Exploring the Experiences of Non-Science Teachers Handling Science Subject: Inputs to a Mentoring Program

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Abstract

Mentoring Program is a structured support system proposed in this study that provides guidance, coaching, and professional assistance to non-science teachers handling science subjects. Despite the increasing number of out-of-field teaching assignments, there were limited studies exploring the lived experiences of non-science teachers in the Department of Education Leyte context. This study employed a phenomenological research design and utilized purposive sampling and semi-structured interviews anchored in Pedagogical Content Knowledge (PCK) Theory. The participants consisted of three (3) non-science teachers who were currently or had recently handled science subjects in selected public secondary schools. Data gathered were analyzed through qualitative thematic analysis to identify key experiences, challenges, and coping mechanisms, which were organized into emerging themes. Based on these findings, a context-responsive mentoring program was developed to support non-science teachers in improving their instructional practices and confidence in teaching science. The study benefited students, teachers, science mentors, school administrators, and policymakers, the Department of Education, and future researchers by enhancing science instruction, strengthening mentoring systems, informing policy and administrative decisions, and contributing to the broader field of science education research.

Keywords: Mentoring program; non-science teachers; phenomenology; public secondary school; qualitative thematic analysis

1. Introduction

Education plays a vital role in developing individuals' knowledge, skills, and values, while science education is essential in preparing learners to become scientifically literate and globally competitive citizens. Globally, many educational systems continue to face challenges in providing quality science instruction due to the shortage of qualified science teachers, and this issue is also evident in the Philippines where many teachers are assigned to teach subjects outside their specialization. In the Philippine context, the increasing number of non-science teachers handling science subjects has raised concerns regarding instructional effectiveness, teacher preparedness, and students' performance in science, especially in international assessments such as the Programme for International Student Assessment (PISA). These challenges highlight the need to better understand the realities, struggles, and coping mechanisms of non-science teachers as they navigate the demands of science teaching despite limited formal preparation in the field. Hence, conducting an assessment study on the lived experiences of non-science teachers handling science subjects is necessary to

provide evidence-based insights that may serve as inputs for responsive mentoring and professional support programs.

Previous studies revealed that out-of-field teaching remains a major issue in education, particularly in science, where teachers are assigned subjects beyond their specialization due to the shortage of qualified educators. Studies by San Jose (2022), Caldis (2022), and Malahay (2021) found that non-science teachers often experience stress, anxiety, lack of confidence, and difficulty in content mastery, which may negatively affect instructional quality and student learning outcomes. Furthermore, Co, Abella, and De Jesus (2021), as well as Fullido (2025), emphasized that teacher specialization significantly influences teaching effectiveness, student engagement, and academic performance, although non-specialized teachers may still adapt through experience and pedagogical strategies. Meanwhile, Edulan and Fajardo (2024) highlighted that non-science teachers cope with these challenges through self-directed learning, collaboration with colleagues, and resourcefulness, while studies on mentoring programs such as Galvez and Azarias (2024) stressed the importance of professional support, coaching, and collaborative mentoring in strengthening teacher competence and confidence. Despite these existing studies, there remains limited qualitative research focusing specifically on the lived experiences of non-science teachers handling science subjects and how these experiences may serve as the basis for developing responsive mentoring programs, thereby justifying the present study.

The present study is anchored on the Phenomenological Theory and the Pedagogical Content Knowledge (PCK) Theory, which together provide a strong foundation for understanding the experiences of non-science teachers handling science subjects. Phenomenological Theory, as explained by Teherani et al. (2015), emphasizes exploring and interpreting the lived experiences of individuals to understand the meanings they attach to a particular phenomenon, making it appropriate in examining the realities, challenges, and coping mechanisms of non-science teachers. Meanwhile, Shulman's Pedagogical Content Knowledge (PCK) Theory highlights that effective teaching requires not only mastery of subject content but also the ability to deliver that content through appropriate pedagogical strategies. This theory suggests that teachers who lack specialization in science may encounter difficulties in explaining scientific concepts, conducting inquiry-based instruction, and facilitating meaningful learning experiences due to limited science-specific pedagogical knowledge. Therefore, these theories guided the study in exploring how non-science teachers experience science teaching, adapt to instructional challenges, and develop strategies that may contribute to the formulation of an effective mentoring program.

This study focuses on exploring the lived experiences of non-science teachers handling science subjects in selected public secondary schools within the Department of Education Leyte Division for the school year 2025–2026. Despite the growing practice of assigning teachers outside their area of specialization, limited qualitative studies have examined how non-science teachers experience and cope with the demands of teaching science subjects. The study specifically seeks to determine the experiences of non-science teachers in handling science subjects, the challenges they encounter in the teaching process, and the coping mechanisms they employ to manage these difficulties. It also aims to identify the existing mentoring programs and institutional support provided for non-science teachers handling science classes. Ultimately, the findings of the study are intended to serve as the basis for developing responsive mentoring program inputs that may strengthen science instruction and support out-of-field teachers in their professional growth.

This study is significant because it provides a deeper understanding of the lived experiences of non-science teachers handling science subjects, particularly in public secondary schools within the DepEd Leyte Division. The findings of the study may benefit non-science teachers by identifying their instructional needs, challenges, and coping strategies, which can guide the development of targeted mentoring and professional support programs. Likewise, students may indirectly benefit from improved science instruction as teachers gain enhanced confidence, pedagogical competence, and content knowledge in teaching science subjects. The study is also valuable to school administrators, policymakers, and the Department of Education because it offers evidence-based insights that may support informed decisions regarding teacher deployment, training, mentoring, and science education programs. Furthermore, this study addresses an existing research gap by qualitatively exploring the experiences of non-science teachers handling science subjects, thereby providing a strong rationale for developing responsive and contextually grounded mentoring interventions.

2. Methodology

2.1 Research Design

This study utilized a qualitative phenomenological research design to explore and understand the lived experiences of non-science teachers handling science subjects in selected public secondary schools within the DepEd Leyte Division. According to Creswell and Creswell (2017), phenomenological research focuses on describing the common meaning of individuals' lived experiences regarding a particular phenomenon, making it appropriate for this study. The participants were selected through purposive sampling and consisted of non-science major teachers who were currently teaching or had recently taught science subjects such as General Science, Biology, Chemistry, or Physics. Data were gathered using a researcher-developed semi-structured interview guide with open-ended questions, and the responses were audio-recorded, transcribed verbatim, and analyzed using thematic analysis to identify recurring themes and

patterns. Ethical considerations such as informed consent, confidentiality, voluntary participation, and compliance with the Data Privacy Act of 2012 were strictly observed throughout the conduct of the study.

2.2 Research Locale

The study was conducted in selected public secondary schools within the Department of Education (DepEd) Leyte Division during the school year 2025–2026. These schools were chosen because they have non-science teachers who are assigned to handle science subjects such as General Science, Biology, Chemistry, and Physics. The research locale provided an appropriate setting for exploring the lived experiences, challenges, and coping mechanisms of non-science teachers in actual classroom situations. Public secondary schools within the division were considered relevant to the study because the practice of out-of-field teaching is evident in these institutions due to the shortage of qualified science teachers. Through this locale, the researcher was able to gather meaningful and context-based data that served as the foundation for developing inputs to a mentoring program intended to support non-science teachers handling science subjects.

2.3 Research Participants

The participants of this study were non-science teachers handling science subjects in selected public secondary schools within the Department of Education (DepEd) Leyte Division for the school year 2025–2026. These teachers were selected because they were assigned to teach science subjects despite having academic backgrounds or specializations outside the science discipline. The study employed purposive sampling to ensure that only participants who could provide rich and relevant information about the phenomenon were included. The inclusion criteria required that participants must be non-science major teachers, currently teaching or have recently taught science subjects such as General Science, Biology, Chemistry, or Physics, and must have at least one year of teaching experience in the secondary level. Additionally, participants must be willing to voluntarily participate in the study and share their lived experiences regarding teaching science subjects.

2.4 Research Instrument

The study utilized a researcher-developed semi-structured interview guide as the primary research instrument to gather in-depth information on the lived experiences of non-science teachers handling science subjects. The interview guide consisted of open-ended questions designed to elicit detailed responses regarding teachers' experiences, challenges, coping mechanisms, instructional practices, and perceptions of existing mentoring programs. Probing questions were also included to allow participants to further explain and clarify their answers, ensuring richer and more meaningful data. To ensure validity and clarity, the instrument was reviewed and validated by experts in the field prior to its use, and revisions were made based on their recommendations. With the consent of the participants, the interviews were audio-recorded, transcribed verbatim, and prepared for thematic analysis to ensure accurate interpretation of data.

2.5 Data Gathering Procedure

The data gathering procedure of the study was conducted in a systematic and ethical manner beginning with Phase 1, which involved securing approval from the research adviser and obtaining ethical clearance from the Research Ethics Committee to ensure that the study complied with all research ethics

standards. After approval, the researcher sought permission from the Dean of the College of Education and the Schools Division Office of Leyte, including coordination with selected public secondary schools where the participants were identified. Phase 2 focused on instrument validation and pilot testing of the semi-structured interview guide to ensure clarity, appropriateness, and reliability of the questions before actual data collection. In Phase 3, the researcher identified eligible participants through purposive sampling and formally invited them through email and written communication, followed by the distribution and collection of informed consent forms to ensure voluntary participation.

In Phase 4, the researcher scheduled and conducted the in-depth interviews with the participants either through face-to-face or online platforms, depending on their availability and preference, ensuring a convenient and non-disruptive process. During the interviews, responses were audio-recorded (with permission), and detailed notes were taken to support accurate transcription and analysis of data. Phase 5 involved the transcription of recorded interviews verbatim, followed by organization, coding, and thematic analysis of the data to identify emerging patterns and themes related to the lived experiences of non-science teachers. Finally, all data were securely stored in password-protected digital files and locked physical storage, ensuring confidentiality and proper data management in compliance with the Data Privacy Act of 2012.

2.6 Data Analysis

The data gathered from the in-depth interviews were analyzed using thematic analysis to identify the lived experiences of non-science teachers handling science subjects. The process involved transcribing the audio-recorded interviews verbatim, carefully reading and re-reading the transcripts, and identifying significant statements relevant to the phenomenon under study. These statements were then coded and grouped into meaningful categories, which were further organized into emerging themes that reflected the participants' experiences, challenges, coping mechanisms, and support needs. According to Braun and Clarke (2006), thematic analysis is a flexible qualitative approach used for identifying, analyzing, and reporting patterns or themes within data, making it appropriate for phenomenological studies. The identified themes were interpreted to capture the essence of the participants' lived experiences, which served as the basis for developing inputs to a mentoring program for non-science teachers handling science subjects.

2.7 Ethical Considerations

The study strictly observed ethical considerations to ensure the protection, dignity, and rights of all participants throughout the research process. Informed consent was obtained from all participants, and they were fully informed about the purpose of the study, procedures, and their right to voluntarily participate or withdraw at any time without any penalty. Confidentiality and anonymity were ensured by assigning codes to participants instead of using their real names and by securely storing all collected data in password-protected files and locked storage. The researcher also adhered to the principles of the Data Privacy Act of 2012 (R.A. 10173) to guarantee that all personal information and responses were handled with utmost security and confidentiality. Moreover, the study considered the risk-benefit balance by ensuring that participants experienced minimal risk while providing a safe and respectful environment during interviews, with the goal of contributing to the development of a mentoring program for non-science teachers.

2.8 Trustworthiness

The trustworthiness of the study was ensured by applying established criteria in qualitative research, specifically credibility, transferability, dependability, and confirmability. Credibility was achieved through prolonged engagement with participants, careful transcription of interview data, and member checking, where participants were given the opportunity to verify the accuracy of their responses. Transferability was addressed by providing a rich and detailed description of the research context, participants, and processes to allow readers to determine the applicability of the findings to similar settings. Dependability was ensured through a clear documentation of the research process, including data collection procedures, coding steps, and thematic analysis, allowing for consistency and potential replication. Confirmability was maintained by minimizing researcher bias through careful data handling, peer review of findings, and ensuring that conclusions were grounded directly on the participants' narratives.

2.9 Reflexivity

Reflexivity in this study was observed as the researcher continuously examined personal assumptions, experiences, and potential biases that may influence the interpretation of data. Since the study involves non-science teachers handling science subjects, the researcher remained aware of preconceived views regarding teaching specialization and instructional effectiveness. Throughout the data collection and analysis process, the researcher maintained a reflective journal to document thoughts, decisions, and reactions to participants' responses. This practice helped ensure that the analysis remained grounded in the participants' lived experiences rather than the researcher's personal interpretations or expectations. By consistently engaging in reflexive practice, the researcher was able to uphold objectivity and strengthen the credibility and authenticity of the study's findings.

3. Results and Discussions

The study involved three (3) participants, consistent with the recommendation of Dukes (1984) that 3–10 participants are appropriate for in-depth phenomenological research. The participants, who were non-science teachers handling science subjects, were interviewed to explore their lived experiences. Data gathered through semi-structured interviews were carefully transcribed and analyzed. The presentation and discussion of findings followed the research questions, with a thematic map illustrating the key objectives and results of the study. Analysis of the interview transcripts revealed four major themes and several subthemes that described the experiences of non-science teachers handling science subjects in selected public secondary schools within the DepEd Leyte Division during the School Year 2025–2026. These findings also served as the basis for the development of a researcher-designed mentoring program.

3.1 Theme 1: Experiences of Non-Science Teachers in Handling Science Subjects

Sub-theme 1.1 Content Knowledge Deficit and Curricular Uncertainty

The primary theme identified within the technical constraints is the Content Knowledge Deficit and Curricular Uncertainty. This subtheme captures the internal struggle of educators who find themselves navigating subjects for which they lack a formal academic foundation. Data from participant interviews highlights two critical dimensions of this constraint:

(1) Instructional Difficulty: Teaching the science subject was not easy to teach specifically because they lacked a strong background in the area.

"No background. Although math and science have similarities, during my baccalaureate math is more on computation, while science is difficult to teach especially Physical science and having no focus in chemistry such as atoms." (Participant 1, NST-01)

"At first, it was not easy to teach the subject since I am not a science major. But because I am in this situation, I do my best to simplify the topics for the students to learn and understand easily." (Participant 2, NST-02)

In the study of Suelo & Caloc (2025), findings indicated that pre-service teachers reported very high levels of content mastery and pedagogical training, where both showed significant positive relationships with classroom preparedness. Hence, this suggests that pedagogical confidence is directly tied to content mastery.

(2) Content Ambiguity: One participant expressed a deep sense of hesitation with the statement felt unsure on what to teach.

"At first, I felt unsure of myself, but with the help of different resources and trainings for non-science teachers, I knew I could deliver my lessons well." (Participant 3, NST-03)

This indicates that the challenge is not just how to deliver a lesson, but what specific elements of the curriculum should be prioritized to teach. The knowledge gap identified in this study underscores a significant systemic challenge in education, especially on the expectation that teachers can maintain instructional quality regardless of their specialized training.

When a teacher is in the state of a content knowledge deficit, the instructional process becomes labor-intensive. As seen in the testimony of Participant 1, having "no background" transforms the act of teaching from a fluid exchange of ideas into a high-stress task of self-education. Without a deep conceptual framework, teachers may struggle to answer student inquiries or provide real-world applications, often leading to a reliance on rote memorization or strict adherence to textbooks by merely reading them. In addition, when educators are unsure of the essential learning competencies, they face a form of "decision paralysis." This uncertainty often results in teaching everything as they cannot distinguish between core and peripheral concepts or maybe accidentally skipping the crucial and foundational topics. These findings suggest that technical constraints are not merely about a lack of resources, but a lack of cognitive preparedness.

Sub-theme 1.2 Pressure & Early Adaptive Struggles

The findings revealed that teaching outside one's specialization imposes a significant psychological burden, characterized by an intensive period of initial adjustment. Participant 1 candidly noted she were "struggling at first, although there are some science topics I know but it's superficial." This illustrates the mental shock and disorientation that often accompanies an unfamiliar assignment.

This struggle is driven as described by Participant 1, who cited a constant pressure in teaching creating a state of cognitive overload, as educators must quickly master complex concepts in private while maintaining professional authority in public.

"Pressure, that is why I prepare to learn the subject matter." (Participant 1, NST-01)

These results suggest that it is not just a technical hurdle but also an emotional one, where the fear of providing inaccurate information and the exhaustion of staying one step ahead of students lead to a state of vulnerable expertise that necessitates stronger institutional mental health support.

Sub-theme1.3 Affective Transformation & Embracing Science

The findings indicate a significant affective shift in the participants' professional journeys, marking a transition from initial resistance to genuine engagement. This turning point was highlighted similarly by the participants by describing a process of starting to love, embracing, and enjoying the once-overwhelming assignment.

"Okay, loving the subject science and the topics are good especially the origin of the universe, stars, and life on earth making it a story to students. I am enjoying the subject due to frequent teaching." (Participant NST-01)

This is an indication that educators seemingly overcome the initial knowledge gap, where the psychological burden is replaced by a sense of personal fulfillment and intellectual curiosity. This transformation signifies that teaching outside one's comfort zone can eventually foster interdisciplinary growth, where the teacher's identity evolves from a hesitant novice to an enthusiastic practitioner. Thus, by crossing disciplinary boundaries, researchers can foster innovation, generate new insights, and create an impact that extends beyond academia (Brunner, 2025). Also, this shift demonstrates that with time and persistence, what begins as a professional constraint can become a source of professional passion and a deeper appreciation for the science discipline.

Sub-theme 1.4 Evolution of Competence & Confidence

The final phase of the participants' transition is defined by a significant evolution of pedagogical competence, where initial uncertainty is replaced by professional mastery. Participants 1 and 2 reported an improved teaching skills and a newfound confidence in delivery, suggesting that the persistent challenge of teaching a non-major subject eventually catalyzes professional growth.

"Science helped me learn, not just the learners. Mostly on earth and life." (Participant 1, NST-01)

"Even though I am not a Science major, my experience in teaching Science helped me improve my teaching skills and become more confident in delivering lessons." (Participant 2, NST-02)

This is further supported by two participants, who noted that teaching science lessons changed their competence and confidence over time and they successfully developed and mastered competencies that were once foreign.

"Yes, changed. Learning improves teaching. The more you teach, you learn how to teach and becomes confidents." (Participant 1, NST-01)

"...because even though I am not a Science major, teaching the same grade level and subject over time helped me develop and master the competencies needed in teaching Science." (Participant 3, NST-03)

This shift indicates a boost in teacher self-efficacy, as the educators moved beyond mere survival to a state of instructional fluency. These results demonstrate that through the process of navigating content constraints, teachers do not just learn the subject matter; "they learn while they teach" and refine their overall instructional or pedagogical repertoire.

3.2 Theme 2: Challenges Encountered in Teaching Science Subjects

Sub-theme 2.1 Content Mastery & Complex Nomenclature

The findings highlight that content mastery remains a primary barrier for educators teaching outside their specialization, specifically due to the inherent complexity of the discipline. Two participants identified a fundamental lack of background in science, which translated into significant difficulty when navigating difficult science concepts and terms, suggesting that the challenge is twofold: (1) a lack of broad conceptual frameworks and (2) the hurdle of scientific nomenclature.

"...lack of background in science, and that there is a need to study and search for resources such as the topic on the layers of the atmosphere." (Participant 1, NST--01)

"I admit that some scientific concepts and terms are difficult for me as a non-science major. However, I do not treat them as a hindrance. I spend more time studying, researching, and asking help from my co-teachers who are Science majors to make sure that I teach the lessons clearly and correctly." (Participant 2, NST-01)

While addressing the gap, teachers must first translate technical jargon into personal understanding before they can facilitate learning for their students. Hence, these results underscore that without a strong foundational background, the complex vocabulary or terminology of science acts by complicating the instructional process and necessitating targeted content-based support to ensure accurate delivery during lesson.

Sub-theme 2.2 Simplifying & Contextualizing Science Concepts

The results identify a critical instructional challenge centered on the "How" of teaching complex science to students. One of the participants highlighted the specific difficulty of finding engaging activities and ways to explain complex topics, illustrating the struggle to bridge the gap between high-level scientific data and student-level comprehension, and while also allowing the teacher to be more creative and resourceful in choosing strategies, activities, and examples that will catch the students' attention and help them understand the lesson.

"In terms of teaching strategies, finding effective, engaging, simple activities, and ways to explain difficult and complex Science topics to different students is not easy. I always need to be more creative and resourceful in choosing strategies, activities, and examples that will catch the student's attention and help them understand the lesson." (Participant 3, NST-03)

This result suggests that the educator's task is not merely delivery, but a process of didactic simplification, where they must strip away jargon without sacrificing scientific accuracy. Being aware that teachers lack a deep-rooted background in the subject, this transforms fun activities become a significant hurdle, as they must simultaneously master the content and invent creative ways to make it relatable. These findings emphasize that the success of science instruction in this context depends on the teacher's ability to contextualize abstract theories, a skill that requires both creative pedagogical effort and a firm grasp of the subject's core principles.

Sub-theme 2.3 Infrastructural & Laboratory Deficits

The findings revealed that the delivery of an inquiry-based curriculum is severely hindered by infrastructural limitations and a lack of technical expertise. Participants identified a critical lack of lab tools and the absence of a dedicated laboratory room, which effectively prevents the transition from theoretical instruction to hands-on experimentation.

"No laboratory room and lack of equipment such as used for a solutions and mixture." (Participant 1, NST-01)

This physical constraint is compounded by the participant's observation of limited experience in conducting experiments, suggesting that even if tools were available, a lack of prior exposure to laboratory protocols creates a secondary barrier.

"…in terms of laboratory activities or experiments is the lack of materials and my limited experience in conducting some experiments. Because of this, I prepare carefully, become resourceful, and ask help from my Science co-teachers when needed." (Participant 3, NST-03)

These results indicate that the teacher's own limited hands-on background and the school's missing facilities converge to suppress the "discovery" aspect of science education. Indeed, without the necessary space and specialized equipment, the curriculum remains predominantly lecture-based, depriving students of the opportunity to develop essential scientific inquiry skills. Based on the results of the study conducted that students were confident that they learned things in a hands-on laboratory including the skills, process, concept, and knowledge of science in doing an experiment (Bugarso, Cabantugan, Tapiculin, & Malaco, 2021).

Sub-theme 2.4 Material Deprivation & Delayed Resources

The results highlight significant systemic barriers categorized as material deprivation, which directly impede the delivery of a standard-aligned curriculum. Participant identified a critical lack of support like books or late delivery of materials as a primary obstacle to effective teaching.

"No books. I borrow books from my co-teacher and divide the specific topic to teach." (Participant 1, NST-01)

Torkar (2021) stated that textbooks are the most notable which play an important role in almost every school system in the world, thereby representing a useful resource for both teachers as course designers and students acquiring knowledge. This logistical failure creates an environment of resource scarcity, forcing educators to rely on improvised materials or outdated information, which adversely compromise the quality and accuracy of the lesson.

In addition, the untimely delivery of these essential instructional resources prevents teachers from following the prescribed curricular timeline, leading to a fragmented learning experience for students, however, teachers continue to deliver lessons even without the prescribed science textbook. These findings clearly suggest that even the most dedicated pedagogical efforts are undermined by institutional delays, emphasizing compromised curricular success through provision of fundamental learning tools like textbooks and manuals.

3.3 Theme 3: Coping Mechanisms and Strategies

Sub-theme 3.1 Self-Directed Mastery & Digital Integration

The findings demonstrate that educators mitigate knowledge gaps through proactive, autonomous content mastery and the strategic use of multimedia tools. Participants 1 and 3 reported reading difficult topics and spending more time studying, highlighting a deep sense of personal responsibility and a commitment to intensive self-directed research.

"Reading especially on difficult science topics and finding ways to teach the lesson." (Participant 1, NST-01)

"I study the lessons ahead of time and use different resources like books and online materials to understand the topics better." (Participant 3, NST-03)

This internal effort is heavily supported by participant's consistent use of internet/YouTube to decode complex information. The use of video streaming media in the classroom, such as YouTube, is considered as an important alternative educational tool to promote students' engagement in science lessons (Jaffar, 2012). However, these results suggest that when formal training is absent, teachers leverage their digital literacy to curate their own "just-in-time" curriculum.

"Both internet and self-study by searching and reading books or e-books and videos like Youtube." (Participant 1, NST-01)

"I use online resources such as videos, articles, and educational websites to research an study topics in advance, which helps me prepare my lessons and improve my teaching." (Participant 2, NST-02)

The shift toward self-regulated learning indicates that while teaching outside one's specialization is demanding, it fosters a resilient professional identity characterized by lifelong learning and the ability to navigate a vast landscape of open-source educational technology.

Sub-theme 3.2 Peer Mentorship & Collaborative Sharing

The results underscore the vital role of peer-mediated mentorship as a primary survival mechanism for educators teaching outside their specialization. Participants 1 and 2 highlighted a reliance on asking help from science majors and seeking help for experiments. This emphasizes that informal social support systems, such as mentoring master teachers, often fill the void left by formal training. Relying on science co-teachers sometimes extends for support and guidance. While collaborative resource sharing extends to physical materials, such as borrowing books from co-teachers, it helps mitigate the impact of systemic resource scarcity.

> *" borrowing books from my co-teacher, and ask help form my other co-teacher teaching science subject to divide the specific topics to teach." (Participant 1, NST-01)*

> *"I rely on my Science co-teachers for support and guidance. I ask them about difficult topics, teaching strategies, and activities to help me improve my teaching and understanding of the lessons." (Participant 2, NST-02)*

These findings suggest that in the absence of specialized professional development, teachers cultivate a community of practice where expertise is shared horizontally. Thus, collegial support ensures instructional accuracy and laboratory safety. Rutter (2000) emphasized that with increased interactions and interdependence, frequent collaborative actions among colleagues can also reinforce positive relationships, strengthen trust and support, and enhance the overall school climate. This also proves that the collective knowledge of the faculty is a critical asset in maintaining educational standards despite individual content knowledge gaps.

Sub-theme 3.3 Instructional Improvisation & Pedagogical Adaptability

The findings reveal that educators navigate instructional constraints through strategic pedagogical adaptability and a heightened sense of professional ingenuity. In fact, participants emphasized the necessity of being creative and resourceful and constantly finding ways to teach despite a lack of formal equipment or specialized background. This led to teachers to improvise instructional materials and strategies, where Participant 3 highlighted the importance of careful preparation for experiment to compensate for limited experience.

> *"In terms of experiment, I prepare carefully, become resourceful, and ask help from my Science co-teachers when needed." (Participant 3, NST-03)*

These results suggest that the absence of standard facilities, such science room/laboratory does not lead to instructional paralysis; rather, it forces teachers to improvise and innovate to transform the classroom into a space of meaningful learning. A study on the innovative educators as the change agent for driving the quality of education, concludes that innovative teaching practices is essential in reshaping the education landscape, fostering enhanced learning experiences, and ultimately elevating the overall quality of education (Mahapoonyanont, Songsang, Phinla, & Phinla, 2023). Teachers become more adaptable demonstrating resourcefulness which is a critical bridge between limited physical resources and the delivery of engaging, hands-on learning experiences for students.

3.4 Psychological Resilience & Professional Agency

The findings illustrate that a core component of the participants' success is their psychological resilience and not letting external constraints become hindrances to their instructional quality. Participant 1 emphasized a reliance on self-support, and with self-directed learning can enable teachers to take full advantage of their initiative in their professional development, and that lifelong learning is the only way for teachers to cope with the changes in the world (Wu, 2021). Meanwhile, Participant 2 highlighted a mindset of not treating difficulties as a hindrance. These are indicators that educators view and treat challenges as being surmountable obstacles rather than a resort of an end. This demonstrates professional agency from among the participants, where they choose the will to succeed rather than solely minding on the lack of specialized background.

> *"Self-support in finding sources of topics to teach even from co-teachers." (Participant 1, NST-01)*

> *"I do not treat them as hindrance, I spend more time studying, researching, and asking help from my co-teachers who are science majors to make sure that I teach the lessons clearly and correctly." (Participant 2, NST-02)*

This psychological initiative maintains their motivation and focus, thereby suggesting that the internal drive and commitment to provide quality education serves as a powerful protective factor, despite the technical and content-related pressures of teaching a non-major subject.

3.4 Theme 4: Mentoring Programs and Institutional Support

Sub-theme 4.1 Systematized Professional Training Frameworks

The results indicate that systematized professional development serves as a vital institutional lifeline for educators transitioning into unfamiliar science disciplines. Participants noted the significance of Division office trainings, specifically mentioning frameworks like HOTS (Higher Order Thinking Skills) and SOLO (Structure of Observed Learning Outcomes), which provide a high-level pedagogical structure for delivering complex content by enhancing the "art of questioning". This top-down support is complemented at the school level by LAC sessions and seminars for non-majors, which Participant 2 identified as essential venues for guidance specifically on the edge of teaching content.

> *"The Division office conducts training like LAC sessions especially on crafting lesson plans." (Participant 1, NST-01)*

> *"Yes, there are support mechanisms in our school and division for non-science teachers handling science subjects such as LAC." (Participant 2, NST-02)*

> *"There are seminars intended for non-science majors that focus on content knowledge and pedagogy, and these programs help us improve. (Participant 3, NST-03)*

These findings suggest that structured curricular training frameworks help standardize instructional quality by bridging the gap between a teacher's initial background and the strict demands of the Department of Education's standards when there is out-of-field teaching. The participants self-directed efforts are necessary

for institutional validation and technical scaffolding that allow non-major teachers to align their classroom practices with national educational goals.

Sub-theme 4.2 Collaborative Expert-Novice Mentorship & Supervision

The findings highlight the critical role of constructive instructional supervision and localized support systems in maintaining the quality of science instruction. Participant noted the importance of having a master teacher checking lesson plans suggesting that formal oversight serves as a quality control mechanism to ensure that content accuracy is maintained before it reaches the learners in the classroom. Instructional supervision emerged as a continuous, developmental process that enhances teaching effectiveness through mentoring, coaching, and constructive feedback (Castillo, 2025). This is also reinforced by a more fluid collaborative expert-novice mentorship, as described by other participant through the guidance and sharing ideas from experienced teachers.

> *"I am obliged to craft my lesson plan especially when checked by a master teacher."*
> *(Participant 1, NST-01)*

> *"The most helpful part is the guidance and sharing of ideas from experienced Science teachers."*
> *(Participant 2, NST-02)*

These results indicate that on-the-ground or direct support creates a foundation for non-majors, thereby compensating the teacher's content knowledge gaps through pedagogical expertise of a senior faculty like master teacher. The combination of structured supervision and informal collegial exchange allow educators to refine their instructional strategies and grow professionally within a supportive school environment.

Sub-theme 4.3 Strategic Programs for Enhanced Support

The findings indicate that while existing interventions provide a necessary foundation, there is a clear call for program strengthening to better address the complexities of teaching outside one's specialization, especially in science education. Two from the participants emphasized that the institution "should have strengthened strategies" and raised questions regarding the long-term "effectiveness of programs," suggesting a gap between general professional development and the specific needs of non-major science teachers.

` > *"Teaching strategies should be strengthened and more on way of teaching science."*
> *(Participant 1, NST-01)*

> *"These mentoring programs are effective because they help me improve my understanding of science lessons and teaching strategies. (Participant 3, NST-03)*

This evaluative feedback culminated in a documented "need for more trainings/materials" by Participant 3, highlighting that pedagogical frameworks alone are insufficient without the simultaneous provision of physical instructional tools, and that learning tools are used to help students learn more effectively and efficiently to support the science learning process (Parwata & Sudiatmika, 2020). These results suggest that for support systems to be truly impactful, they must transition from broad seminars to

strategic imperatives—targeted, intensive training sessions coupled with robust resource allocation. Lastly, the participants' assessment serves as a critical roadmap for school leadership, advocating for a more comprehensive support model that balances high-level theory with the practical, material realities of the science classroom, where abstract concepts become tangible, engaging, and essential for developing problem-solving and critical thinking skills.

4. Conclusion

The study concludes that non-science teachers handling science subjects experience a significant transition characterized by initial content knowledge limitations, professional pressure, and instructional challenges, which gradually develop into improved competence through experience, adaptation, and resilience. These findings imply that while non-science teachers can manage science instruction, their effectiveness is strongly influenced by access to appropriate support systems, resources, and targeted professional development. The results are meaningful as they highlight the urgent need to strengthen institutional mentoring programs and provide continuous training to ensure quality science education despite out-of-field teaching practices. Guided by Phenomenological Theory and Pedagogical Content Knowledge (PCK), the study emphasizes that teachers' lived experiences and their ability to transform content into teachable knowledge are central to effective instruction. Therefore, it is recommended that the Department of Education and school leaders implement structured mentoring programs, improve resource allocation, and ensure alignment of teacher specialization with assigned subjects to enhance both teacher performance and student learning outcomes.

5. Recommendation

Based on the findings of the study, it is recommended that the Department of Education and school administrators prioritize assigning teachers to subjects aligned with their area of specialization to ensure effective and quality instruction. It is also recommended that regular and specialized training programs be conducted to enhance the content knowledge and pedagogical skills of non-science teachers handling science subjects. Furthermore, the implementation of a structured and sustained mentoring program is strongly encouraged, where science specialists and master teachers provide continuous guidance, coaching, and support to non-science teachers. Schools are likewise encouraged to improve the availability of instructional resources, laboratory facilities, and teaching materials to support inquiry-based science learning. Lastly, future researchers are encouraged to further explore similar studies in different contexts to strengthen and expand the understanding of out-of-field teaching in science education.

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