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ORIGINAL

Experiences of Senior High School Mathematics Teachers in Out-of-field Teaching

Experiencias de los profesores de matemáticas de secundaria en la enseñanza fuera del campo

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ABSTRACT

The research article focuses on Out-of-field teaching that demands urgent attention from school leaders and administrators due to its impact on instruction quality and student learning particularly in Leyte Division, Philippines. This study describes the challenges as well as the coping mechanisms of out-of-field mathematics teachers. The phenomenological approach was employed to examine the experiences of fifteen senior high school math teachers. Data were gathered through in-depth interviews, digitally recorded, transcribed, and was analyzed using the Moustakas method. The results showed that mathematics educators faced challenges when teaching subjects outside their expertise due to lack of content and pedagogical knowledge, resources, student motivation, and training. Despite this matter, they overcame these circumstances through self-learning and adaptive methods. This study determined that teaching subjects without adequate knowledge was problematic as it created interconnected problems. Effectively, a retooling and mentoring program led by subject experts would be beneficial in improving the content and pedagogical knowledge of out-of-field teachers. Meanwhile, school leaders and administrators may conduct profiling to identify the needed teachers and should allocate more school funds for teaching, learning resources, and other materials necessary for instructional delivery.

Keywords: Out-of-field Teaching; Mathematics Teachers; Challenges; Coping Mechanism; Phenomenological Approach.

RESUMEN

El artículo de investigación se centra en la enseñanza fuera de la escuela, que exige una atención urgente por parte de los líderes y administradores escolares debido a su impacto en la calidad de la instrucción y el aprendizaje de los estudiantes, especialmente en la División de Leyte, Filipinas. Este estudio describe los retos y los mecanismos que utilizan los profesores de matemáticas que trabajan fuera de la escuela. Se empleó un enfoque fenomenológico para examinar las experiencias de quince profesores de matemáticas de secundaria. Los datos se recogieron mediante entrevistas en profundidad, se grabaron digitalmente, se transcribieron y se analizaron utilizando el método Moustakas. Los resultados mostraron que los profesores de matemáticas se enfrentaban a retos a la hora de enseñar materias ajenas a su especialidad debido a la falta de conocimientos pedagógicos y de contenidos, de recursos, de motivación de los alumnos y de formación. A pesar de ello, superaron estas circunstancias mediante métodos de autoaprendizaje y adaptación. Este estudio determinó que enseñar asignaturas sin los conocimientos adecuados era problemático, ya que creaba problemas interconectados. Efectivamente, un programa de perfeccionamiento y tutoría dirigido por expertos

en la materia sería beneficioso para mejorar el contenido y los conocimientos pedagógicos de los profesores que no ejercen. Entretanto, los directores y administradores de los centros escolares podrían realizar perfiles para identificar a los profesores necesarios y deberían asignar más fondos escolares para la enseñanza, los recursos didácticos y otros materiales necesarios para la impartición de la enseñanza.

Palabras clave: Enseñanza Fuera del Campo; Profesores de Matemáticas; Retos; Mecanismo de Afrontamiento; Enfoque Fenomenológico.

INTRODUCTION

Out-of-field teaching occurs when educators lack the necessary qualifications, training, or expertise to teach specific subjects or grade levels in schools.^(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18) This mismatch between teacher qualifications and the subject matter taught is a widespread issue in education, caused by various factors like teacher shortages and scheduling problems.^(7,10,20,25) Moreover, Hobbs and Törner⁽¹⁸⁾ explained that out-of-field teaching presents various instructional challenges, a global critical issue in education. Porsch and Whannell⁽²⁸⁾ pointed out that out-of-field teaching can lead to less effective learning environments due to teachers lacking the necessary training and experience. Hobbs and Porsch⁽¹⁶⁾ added that teachers teaching outside of their expertise may provide lower-quality instruction as they rely heavily on textbooks and use shallow methods. As a result, students experience less academic growth and decreased emotional support.

According to Raymundo,⁽²⁹⁾ students lose confidence and interest in class when the teacher lacks subject knowledge, impacting their enjoyment and attitude towards the subject. Conversely, teachers with higher content knowledge, design their own lesson plans and complement the textbook information with engaging classroom activities make their students interested in the class.⁽⁵⁾ In other words, teachers teaching in their field of expertise allow their students to learn the subjects dynamically to maintain students' interest by connecting various themes and engaging in creative activities. Out-of-field teaching has a detrimental effect on achieving quality education. Hence, this phenomenon must be regarded as an essential issue in teacher education.

In this study, based on records and the corresponding author's firsthand experience of teaching out-of-field subjects, he was assigned to teach Filipino and Science subjects for a couple of months due to the absence of the subject teachers. While teaching the said subjects, he experienced difficulties because it required rigorous study and research about the subjects. He also struggled in preparing lessons because it took time and effort to comprehend them, which needed clarification. Being a mathematics specialist, he cannot teach what he does not possess.

In this regard, the authors focused on the same specialists in Mathematics who were tasked to teach a subject out of their field of expertise, particularly in the public senior high schools of Leyte Division, Philippines, to relate and gain a deeper understanding of their experiences. During the implementation of K to-12 programs and the urgent need for teachers to handle the course subjects, many teachers were assigned to teach subjects outside their specialization. Del Pilar and Militante⁽¹⁰⁾ stated that two years after the enactment of senior high school, the Department of Education hired many teachers for senior high school. Sadly, when these teachers were deployed to their respective assigned schools, the school heads tasked them to teach subjects in which they were not specialized.

Based on the interviews with five mathematics teachers in public senior high schools in Leyte Division, these teachers revealed that they were assigned to teach subjects other than mathematics. While teaching such subjects, they needed help with content knowledge and teaching strategy. They also felt physical and emotional strains while attempting to meet the requirements of a job they did not specialize in. These feelings affected their teaching performance and the student's learning process as well.⁽⁶⁾ Their struggle was visible on how they presented the courses and their teaching methods, which mainly relied on survival techniques, as these teachers conveyed. Teachers were frequently struggling with a lack of in-depth subject knowledge, which undesirably affected their competence and confidence in presenting the subject matter and responding to students' questions during class discussions.^(1,21,26)

In addition, Fulgado⁽¹³⁾ mentioned that students who learned from specialists performed better than those taught by non-specialists. He added that a highly trained and qualified teacher in the classroom leads to higher academic performance. There is a significant impact on teaching performance and the students' learning process when teachers are assigned to teach unrelated to their field of expertise. Moreover, it could be seen that since the implementation of senior high school in 2016, many teachers have still been assigned to teach subjects outside of their field of specialization, even though this phenomenon affects the teachers' teaching quality and lowers students' performance. Thus, it is evident that this issue is not getting enough attention because these teachers are still facing this problem, and this problematic situation is neglected because teachers are known

to be flexible and knowledgeable outside of their expertise, which is untrue.⁽¹³⁾

In previous studies, it indicates several reasons on how out-of-field teaching issue manifested in the field of teaching profession in diverse context and the neighbor regions of the current study. For instance, lack of qualified teachers, urgent hiring, teacher shortage, obedience from instructions, teaching loading, and to mention a few.^(1,2,3,8,21,32) As a result, the teachers were left with no choice but to accept the challenge even if they were not more knowledgeable to teach the subject that was assigned to them.^(1,2,3) In addition, most teachers who are immersed in this situation strived to cope with the challenges by enhancing their knowledge and skills through professional development and other adaptive and supportive strategies.^(21,26,29,32,36,37)

It was also noted from the said existing studies that all the suggested solutions are general, not a detailed alternatives that could help improve the system of these practices that might prevent giving teachers subjects to teach outside of their areas of expertise, or at the very least, improve their abilities to teach those subjects to alleviate the difficulties they faced. Hence, by exploring this area of study, the researchers could contribute to the literature of out-of-field teachers who majored in Mathematics but were assigned to teach outside of their field of expertise. Moreover, the researchers made the case that if they can establish the mathematics teachers' challenges and the strategies employed, this would serve as a basis to suggest specific alternatives to help the school administrators and other school officials address these situations.

Generally, this study aimed to describe the experiences of public senior high school mathematics teachers who have taught outside of their expertise. It specifically sought to identify (1) the challenges encountered by out-of-field Mathematics teachers when instructing students about subjects unrelated to their area of expertise and (2) the coping mechanisms used by out-of-field teachers to deal with these challenges.

METHODS

Research Design

In this research, a phenomenological study approach was employed. The main objective of this study was to give the informants the ability to articulate themselves and adequately express their experiences vocally. The researchers would be able to comprehend the significance of their acts and their perspectives and thoughts by using this study approach. It aims to gain a profound grasp of lived human experiences. It encompasses a structured procedure of collecting data for analyzing and explaining the intrinsic aspects or features of the individual experience.⁽²³⁾ Analyzing the out-of-field mathematics teachers' experiences may unlock challenges in teaching other subjects and their coping mechanisms. It may also reveal a new or different theoretical perspective that may enrich people's understanding of the out-of-field teaching phenomenon and provide significant findings that may contribute to some alternatives for out-of-field teachers.

Sampling

The research informants comprised fifteen (15) out-of-field Mathematics teachers in Leyte Division, Philippines. The informants were determined through purposive sampling. There were two inclusion criteria for determining the informants. The first one was that the teacher is a Mathematics specialist. The second was that the teacher is assigned to teach a subject outside his or her field of specialization. Both criteria were satisfied for the teacher to be included in this study.

Interview

The researcher utilized an interview guide to collect the data. The interview guide had three sections: the first covered the informants' general information, the second focused on the challenges in teaching outside of their expertise, and the last was on their coping mechanisms. Research experts validated the interview guide, and a pilot interview was done to address any issues before data collection for accuracy and reliability.

In addition, the data collection was done through in-depth face-to-face interviews, and it followed a semi-structured interview protocol containing two predetermined questions that revolved around the topic. Unplanned follow-up questions were asked depending on the clarity of responses. Follow-up questions were only given when an informant failed to provide specific answers or expound on his or her answers after having given the main question and enough time to respond. Furthermore, the interview lasted a minimum of forty-five (45) and a maximum of more than (60) minutes.

Prior to data collection, approval was obtained from the division superintendent and school principals. After obtaining permission, informants were notified and given consent forms. The informants were informed in advance that our discussions would be recorded for transcription purposes. Participation was voluntary with no coercion. Only researchers had access to the information provided. Informants had the option to decline participation or withhold information.

During interviews, transparency and trust were established with the informants. They were encouraged to share experiences in a safe environment openly. This approach aimed to capture authentic interview data. Transcriptions were sent for validation via email and handed personally to informants for triangulation.

Moreover, to protect the confidentiality of the data collected, the researchers used unique codes for each informant and stored personal details in a file. As a general principle, the audio recordings and transcribed data were safely kept in a hard drive for five years. This would be kept for legal and compliance reasons, and it would also help in resolving disputes and provide a historical record for analysis, training, or future reference. However, after five years, all data would be deleted from the hard drive to comply with privacy regulations and protect sensitive information.

Data Analysis

The phenomenological data were analyzed by following a systematic and rigorous procedure whose steps were outlined by Moustakas.⁽²⁴⁾ The first step in the analysis is Bracketing or Epoche, in which the researcher sets aside their own perspective on the topic under study and focuses on the perspectives of the participants. The researcher did not take a position or advance his or her own opinions, but instead relied on what the participants reported. For example, as I indicated before the interview, the researcher set aside any preconceived notions and approached the informants' experiences with a fresh perspective. The informants are allowed to express their opinions without regard for previous assumptions.

Horizontalization as second step in the data analysis, involves examining the data - for instance, interview transcriptions - and determined significant statements, sentences or words that helped the researcher understand the experiences of the participants of the phenomenon under investigation. These statements or codes are then grouped into cluster of themes. Scanning raw data for textual description involves creating a narrative explaining or clarifying participants' perception of the phenomenon. Lastly, formulation of structural description which involved developing descriptions of the context or setting considered to be influential to the phenomenon experienced by the participants is written.

RESULTS

Challenges Encountered by Out-of-Field Mathematics Teachers

Six themes emerged from the interview responses of the out-of-field mathematics teachers. These include a lack of content knowledge, lack of pedagogical knowledge, low student interest and motivation, lack of teaching and learning resources, lack of training for out-of-field Mathematics teachers, and Frustration and Dissatisfaction. While these themes are discussed separately, two or more necessarily exhibited interconnection and overlaps.

Theme 1. Lack of Content Knowledge

The out-of-field mathematics teachers said that they were asked to teach various subjects other than mathematics such as Music, Arts, Physical Education, Health (MAPEH), Technology and Livelihood Education (TLE), English, Filipino, and Science. They expressed the need for more confidence in delivering accurate instruction in these non-mathematics subjects. One of the informants mentioned that: "While teaching a non-mathematics subject, the most common challenges and problems that I have encountered were the insufficient or the lack of knowledge on subject matter" (P15-3864-3866). The informant's report is consistent with the result of the previous studies which highlighted that competence is important when teaching outside of the field of expertise.^(1,2,9)

In addition, several informants did not only point out their lack of knowledge of the subject matter but also explained specific aspects of the subject they were having difficulty with. For instance, unfamiliarity with the subject competencies, technical terms, and specific concepts, among others. One of the informants said, "So, about the subjects that are not my major, I need to refresh, read, and study the concepts because I am not really familiar with them" (P5-1346-1348). Meanwhile, the informants outlined scenarios in which they were unable to share their thoughts on the lesson and provide answers to students' queries during class discussions. The informant said: "Sometimes they have questions during discussion, especially during debate. So, the tendency is insufficient input. I don't know, it's just that it is very difficult to teach" (P5-1508-1510).

The mathematics teachers' shallow knowledge limited their capacity to make connections between concepts, causing potential difficulties in delivering precise and comprehensive instruction.^(2,5) This point corroborated the informant's statement saying, "I am guilty if the students ask questions, and I can't answer them. My way of answering them is to say, "okay, that is your assignment" (P2-479-480). This finding also supports the statement of Fulgado⁽¹³⁾ who mentioned that this situation could impact their teaching quality, ability to answer student questions, and create meaningful learning experiences.

Furthermore, another informant admitted that there were occasions when his students appeared to be more knowledgeable than him, as they were the ones explaining the lesson to the class. The informant mentioned: "I mean it's disappointing since I lack knowledge with one topic, I have students who are excellent in the class. Like that student is very good, and he/she will just be the one who elaborates. So that's it, it's a bit offending because I should be the one who should explain" (P6-1664-1668). The result also supported the

findings of Andueza et al.⁽¹⁾ who mentioned that out-of-field teachers often faced students with more advanced understanding of a specific subject than teachers who were designated to teach of the said subject.

Theme 2. Lack of Pedagogical Knowledge

During the interviews, the informants expressed challenges in selecting appropriate teaching strategies and activities for their students' needs. In fact, one of the informants said, "I struggle with what activities I will do for the students" (P7-1857-1858). Another informant shared her experience, "So, it's not easy, especially in delivering the lesson, difficult to let them understand the topic, and I am used to teaching mathematics, it has a huge difference to what strategies or techniques of what to use to be able them to understand the lesson" (P5-1348-1351). This observation corroborated the findings of Fulgado⁽¹³⁾ who found out that it is difficult to apply teaching approaches while teaching subjects outside of the expertise.

In addition, the responses of mathematics teachers' informants to instructional planning revealed that it is one of their most difficult obligations. One informant said, "Yes, of course, the most challenging part in teaching a subject, which is not my field, is preparing the lesson. Honestly, it's hard in making lesson plan" (P3-767-769). Moreover, several mathematics teachers further identified the aspects that make lesson planning a challenging task. Informants said that "It is more challenging to make a lesson plan because I am not used to making lesson plans in that subject" (P1-171-173). This finding confirmed the results of Bugwak⁽⁴⁾ who reported that those teachers with limited pedagogical expertise in the subject area hinder effective lesson planning and assessment alignment with learning goals.

Theme 3. Low Student Interest and Motivation

Throughout the interview with mathematics teachers' informants, most of them expressed a common observation, especially during class discussions. When asked about this state, one informant disclosed that, "First, they said they are not motivated, especially that I am a strict teacher. But in a sense that they are not motivated because they feel that I cannot provide the sufficient knowledge, because it's not my mastery. During discussion they are just quiet, they don't even ask questions" (P13-3503-3507).

According to Caldis,⁽⁵⁾ the students have no interest or motivation because the students know that the teacher is not knowledgeable of the subjects, they are teaching. This point corroborated the statement of one informant saying: "As far as I remember they are bored because my style of teaching is reporting. I don't know, it's just that it is very difficult to teach, and I feel my students are not motivated. Maybe because they know and understand that I am a math teacher" (P5-1507-1512). Moreover, one informant mentioned, "Of course, the knowledge I have is not sufficient for my students and I noticed also that they are not interested because they know that I am a math teacher, then I am their MAPEH teacher" (P3-901-903). This finding confirmed the previous results that because of the unfamiliarity of the subject to teach, students were more likely to become disinterested and unmotivated as they were not able to grasp the lesson during class session.^(4,5)

Theme 4. Lack of Teaching and Learning Resources

The interview reports revealed that the informants struggle with looking for instructional material to use for their class, such as textbooks, workbooks, and other supplementary resources essential for providing students with a comprehensive understanding of the subject and supporting the students' learning. This point supported the statement of the informant saying, "Then the problem that I experienced is the lack of resources in our school to use for instruction, like books because the internet here is weak. So, it's hard to look for the materials to be used)" (P8-2124-2127). Likewise, another informant added this statement saying, "Being in public school, it's hard in the first place especially during the first years of senior high school, the pioneering class, it's so hard because there are no learning materials" (P3-704-706). The study of Tingzon and Buyok⁽³⁶⁾ supported this finding stating that lack of teaching and learning resources is a challenge to out-of-field teachers.

Meanwhile, this condition on the availability of teaching and learning resources is ultimately determined by the level of support provided by schools to teachers and the availability of funds to that aim.⁽³⁾ In fact, one informant said, "It is better if the school has a budget for the training or whatever programs we want to implement in school and to be able to provide instructional materials" (P5-1577-1579). Another informant added saying, "Even in budget it's lack of money to provide what are the needed here in school" (P6-1755-1756). Their statements supported the result of Sebrero⁽³²⁾ who emphasized that financial constraints are the main reason for inadequate resources in school.

Theme 5. Lack of Training for Out-of-Field Teachers

The mathematics teachers' informants reported that they do not even receive any targeted training to develop their content familiarity in the subject they teach to acquire the depth of understanding and expertise needed to prepare the subject effectively. However, one of the informants shared and mentioned, "We do have Learning Action Cell session (LAC), it's like our seminar or training but not related to improving our knowledge

to teach the subject. We still learned something from our LAC session like strategy, like games but it's not applicable always" (P8-2242-2245). This finding supported the study of Arendain and Limpot⁽²⁾ who indicated that the absence of these specific professional developments for out-of-field teachers could hardly improve the effectiveness of the delivery of lessons.

Although there are departmental and school-level training courses and similar sessions conducted regularly, it does not directly help them to alleviate their difficulties in teaching out-of-field subjects. In fact, one of the informants mentioned that, "Usually, we have LAC session that we conduct but not necessarily the subject itself. There are specific training sessions that are based on Individual Performance Commitment and Review Form (IPCRF). So, in general, it's like LAC sessions, not to help these problems like to teach that are not our major." (P3-998-1002). Another informant also shared the same sentiments, "No training or seminar, we have in-service training, sir, but not related to help our experience. Like that" (P12-3302-3303). The mathematics teachers' statements about their usual practices did not support equipping them with knowledge and skills to address their deficit in knowledge of content and pedagogy.^(13,21,29)

Theme 6. Frustration and Dissatisfaction on Teaching Performance

Based on the interviews with the informants, they felt that right after each class discussion, they were not able to provide the students with the quality of teaching and education that they deserve. One of the informants described her experiences during an interview, "I have difficulty in teaching music and arts. Especially those terms, those terms using instruments, I don't even know how to play guitar and drums, I don't know, so it's difficult. What I did is I download some video then I let them watch the video, then let them demonstrate also. But I am not contented with what I've taught to them because it feels like it's not fulfilling on my part as a teacher on that case" (P9-2338-2345). Another informant also shared sentiment, stating that: "Since I'm not an expert in teaching the subject, I don't seem really confident. I can feel nervousness during my class because I'm not sure if the terms are correct even if I studied it, I felt it's not enough" (P10-2698-2700). This finding was consistent with the results of Raymundo⁽²⁹⁾ who emphasized the disturbing impact of negative emotion when teaching subjects outside of their field of expertise.

According to Del Pilar and Militante,⁽⁹⁾ the condition of being frustrated and other destructive sentiments could affect the student's learning process and their academic performance, especially in the classroom setting. Their point of view confirmed the informant's statement saying, "The problem is that we are not able to provide the students' need to learn because it's not our field. In addition, one informant shared his experience: "But in general, it affects their performance because the knowledge they learn from me is not sufficient, for the reason that I am not knowledgeable about that subject and not my major" (P5-1512-1514). Meanwhile, another informant mentioned, "I'm sure if one who will handle the subject is the teacher who is his major, the knowledge you can give to the students is more sufficient. Just like us, it affects the performances of the students because what they are learning from us is not exact" (P14-3703-3708).

Coping Mechanisms of Out-of-Field Mathematics Teachers

The out-of-field mathematics teachers disclosed several coping mechanisms they fell back on to adapt to the challenges they encountered while teaching subjects they were not trained to teach. These coping mechanisms are adaptive strategies and steps that the informants took to manage and alleviate the difficulties they experienced as out-of-field teachers - whether internal or external to them.

Theme 1. Self-Directed Learning to Improve Content Knowledge

As facilitators of learning, teachers are expected to provide guidance to students in learning a subject by engaging with students in analyzing and elaborating on ideas and concepts, making connections among pieces of information, and conducting explorations, among others. During the interview with the mathematics teachers' informants, it appears that they recognized that all these things are difficult to carry out if they do not possess even a modest amount of knowledge of the content intended to be taught.

Teachers must come to class prepared and ready for their sessions. Thus, their initial coping mechanism is self-directed learning, which they willingly did to improve their content knowledge. One of the informants disclosed that: "I really need to study hard to be able to share the right concepts that my students need to learn. So, I make double effort for my students compared to the major subject because at least I have a background knowledge about it. For the subjects that are not my major, I need to refresh, read, and study about the concepts because I am not familiar with it" (P5-1343-1348). The informant statement supports the result of Pacaña et al.⁽²⁶⁾ they found that teachers need to familiarize the concept of the subject they were unfamiliar with for them to equip knowledge and skills.

Moreover, mathematics teachers had been brought to the status of novice teachers due to teaching non-math subjects. In this case, they must make a twofold effort to study a specific topic repeatedly so that they have a clear understanding of the subject to be prepared.^(3,8) In fact, one of the informants shared the same

point, stating, “I don’t have any knowledge of that particular subject. But as time goes by, since I don’t have a choice, I master it. It’s just that I go back to being a beginner. Because I need to always study the topic. Reading is necessary and I always search to Google because I can’t understand the other terminologies” (P2-370-374). The informant further mentioned that: “Those subjects I handled I am getting used to it, and I feel like I master it already because I keep on studying and reading and I learn from it too. But it’s difficult, especially in my first time” (P2-427-429).

Theme 2. Exploring Alternative Sources of Instructional Materials

The informants expressed that they explored various alternative sources to address the need for teaching and learning resources such as books and references, materials, and equipment, among others, in their schools and the inability of the schools to provide such resources immediately. Based on the responses of the mathematics teachers’ informants, they used the internet to find reading materials for themselves and their students. In fact, one of the informants shared, “Since we lack learning materials, books, what I do is always research on the internet, that’s where I read and take activities that I give to students” (P12-3278-3280). Another informant also shared, “So, it’s a challenge to teach and we are lacking learning materials, that is our problem, that is why I search to the Internet for my lesson” (P2-374-376). Andueza et al.⁽¹⁾ supported the informant’s statements that only searching on the internet was the main source of the teachers in finding lesson materials to use for teaching.

In addition, some of the informants mentioned that they provide students with many valuable learning materials and activities, as well as great ideas for making classes enjoyable, like incorporating games into lessons. Mathematics teachers were able to present the material in unique and captivating ways that make it more understandable and more engaging for their students using the online sources.^(1,14) In fact, one of the informants mentioned that: “There’s more, I search YouTube for my visual aid and instructional materials, I also search examples and games on google, I am becoming resourceful since I don’t have a choice and for the sake of my students. I am getting used to it, as time goes by” (P1-254-257). The informant stated, “To at least manage the challenges, I read the internet sources” (P1-250-251).

Apart from leveraging online sources, other teachers had to spend their own money to purchase the needed teaching and learning materials in the classroom. One of the informants said, “We are the ones who spend our own expenses for the classroom, buying things such as learning materials for the classroom” (P2-565-566). Another informant also mentioned, “There is also a lack of references for one of my subjects like Risk Management and Social Science. I really find ways because there are no books available, and even the division don’t provide” (P4-1155-1157). This finding confirmed the result of Pacaña et al.⁽²⁶⁾ who indicated that since the school was insufficient of learning materials, teachers spent more effort and their own salary to purchase teaching materials and other school supplies. This assertion also corroborated the point of Andueza⁽¹⁾ who mentioned that due to lack of financial school support, teachers often utilize their personal funds to obtain the necessary materials for teaching.

DISCUSSION

The purpose of this article was to describe the experiences of mathematics teachers in out-of-field teaching, particularly the challenges they encountered teaching non-mathematics subjects in senior high school and the coping mechanism they employed. Based on the findings of this study, the authors determined that teaching subjects outside of their area of competence causes problems. In fact, mathematics teachers frequently struggle with unfamiliar topics and lack the necessary skills to efficiently engage students. Many informants reported challenges in facilitating class due to a lack of competence, which hampered their ability to connect students effectively.

This study confirmed the findings of Du Plessis⁽¹²⁾ that teachers who lack expertise in the subject matter may provide a lesson that is too superficial for students, which hinders their ability to take in and comprehend new information. Her research also shown that this lack of understanding contributes to subsequent issues with students’ assimilation, development, and scaffolding of new information. Similar results were obtained by Bugwak,⁽⁴⁾ who showed that teachers who do not practice their field of study have difficulty providing in-depth responses to students’ queries during class discussions. It also supported the current study’s assertion that a deficiency in knowledge of the topic is the main cause of this issue.

In the absence of relevant knowledge, mathematics teachers struggled to determine the most appropriate teaching and instructional strategies to employ. This finding was reinforced by Bugwak⁽⁴⁾ and Co et al.⁽⁸⁾ both studies reported that this issue derived from a lack of content expertise. They added that out-of-field teachers with inadequate competence may use typical, uncreative ways. They emphasize the significance of teachers devoting sufficient time and effort to develop a thorough understanding of the subject and designing appropriate instructional activities.

In addition, Sebrero⁽³²⁾ emphasized that teachers do not prefer to teach lessons without prior knowledge,

expertise, or experience. He further explained that this difficulty could be associated with the transfer of learning. This means that prior knowledge of teachers acquired through their education and training in their field of expertise could be challenging to apply in a new field. This further suggests that knowledge and skills are restricted only to a specific field and unsuitable for adoption. This could explain the difficulties in lesson execution of out-of-field teachers who are initially mathematics majors.

The results also disclosed that a lack of content and pedagogical knowledge in these areas hindered out-of-field teachers' capacity to create or employ effective strategies and instructional activities that might stimulate and heighten student interest and motivation. This finding corroborated the result of Haron et al.⁽¹⁵⁾ and Weiner⁽³⁸⁾ regarding this matter. They found out that inadequate pedagogical expertise causes teachers to use inefficient teaching methods, which in turn causes teachers to fail to engage students and increase their motivation and intelligence. According to Johnson,⁽¹⁹⁾ teachers should be competent and dedicated to their work since this provides a comprehensive approach that engages students and motivates them to meet higher standards for learning.

Another issue that emerged was the demand for additional training programs designed especially for out-of-field teachers, who usually lack resources for instruction and learning. This result supported by Tingzon and Buyok⁽³⁶⁾ statements that insufficient school funding causes a shortage of instructional resources, which hinders the teachers to provide with students needs in classroom. In addition, their argument strengthens the informants' view that the lack of teaching materials and resources, along with other types of teacher support, is mostly due to inadequate funding.

According to Maffea⁽²⁾ there is funding allocated to each school, however providing sufficient resources is not a top priority. She further mentioned that schools must change the way they spend their funds that it is directed toward initiatives that actually improve student learning. For instance, offering specialized training and assistance to out-of-field teachers could improve student performance and their ability to teach effectively. Fulminar⁽¹⁴⁾ supports this point of view by stressing out that targeted training sessions and seminars can equip educators with the know-how and abilities required to apply successful teaching practices.

The results also showed that the mathematics teachers had to deal with personal issues including disappointments and dissatisfaction with their teaching performance due to their knowledge gaps and inability to provide students with appropriate learning opportunities. Similar findings from previous studies indicated that out-of-field teachers felt ineffective and dissatisfied with their capacity to impart knowledge and the knowledge that students learn from them.^(3,13,32,37) They also reinforced how frustrated and unsatisfied the non-specialist teachers when they are unable to completely explain topics to students because they require more knowledge about the topic. They believe that they could provide students with higher quality education if they were just competent enough. But given that improving the content understanding requires time and effort, it could be more frustrating and dissatisfying.

Despite of the all the challenges experienced by the mathematics teachers, they were able to adapt and take significant steps to make advancements. The findings indicate that in order to address their knowledge gaps they had in the subject, they typically resorted to independent study. This outcome is reinforced by the findings of Arendain and Limpot⁽²⁾ and Bayani and Guhao.⁽³⁾ They mentioned that the teachers showed perseverance and dedication even though they spent more time and energy researching subjects unrelated to their areas of expertise and they took initiative to make up for their knowledge gaps. Moreover, it has been revealed by several previous studies that out-of-field teachers are more likely to begin the process of equipping themselves with the knowledge needed to teach through independent study.^(43,33,36)

The math teachers also explored alternative means for teaching and learning in order to overcome the issue of their schools' failure to supply adequate instructional materials. They took advantage of the Internet, searching for helpful online resources, particularly when determining the most effective teaching methods and lesson plans to utilize for their classes. This outcome shows that teachers are resourceful in their attempts to assist students in learning with greater efficiency by utilizing instructional resources that capture students' interest and effectively present and explain the specific topics they are teaching, especially those that are complex. The results were aligned with the findings by Arendain and Limpot,⁽²⁾ which indicated that exploring alternative sources of instructional material demonstrated their aim to overcome resource constraints and the significance of instructional resources in the delivery of lessons.

Furthermore, Price et al.⁽²⁸⁾ suggested that ingenuity matters most for out-of-field teachers. One example is their ability to create beneficial educational resources that promote successful student learning. Mathematics teachers additionally reported that their mentors helped them enhance their class preparation and delivery skills. This is consistent with the findings of Bugwak⁽⁴⁾ and Sebrero.⁽³²⁾ They observed that mentoring could assist teachers learn novel concepts and improve their teaching abilities. This strategy could be an effective option for gaining knowledge and improving teaching skills of the out-of-field mathematics teachers.

CONCLUSIONS

Based on the findings, assigning mathematics teachers to teach outside their expertise caused teaching issues. Lack of content and pedagogical knowledge is a major challenge. These problems undermine their effectiveness in the classroom. In this instance, students perhaps will lose faith in the teacher's capacity to educate them, which has a detrimental impact on the learning environment. Failure to address this matter could hinder teachers' ability to support students effectively. The results also highlighted that insufficient funding is the primary cause for the lack of teaching resources, specialized training, and support, leading to poor teaching performance, low student motivation, and achievement, eventually leading to a decline in the overall morale and job satisfaction of the mathematics teachers.

In addition, despite facing such challenges, out-of-field mathematics teachers have used adaptive methods like self-learning and alternate resources to improve their teaching conditions. However, these cannot be considered a long-term solution to challenges brought about by out-of-field teaching. If this practice continues, these teachers will consistently struggle, impacting the quality of education and hindering the Department of Education's goal to ensure students achieve the necessary competencies for a quality education.

Hence, it is strongly recommended by the researcher that school leaders may implement a retooling program for out-of-field mathematics teachers that would center on enhancing content and pedagogical knowledge. This could involve organizing long-term and sustainable seminars and training workshops for mathematics teachers teaching subjects beyond their expertise. The purpose is to provide the necessary abilities for managing the out-of-field teaching task. The strategy may include quarterly seminars and workshops delivered by subject-matter experts over the course of two to three years. This would allow mathematics teachers to improve their knowledge of the subject they are responsible for teaching. Moreover, the authors proposed a mentoring program managed by a subject expert to solve this issue. This can be accomplished by coaching mathematics teachers with experienced mentors for at least one school year. The mentor's role is to guide and oversee the math teacher in efficiently teaching the topic, developing lesson plans, and implementing various teaching methodologies.

Moreover, senior officials from the Department of Education, notably those in the Leyte Division, may undertake profiling to determine the teachers required in each school. This recommended method could assist them in identifying schools with excess teachers who are teaching subjects outside of their area of competence, allowing them to be reallocated to other schools through a simple assessment or survey. Finally, school officials may consider modifying their budget to increase funding for instructional resources and materials required by teachers. They may undertake an assessment to establish the resources required for funding. Also, schools may consider looking at additional funding sources to help teachers meet their instructional needs, which can be accomplished through partnerships, grants, and fundraisers.

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