

Innovations

Out-of-Field Teaching in Mathematics: Issues and Adaptive Strategies among Senior High School Teachers in Balicuatro Area Division of Northern Samar

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Abstract: *This study used phenomenological approach in exploring the life and lived experiences of out-of-field senior high teachers teaching Mathematics subject. This qualitative study incorporated Gadamer's theory (1975) of "fusion of horizons" and with Vygotsky's theory (1978) of the more knowledgeable other, which provided a better understanding of the significance of out-of-field teaching for the learning environment. Gadamer's concept of "shared meaning" (1976) aided in examining participants' lived experiences through multiple lenses. Using purposive sampling, fifteen (15) senior high teachers participated in the study. Utilizing Creswell's method for data analysis, three major themes emerged: (1) Arduous Work; (2) Being Adaptable; and (3) Improving Content and Knowledge. The results revealed that these out-of-field senior high teachers experienced significant difficulty adjusting to teaching their Mathematics classes. The findings also showed that these out-of-field senior high mathematics teachers employed various teaching strategies, participated in peer mentoring and coaching, and continuously tracked student progress using diverse assessment techniques from carefully prepared lessons and improvised instructional learning materials. With their positive attitude, commitment to service, and passion for teaching, these teachers successfully coped with different teaching-related adversities. They demonstrated proficiency in developing mitigating solutions, creating teaching strategies, and persevering to assist students in achieving predetermined learning outcomes. School administrators and district supervisors are advised to seriously address this issue to implement appropriate strategic interventions and recruitment policies based on fields of expertise. Parallel studies could be conducted focusing on out-of-field teachers across all levels from other disciplines.*

Keywords: *1. Quality Education, 2. Contingency Plan, 3. Skilled Teacher, 4. Proficiency, 5. Specialization*

I. Introduction

Learners will undoubtedly become lifelong learners and capable of assisting in the rapid economic development of a country if they receive quality instruction from teachers who are skilled and confident in teaching their subject matter. The quality of the educational process is impaired when taught by teachers who do not have a relevant major. However, a critical question emerges: how can this level of education be attained with so many out-of-field teachers instructing mathematics?

In the Philippines, out-of-field teaching represents a vital yet long-ignored problem in schools and in the Department of Education in general. As stated by Kenny et al. (2020), the high incidence of out-of-field teaching has become irrefutable and unavoidable, leading state-funded certificates or professional development programs to be offered to out-of-field science and mathematics teachers.

The credentials and quality of teachers have been criticized by numerous studies, commissions, and national reports over the previous decade. The challenge in finding high-quality education is partially attributable to the large number of graduates from teacher-education programs who major in non-mathematics subjects, as well as the significant number of teachers hired to teach subjects outside their field of specialization. Hobbs and Porsch (2021) explained that 'teaching out-of-field' is a phenomenon where teachers are assigned to teach subjects for which they have inadequate training and qualifications. This widespread phenomenon represents a significant problem in the Department of Education. Even though nearly all teachers possess basic qualifications, the number assigned to teach subjects that do not correspond to their education continues to rise, especially in senior high school.

Despite numerous adjustments aimed at improving teacher quality, out-of-field teaching has marginally deteriorated in recent years. According to Hobbs (2020), the out-of-field phenomenon arises because of systemic teacher shortages, unequal distribution of teachers, scheduling issues in schools, and teacher education systems in various countries where teachers are trained as specialists rather than generalists. While this phenomenon has become common internationally, there are differences in how it is manifested, regarded, and addressed across countries (Price et al., 2019). This situation can negatively impact student learning (Hanuscin et al., 2020; Taylor et al., 2020) and triggers feelings of incompetence and reduced confidence among teachers (Pacaña et al., 2019).

As out-of-field teaching continues to exist in the senior high school curriculum, low academic performance in Mathematics has become one of its perennial effects. In-depth investigation into this dilemma can provide highly needed information to guide policy redirection regarding hiring and distribution of teaching personnel in

senior high school Mathematics. Furthermore, findings can steer instruction, learning, and development programs at the school and district levels.

While out-of-field teaching has been common in senior high school since the implementation of the K-12 curriculum, research on out-of-field teaching in Mathematics remains scarce. Specifically, no studies have investigated this phenomenon among island schools in Balicuatro Area, Division of Northern Samar. Thus, this study aimed to depict the lived experiences, issues, and adaptive strategies of non-mathematics major senior high school teachers teaching mathematics.

II. Objectives

Generally, this study examined the issues and adaptive strategies among out-of-field senior high school Mathematics teachers in Balicuatro Area Division of Northern Samar.

In particular, it sought answers to the following questions:

1. What challenges were encountered by out-of-field senior high teachers teaching Mathematics?
2. What adaptive strategies were employed by out-of-field senior high teachers teaching mathematics?
3. What implications may be derived based on the lived experiences of out-of-field teachers teaching mathematics?

III. Methodology

a. Research Design

This qualitative study utilized a phenomenological approach that aimed to investigate the experiences and adaptive strategies of out-of-field senior high teachers teaching Mathematics. Phenomenology was selected as the most appropriate design as it sought to understand the essence of participants' lived experiences (Creswell & Poth, 2018). This approach allowed the researcher to explore how out-of-field mathematics teachers interpreted their everyday professional lives and made meaning from their experiences.

b. Participants and Sampling

Unlike quantitative research which uses random sampling generalizable to larger populations, this qualitative study utilized purposive sampling to identify participants. The researcher selected participants from the sampling frame based on specific characteristics of interest. To draw a purposive sample, the researcher identified individuals with the following characteristics: 1) currently employed as senior high teachers; 2) non-mathematics majors teaching mathematics subjects; 3) teaching in schools located in Balicuatro Area; and 4) willing to participate in the

study. Fifteen (15) senior high school teachers who met these criteria were selected as participants.

c. Data Collection

In gathering appropriate data for the study, semi-structured interviews were used as the primary data collection method. A developed interview guide was utilized following validation by two research experts. Semi-structured interviews provide a clear set of instructions for interviewers and can yield reliable, comparable qualitative data (Cohen & Crabtree, 2006). The researcher also provided an agreement that included obtaining informed consent, ensuring confidentiality, permission to record, and delineating the ethical principles guiding the research. For data storage methods, the researcher used note-taking and paper-and-pen form interviews to capture deeper responses from the informants.

d. Data Analysis

The study utilized Creswell's process for phenomenological data analysis (Creswell, 2013), which involved the following steps: (1) Organizing and preparing the data for analysis through transcribing interviews, scanning materials, and categorizing visual materials. (2) Reading through all data to gain a general understanding and reflect on its overall meaning. (3) Coding the data by categorizing text segments and labeling these categories. (4) Using the coding process to generate descriptions of people, settings, and themes for analysis—a crucial step for designing detailed descriptions for different research initiatives. (5) Determining how themes and descriptions would be represented in the qualitative narrative. (6) Making interpretations of the findings or results.

e. Research Reflexivity

In this study, the researcher's approach differed from other perspectives. As a mathematics teacher who observed non-mathematics majors teaching math, the researcher understood her position might lead to developing an in-depth understanding of different situations from various angles, ultimately identifying positive aspects, solutions, and actions for the particular situation under study.

The researcher's position and background influenced all investigation choices, from selecting methods that best served the study's purpose to identifying patterns, themes, and overall conclusions, with the intent of sharing results with participants. A researcher's experiences shape how meaning is understood and made significant to others (Smith et al., 2009). Moreover, the researcher's positionality influenced all aspects of the research study (Creswell & Poth, 2018).

f. Ethical Considerations

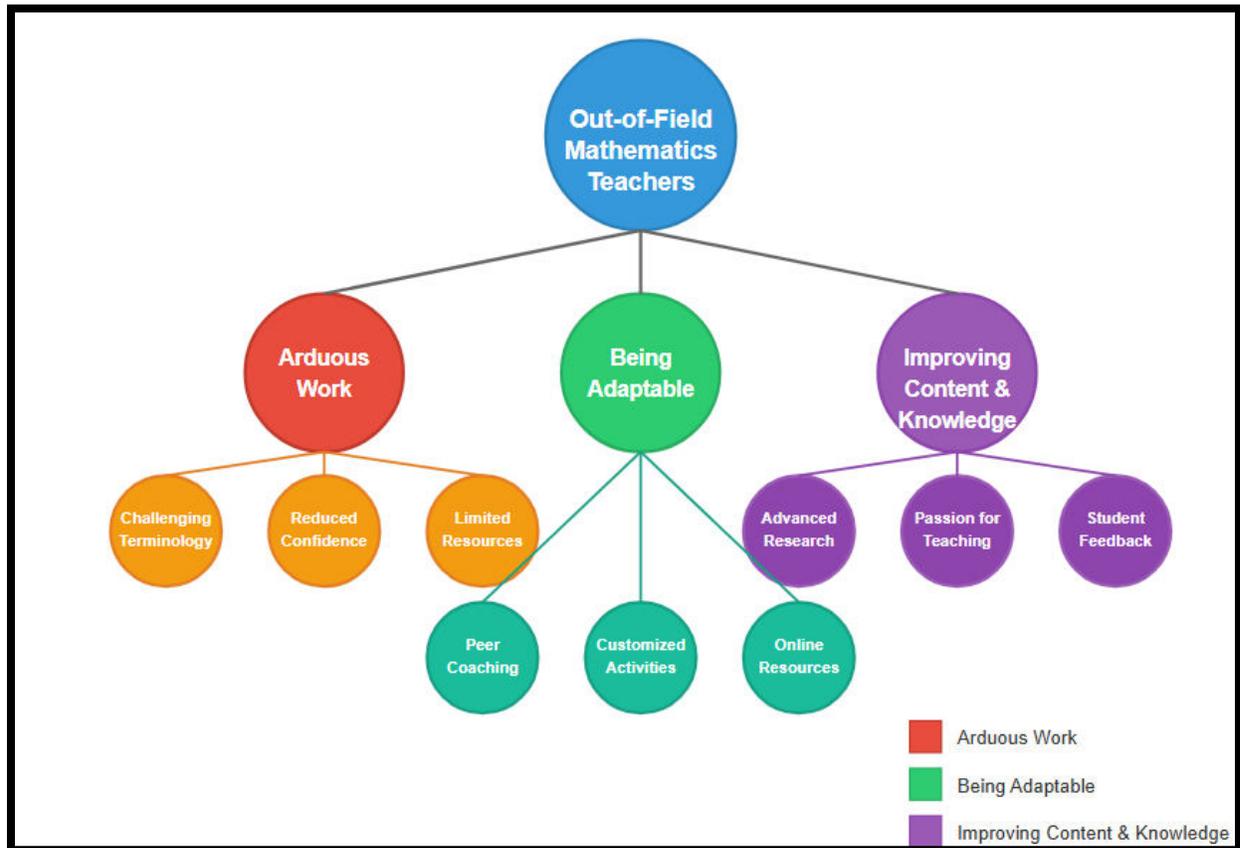
The study focused on the real-world experiences, self-perceptions, and adaptation methods of non-mathematics major senior high school teachers who taught mathematics. Ethical considerations centered on depicting settings entirely through participant experiences, interactions, and observed behaviors. Participants' anonymity and confidentiality were maintained by withholding names and identities during data collection, analysis, and reporting of findings. Privacy and confidentiality of the interview environment were carefully managed throughout the interview process, analysis, and dissemination of results.

IV. Results and Discussion

Substantial information about the current experiences of out-of-field senior high teachers teaching mathematics was gathered. Knowledge about hiring mismatches of senior high school teachers and the assignment of teaching loads for non-major subjects was documented. The information generated can establish not only a springboard for subsequent research but also a platform for teachers to express their diverse experiences.

From data analysis, three major themes emerged: (1) Arduous Work; (2) Being Adaptable; and (3) Improving Content & Knowledge. These themes suggest that teachers who were assigned to teach mathematics despite it being outside their field of specialization exerted their best efforts to meet students' needs and impart knowledge, believing that their passion and willpower were sufficient to teach even the most challenging and feared subject.

Figure 1.



Thematic Analysis Mind Map of Out-of-Field Mathematics Teachers' Experiences

Arduous Work

Episodes of arduous work preparation were reflected in the first theme. Teachers admitted feeling pressured and burdened when handling the subject. They acknowledged that teaching out-of-field classes like mathematics requires greater physical and mental effort, time, and skills compared to teaching within their field of specialization. According to the informants:

- [1] "Teaching math subject is very challenging; it really differs from teaching my major fields. There were some terminologies that I am not familiar with, and there were some instances that I skip some activities because I didn't get the correct answer."
- [2] "Students with no interest in the subject are hard to deal with. This sometimes reduced my excitement and self-confidence in teaching."
- [3] "Limited resources and limited time in studying the competencies due to numerous school reports to finish and submit sometimes result in limited knowledge imparted to the students. We need more training about the subject."

These findings align with Porsch and Whannell's (2019) statement that subject-

specific training of teachers is responsible for more effective teaching resulting in higher student proficiency. Prince and Connor (2018) emphasized that teachers need support and substantial opportunities for learning. Napier et al. (2020) articulated that by understanding the different ways teachers experience out-of-field teaching, professional learning programs can be designed to ensure teacher quality competencies are achieved, even among out-of-field teachers.

Similarly, Panella (2022a) found that teachers experienced significant challenges when adjusting to unfamiliar teaching situations, particularly during the COVID-19 pandemic. This parallel suggests that out-of-field teachers face comparable difficulties when entering new teaching domains without adequate preparation. Both scenarios require extensive adaptation and resilience from educators.

Being Adaptable

Despite the considerable mental effort and skills required, teachers maintained a positive outlook in managing their classrooms and dealing with their out-of-field mathematics classes, especially for students showing little interest in the subject. Their ability to adapt to novel and changing situations in out-of-field mathematics class environments was reflected in the second theme. The teachers took necessary actions and remedies to fulfill their teaching responsibilities, specifically seeking advice and peer coaching from teachers with the appropriate field of specialization. Other teachers searched for resources online, while some developed and customized their own learning materials. The informants stated:

- [1] "Lots of patience in dealing with struggling learners, especially since teaching modes have changed for these past two years due to the pandemic."
- [2] "My out-of-field math class is somehow debilitating and draining. But as a teacher, I need to keep going and find ways and means, and I am proud to say that I have survived this class under pressure for two years now."
- [3] "I just find other learning resources on the internet for more examples, adapt simple problems, but students can learn and engage even when the topic is hard."
- [4] "I sometimes consult my math major co-teacher on topics that are really hard for me to understand. I have to embrace peer coaching to be prepared before my math class."
- [5] "I create engaging activities when conducting remedial classes and tutorials for my struggling learners."
- [6] "I teach them to understand basic facts and concepts. I make an effort to discuss previous and present topics to let students practice regularly until they understand the process and can apply it. I make it a daily basis and have them solve problems with their groups."

- [7] "I always customize my learning activities. Mathematical modeling is one of my strategies. Daily seatwork or board work. Assigning students to reflect on each lesson as part of improving their written skills and analysis."

Despite these overwhelming experiences, teachers found ways to mitigate the challenges they faced in teaching mathematics. This aligns with the findings of Bayani and Guhao (2018), who discovered that out-of-field teachers' experiences ranged from acquiescence and submission to language proficiency issues, lack of administrative and logistical support, inability to generate excitement and build rapport, and feelings of irritation and uneasiness. They found that participants used various strategies to meet the demands of out-of-field teaching, including being creative and inventive, diligent and conscientious, engaging in student instruction, and remaining composed. Careful teacher placement was identified as crucial for avoiding issues with out-of-field teaching.

Additionally, Johnson (2015) noted that creative teachers routinely customize learning activities and adapt techniques and strategies from peers to address different learning styles based on Howard Gardner's Theory of Multiple Intelligence.

This adaptability echoes findings from Panela's (2022b) study on techno-dependence during the pandemic, where teachers demonstrated remarkable flexibility by embracing new teaching modalities and forming support networks. In both contexts, teachers' ability to adapt to challenging circumstances proved essential for maintaining educational quality.

Improving Content Knowledge

With their ultimate goal of maximizing student learning, these out-of-field teachers teaching mathematics sought ways to enhance their teaching capabilities regarding subject content and knowledge, evident in the third theme. Teachers planned ahead on how to develop the competencies needed to teach their students effectively. According to the informants:

- [1] "Have more time and focus in understanding the competencies and try to research more and find other resources to understand the topic or lesson better. Plan and think of more exciting activities for every lesson so that students will not be bored and actively participate in math class."
- [2] "Always be prepared by having advanced reading and research on the competencies to be taught. Find enough resources so that when it's time to discuss the lesson, there is mastery already and understanding can be imparted to students."
- [3] "For me, with passion for teaching, every teacher can teach even subjects outside their field of specialization. Being compassionate and embracing one's work can

make a difference. We can do advanced research on topics we should discuss; it's a matter of having time and, yeah, being passionate in everything we do."

- [4] "As a teacher, regardless of field of specialization, I know we can teach effectively. The passion for teaching is probably the most important thing. We can teach every subject simply because we are teachers."
- [5] "I take students' prior knowledge into consideration. Students' difficulties in terms of analytical, critical, and logical thinking must be handled with appropriate methods and strategies. I let them develop their skills on their own and provide effective feedback."

Study participants also drew on their personal values and beliefs about the importance of their role and responsibilities. Most participants believed that with a strong desire to impart knowledge and passion for teaching, every teacher could teach effectively, even subjects outside their field of specialization.

These findings resonate with Panela's (2022a) study, which identified "Working and Thriving" as a key theme among teachers facing challenges. In both studies, educators demonstrated resilience by developing new competencies, seeking resources, and maintaining optimism despite difficult circumstances.

V. Conclusion and Recommendation

Three major themes emerged from this phenomenological study exploring the lived experiences of out-of-field senior high teachers teaching mathematics: (1) Arduous Work; (2) Being Adaptable; and (3) Improving Content and Knowledge.

This study provided a rich description of the lived experiences of out-of-field senior high teachers teaching mathematics. The findings suggest that teachers have limited options when assigned workloads far from their field of specialization by their direct superiors. For these teachers, embracing challenges in teaching and maintaining resilience in mitigating teaching adversities became essential professional qualities.

School principals and librarians should ensure their libraries contain sufficient copies of books and related teaching resources needed by both teachers and students. Schools should secure stable internet connections to enable teachers and students to access topics not found in existing textbooks.

Concerned agencies should develop comprehensive contingency plans for addressing the out-of-field teaching phenomenon. This study could be enhanced by incorporating quantitative research methodology, conducting more extensive literature reviews, and broadening its scope. To fully understand teachers'

experiences, intensive interviews with their family members, friends, and community members are recommended. Further studies and more in-depth investigations into the lived experiences of senior high school out-of-field teachers teaching mathematics are warranted.

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