	3.71
2. The risk is that it could suddenly go up again and get COVID.	3.48	4.14
Average	**3.60**	**3.93**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

Public school teachers (mean = 3.70) and private school teachers (mean = 4.13) agreed on all elements related to students' poor academic performance (Table 7).

Table 7. Teachers rating on the factor students' poor academic performance.

Students' Poor Academic Performance	Mean	
	Public School Teachers	Public School Teachers
1. Some of the issues that arise have to do with how the kids would comprehend the subject given that the consequences of the Coronavirus occurred at least two years ago	3.76	4.07
2. Their reading and writing deficiencies, as well as distress when they had to leave their parents, were also noted by teachers	3.81	4.07
3. Teachers also saw that some children who hadn't attended class in nearly two years had behavioral issues.	3.86	4.43
4. It was the bonds and connections that the pupils shared. It's difficult for teachers and pupils to get along because they haven't seen each other in a while.	3.33	3.79
5. Since we began our in-person classes, the majority of my pupils have changed significantly, especially those who aren't accustomed to participating in the activities they do now.	3.76	4.29
Average	**3.70**	**4.13**

Legend: 4.51– 5.00- Strongly Agree; 3.5 1– 4.50 – Agree; 2.5 1–3.50- Neutral/Uncertain; 1.51 – 2.50 – Disagree; 1.00-1.50 - Strongly Disagree

3.2. Strategies used by teachers

Wellness and support services had the highest frequency, chosen by 30 teachers (n = 30), indicating that teachers prioritize students' mental and emotional well-being by providing access to counseling services, stress management resources, and virtual support groups. This was followed by regular communication (n = 28), blended learning (n = 27), professional development (n = 27), technology integration (n = 26), student engagement strategies (n = 25), clear instruction and expectations (n = 24), personalized learning (n = 19), modifications to the assessment process (n = 16), and synchronous and asynchronous learning (n = 14) (Figure 3).

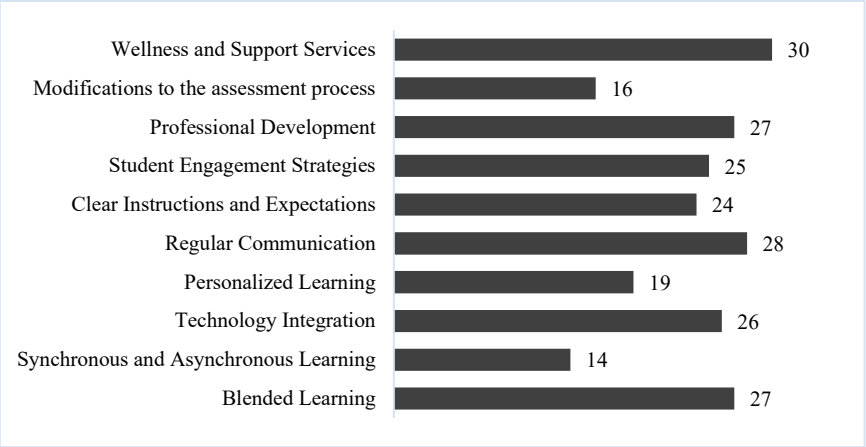

Figure 3. Strategies used by teachers.

4. DISCUSSION

A total of 35 responses were received, of which 21 are teachers from public schools and 14 from private schools. The number of teachers varies between public and private schools due to the fact that public school teachers are generally more open to participating in this kind of research study. According to the National Center for Education Statistics, public school teachers were also more likely to participate in professional development activities, which many believe are essential for teachers throughout their careers to update and improve their teaching skills. This was supported by Almonicar (2023), whose research stated that although teachers in public schools may lack scientific training, they are willing to participate in any research endeavor.

More students attend public schools than private ones, requiring increased supervision. This has led to children becoming demotivated and inattentive due to the large number of subjects to cover, as well as difficulty adjusting after extended absences. Teachers faced challenges when face-to-face classes resumed, including maintaining health protocols, adopting new teaching strategies, and managing time. Additionally, teachers emphasized the importance of ensuring students benefit from activities and assignments while meeting curriculum standards, with the development of instructional materials and new strategies being essential for adapting to the new normal (Jakara, 2022).

The PPE issue presented a challenge at the beginning of face-to-face classes. With the multi-wave pandemic dynamics of 2021 hitting most countries hard, healthcare systems reaching their limits, and schools transitioning to hybrid and partial face-to-face classes, it is essential to understand teachers' fears of infection and risk perception.

Regarding the effect of COVID-19, anxiety was observed among both students and teachers, which was also stated by Paco and Delfino (2023). Teachers worried about their health and the health of their families as they adjusted to hybrid teaching during the post-pandemic period. In addition, they were concerned about medical bills and their ways of handling the situation, though this did not lead to significant psychological stress.

In terms of academic performance, the effects of the COVID-19 pandemic are evident in education. The study results suggest that children's academic performance was impacted by the abrupt shift in learning methods. This finding aligns with the research of Grubic et al. (2020), who stated that the closure of schools disrupted students' daily routines, which are crucial for maintaining focus and discipline in their studies. The lack of a structured environment made it harder for students to stay on track with their academic responsibilities.

In facing these challenges, teachers need to find effective ways to continue delivering quality education to students. Wellness and support services are the primary strategies used by teachers to cope with the challenges of reopening classes after the pandemic. This indicates that teachers prioritize students' mental and emotional well-being by providing access to counseling services, stress management resources, and virtual support groups. According to Paco and Delfino (2020), people worldwide have found themselves coping with new professional roles. Currently, teachers are initiating and applying various ways to cope with the challenges encountered in the reopening of classes, such as maintaining positive well-being, social support, openness to change, and job awareness of the new normal in education.

5. CONCLUSION

After more than two years of campus shutdowns due to the COVID-19 pandemic, public and private schools in San Jose, Occidental Mindoro resumed traditional five-day face-to-face classes. This study compared the experiences of teachers from both public and private schools, revealing several key conclusions. The majority of respondents were female, with most holding positions ranging from Teacher I to Teacher III.

The teachers' experiences were influenced by several factors. There was no significant difference between public and private school teachers in their perception of student demotivation following the return to face-to-face classes. Both groups expressed neutral or uncertain views regarding students' behavior and attitudes. Additionally, teachers from both sectors agreed on the necessity of re-framing classroom arrangements, while they were neutral or uncertain about retrofitting classrooms. Public school teachers acknowledged that the use of personal protective equipment (PPE) limits classroom dynamics, while private school teachers strongly agreed with this view. Furthermore, there was no notable difference in the anxiety expressed by teachers from both sectors concerning COVID-19 surges. A common observation among all respondents was the poor academic performance of students upon their return to face-to-face classes.

To address these challenges, respondents identified the need to prioritize students' mental and emotional well-being through wellness and support services as a key strategy. This emphasis on student well-being underscores the importance of supporting both the emotional and academic recovery of students in the post-pandemic educational landscape.

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