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Research Article

Non-Education Science Teachers' Teaching Competency and Challenges as Inputs to Proposed Teacher Training Model and Training Program for Secondary Schools

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ABSTRACT

This study explored the experiences and teaching competencies of non-education science teachers in the Division of Zambales before and during the pandemic to develop a training model suited for effective science instruction. A mixed-method sequential explanatory design was employed, involving 74 non-education science teachers and 36 supervisors. Quantitative data were collected and analyzed first, followed by qualitative data to deepen understanding of the results. Findings revealed that while teachers demonstrated general proficiency in curriculum planning, and instruction, assessment remained their weakest area. Challenges intensified during the pandemic, particularly in curriculum planning and assessment. Teachers faced difficulties in content depth, lesson planning, evaluation tools, and adapting instruction to student needs. Coping strategies were largely intrapersonal, including self-reliance, strategic planning, and emotional regulation, with limited reliance on external support. The study led to the development of the ELEVATE Teacher Training Model, a professional development framework with seven components: Enrich, builds content and planning skills; Leverage, promotes active learning and peer support; Equip, strengthens assessment skills; Validate, aligns strategies with learner traits; Adapt, encourages flexible, data-driven teaching; Transform, integrates ICT and reshapes negative coping; and Empower, supports continuous growth and leadership. The model provides a practical basis for training programs tailored to non-education science teachers. It provides a practical foundation for training programs tailored to non-education science teachers. Future research should assess its implementation, effectiveness, and long-term impact on teaching practices especially for non-education major teachers.

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Introduction

The passage of Republic Act 10533, also known as the Enhanced Basic Education Act of 2013, significantly reshaped the Philippine education system. A central feature of this reform was the recruitment of professionals from various industries to teach in senior high school, especially in specialized areas like technical-vocational education, business, and STEM. This move aimed to address the skills mismatch and enhance the relevance of the curriculum (Abragan et al., 2022). As a result, many of these teaching positions—particularly in science—are now held by individuals without formal education degrees, with approximately 30% of current science teachers coming from non-education backgrounds (DepEd, 2023).

These professionals typically complete an 18-unit non-degree teacher certification program, which provides a brief overview of essential topics such as educational principles, instructional methods, assessment practices, and classroom practicum (Wong, 2022; Deady, 2022). Unlike education majors who receive comprehensive training over four years, these career shifters undergo a shortened route before taking the licensure exam. Many of them joined the teaching profession after leaving private-sector jobs due to unstable employment or limited long-term opportunities (DepEd, 2023).

This trend has introduced several instructional challenges. Non-education teachers often face difficulties in preparing lesson plans, delivering instruction effectively, and managing classrooms—issues that were further magnified during the COVID-19 pandemic. Compared to education majors, they struggled more in adjusting to online learning and in maintaining student participation (Alcala, 2021; Wong, 2022; Reimers et al., 2020). On a global scale, the pandemic disrupted the learning of over 94% of students due to extended school closures (Haw et al., 2020). Even prior to the pandemic, research had already identified persistent gaps in instructional competence among formally trained teachers, highlighting the need for continuous in-service training (Munna & Kalam, 2021). These difficulties are even more pronounced among non-education teachers who lack foundational pedagogical exposure.

The issue is made more urgent by the continued decline in student performance in both international and local assessments, such as PISA, TIMSS, and the National Achievement Test (DepEd, 2023; Ignacio et al., 2022). Studies have emphasized that a teacher's area of expertise and professional background significantly influence student learning outcomes (Penuliar & Natividad, 2025; Co, Abella, & De Jesus, 2021). Mismatches between a teacher's specialization and the subject being taught have been shown to negatively impact student achievement (UNESCO, 2021; Tran, 2023). In addition, while teachers remain the most influential in-school factor affecting student success, their overall effectiveness is shaped not just by subject knowledge but also by instructional techniques and classroom management abilities (Penuliar & Natividad, 2025; Delgado et al., 2021; DepEd, 2020).

In the context of public secondary schools, non-education science teachers have become increasingly essential, particularly in senior high school STEM strands. Their role has expanded due to shortages in qualified science educators, the broadening of science curricula, and higher enrollment brought about by the K to 12 educational reform. However, the absence of formal teacher education places them at a disadvantage—especially during disruptive periods like the COVID-19 pandemic. The abrupt shift to remote learning intensified their instructional challenges and highlighted the urgent demand for specialized support (Reimers et al., 2020; Wong, 2022).

To mitigate these concerns, the Department of Education has implemented in-service training (INSET) and other capacity-building activities. Yet, these efforts often fall short—particularly for novice teachers—as they tend to be structured from top-down administrative perspectives and may not capture the realities of

classroom practice (Faisal & Hussien, 2023; DepEd, 2022). In many cases, these training sessions adopt a generic, one-size-fits-all format, failing to consider the unique needs and challenges of non-education science teachers (DepEd, 2023). This highlights a critical gap in the literature: the lack of studies that prioritize the voices and firsthand experiences of non-education teachers, especially those handling science subjects, as a foundation for designing more context-sensitive and effective professional development programs. This study focuses on Zambales, a province in Central Luzon, where a growing number of non-education majors have been deployed to teach science subjects in public high schools. Recent local studies underscore the pressing need for teacher development initiatives specific to this group. Branzuela, Ayro, and Vidal (2023) emphasized that most faculty enhancement efforts in Zambales failed to differentiate between education and non-education teachers. Moreover, Bumagat et al. (2023) and Tabligan and Dantic (2022) noted that existing training programs often lack contextual grounding, actionable models, or alignment with the lived experiences of non-education teachers. These findings support the selection of Zambales as a strategic locale to examine these gaps and develop a responsive, evidence-based training model.

Hence, this study is both timely and important. It aims to document and analyze the experiences of non-education science teachers, highlight the challenges they face in transitioning into the education sector, and identify strategies they have developed to succeed. These insights can inform the development of a teacher training model that is both responsive and contextually grounded. The motivation behind this research stems from a strong desire to contribute to the enhancement of teacher quality, which is a key factor in improving student learning and elevating the overall standard of science education in the country.

Therefore, this study seeks to explore the competencies and lived teaching experiences of non-education science teachers, focusing on the obstacles they encountered and the coping mechanisms they employed both prior to and during the COVID-19 pandemic. By understanding these experiences, the study intends to develop a comprehensive training model grounded on actual needs and realities of these teachers.

Methods

1 Research Design

The study employed a mixed methods research design, specifically an explanatory sequential approach, combining quantitative and qualitative techniques. In this explanatory sequential mixed method design, the researcher first employed a descriptive survey questionnaire composed of closed questions and statements bounded by limited options to obtain the quantitative data, followed by its analysis. The researcher then validated the numerical results of the previous phase by collecting qualitative data through interviews, focus group discussions, and observations (Dawadi, Shrestha, Giri, 2021; Siedlecki, 2020).

2. Respondents and Setting of the Study

The respondents of the study were 74 non-education science teachers and 36 supervisors from the different secondary schools in the Division of Zambales, Philippines. For the quantitative part, the researcher employed total population sampling, wherein all 74 identified non-education science teachers from public secondary schools in the Second District of Zambales were included. Alongside them, 36 supervisors—either principals or head teachers—evaluated the competencies of these teachers to eliminate self-assessment bias. The non-education science teachers answered the validated survey questionnaires and interview and focus group guide questions for challenges and coping mechanisms. For the qualitative part, the researcher used non-randomized purposive sampling and adhered to the given criteria in choosing informants from the total population of non-education science teachers. Informants were selected based on the following: willingness to share relevant experiences, a minimum of one year in service, regular or permanent employment status, possession of a non-education baccalaureate degree, and at least one year of experience teaching science or out-of-field subjects. 25 non-education science teachers participated in the qualitative part

that had satisfied the inclusion and exclusion criteria of the study.

3. Research Procedure

For the collection of data to proceed, the researcher first obtained approval and requested endorsement from the Department of Education Division of Zambales to allow for the administration of the adapted, modified, and validated questionnaires as well as the implementation of interviews, focus group discussions, and class observations in different public schools in the division with secondary non-education science teachers. Once the school heads and informants approved the request letters, the researcher personally visited the secondary schools under study and met with the respondents through their principals and head administrators to introduce and explain the study properly.

Personal distribution and administration of the survey questionnaires were conducted for both the head teacher respondents and the non-education science teachers before the lockdown. During the pandemic, the data collection shifted to an online survey via Google Forms to gather information regarding competence, challenges, and coping mechanisms. In-person classroom observations were also performed for the target respondents before the imposition of lockdowns. Afterward, the data were summarized and statistically measured in terms of the relationship between teaching competencies when related to their challenges and coping mechanisms.

This study utilized six research instruments for the collection of data to realize the objectives of the study. Quantitative data were collected using survey questionnaire for competence to teach, survey questionnaire for challenges and coping mechanisms, acceptability questionnaire of the proposed training model, and acceptability questionnaire of the proposed training program. Qualitative date was obtained through focus group discussions, classroom observations, and virtual interviews using interview and focus group guide questions, and COT-RPMS.

The survey tools used were all rigorously validated and reliability tested to ensure their appropriateness and internal consistency. Among the six research instruments used in the study, two were modified, one was researcher-made, and three were adopted. The survey questionnaire for competence to teach, challenges, and coping mechanisms was adapted and modified based on existing resources such as the Department of Education Order No. 42, s. 2017 (PPST), the NCBTS-TSNA Tool, and previous literature. Content validation was conducted with five expert validators—three with specialization in science education, one in language, and one in general education. Suggestions and corrections were integrated to improve clarity, alignment, and appropriateness to the research objectives. The researcher also conducted a pilot test with 60 teachers from President Ramon Magsaysay State University (not included in the main study), which resulted in high reliability scores using Cronbach's Alpha: 0.959 for competence, 0.987 for challenges, and 0.960 for coping mechanisms, all indicating excellent internal consistency. These values confirmed that the instruments were sound and measured what they intended to measure.

Ethical clearance was also secured for this study. Approval and endorsement were first obtained from the Department of Education Division of Zambales. The researcher submitted a formal request, together with the approved dissertation proposal, to the Institutional Ethics Review Committee of Centro Escolar University. During a face-to-face panel interview, the committee thoroughly reviewed the methodology and ethical safeguards to ensure participant protection. Although the researcher was unable to return for the completed documentation due to pandemic-related restrictions, all comments and recommendations by the panel were followed, and informed consent was secured from each participant. These consent forms included information about the purpose of the study, confidentiality of responses, voluntary participation, and the rights of participants throughout the research process.

For the qualitative part, an introductory letter to potential informants, which included an opt-in form and informed consent, was provided to determine their willingness to participate. Those who agreed were included in the pool of informants, while those who declined

were respectfully excluded. A total of seven focus group discussions and six individual interviews were completed to ensure data saturation.

The interviews and FGDs were guided by a semi-structured, validated interview guide developed by the researcher and checked by expert validators. These sessions were conducted both face-to-face and online due to travel restrictions. The mode of interview—face-to-face or virtual—was based on the informants' preference and safety. The researcher ensured that the participants were given ample time and guidance to respond thoughtfully without being led toward specific answers. Participants were assured that all their responses would be kept strictly confidential and that further consent would be obtained if transcripts or recordings needed to be used in presentations or reports.

In addition to the interviews and FGDs, the researcher also utilized the DepEd's official COT-RPMS classroom observation tool, which served as an instrument for triangulating qualitative data. Observations were conducted prior to lockdowns and assessed nine key indicators of instructional competence and classroom management using a standard proficiency scale.

For the qualitative procedure, data were analyzed following the five phases of narrative inquiry: initiation, familiarization and immersion, induction, elaboration, and interpretation. Audio and video recordings were transcribed and subjected to thematic analysis, supported by coding procedures, triangulation, and member checking to ensure the validity and trustworthiness of the results. These qualitative findings were used to provide depth and explanation to the patterns identified in the quantitative data, offering insights into the lived experiences, challenges, and coping strategies of non-education science teachers before and during the pandemic.

Results and Discussion

A. Competencies of Non-Education Science Teachers in Secondary Schools

Majority of the non-education science teacher respondents were female young professionals aged 25 to 29 years who completed their baccalaureate degree and are teaching for not more than five years. Most of the non-education science teacher respondents are licensed professional teachers with biology as their field of specialization. Their competence to teach in science as rated by their supervisors are shown in Table 1.

Table 1. Competence to Teach of Non – Education Science Teacher Respondents

Competence	Mean	Interpretation	Mean	Interpretation
Curriculum Planning	**2.87**	**Proficient**		
Content Knowledge	2.79	Proficient	2.79	Proficient
Lesson Planning	2.94	Proficient	2.91	Proficient
Instruction				
Pedagogy	2.74	Proficient	2.80	Proficient
Instructional Materials	2.78	Proficient	2.62	Proficient
Assessment	**2.60**	**Proficient**	**2.60**	**Proficient**
Overall	**2.78**	**Proficient**	**2.75**	**Proficient**

Legend: 1.00 – 1.74 = Never (Below Basic); 1.75 – 2.49 = Sometimes (Basic); 2.50 – 3.24 = Often (Proficient); and 3.25 – 4.00 = Always (Highly Proficient).

It can be culled from the table that the competencies of the non-education science teachers slightly declined from 2.78 described as proficient before pandemic to 2.75 described as proficient during the pandemic, however, the overall ranking stays the same with curriculum planning as the most dominant competency followed by instruction and assessment as the least dominant that the teachers have regardless of the educational conditions and settings.

Among the domains, lesson planning received the highest mean before the pandemic (M = 2.94), followed by curriculum planning (M = 2.87), while assessment remained the lowest in both periods (M = 2.60). Pedagogical skills slightly improved during the pandemic (2.74 to 2.80), reflecting adaptability to new teaching demands. However, a slight decline was noted in instructional materials use (2.78 to 2.62) and lesson planning (2.94 to 2.91), likely due to constraints of remote and modular learning. These findings indicate steady overall proficiency, with emerging needs for targeted support in assessment and instructional material development.

These findings align with Fernandez, Banet & Vidal (2022) who underscores the difficulties teachers encountered in modifying their instructional approaches amid technological limitations, especially in assessment practices. This may explain the persistently low scores in the assessment domain, suggesting a limited integration of data-driven or alternative evaluation strategies. Although the teachers demonstrated proficiency in traditional forms of assessment and instructional delivery, the results emphasize the need for sustained professional development focused on enhancing assessment literacy, particularly in the areas of digital tools, formative feedback, and learner data utilization. Thus, while overall teaching competence remained steady, there is a clear implication that more targeted support is necessary—especially in developing innovative assessment practices and instructional material design in response to evolving educational modalities.

B. Lived Experiences of Non-Education Science Teachers When Teaching Science Prior to and During the COVID-19 Pandemic

Table 2 illustrates the challenges encountered by non–education science teachers before and during the pandemic across four key areas: Content Knowledge and Pedagogy, Curriculum Planning, Assessment, and Professionalism.

Table 2. Challenges Experienced by Non-Education Science Teacher Respondents

Challenges	Before Pandemic		During Pandemic	
	Mean	Interpretation	Mean	Interpretation
Content Knowledge and Pedagogy	2.99	Moderately Challenging	3.08	Moderately Challenging
Curriculum Planning	3.02	Moderately Challenging	3.13	Moderately Challenging
Assessment	3.07	Moderately Challenging	3.11	Moderately Challenging
Professionalism	3.12	Moderately Challenging	3.09	Moderately Challenging
Overall	**3.05**	**Moderately Challenging**	**3.10**	**Moderately Challenging**

Legend: 1.00 – 1.74 = Never (Not Challenging); 1.75 – 2.49 = Sometimes (Slightly Challenging); 2.50 – 3.24 = Often (Moderately Challenging); and 3.25 – 4.00 = Always (Highly Challenging).

Non-education science teachers consistently rated their teaching-related challenges as moderately challenging both before (M = 3.05) and during the pandemic (M = 3.10). The most notable increase was seen in Curriculum Planning, which rose from M = 3.02 to M = 3.13, suggesting greater difficulty in aligning lessons with rapidly shifting educational modalities. Content Knowledge and Pedagogy also became slightly more challenging (2.99 to 3.08), reflecting the demand for deeper understanding and flexible teaching strategies during remote instruction. While Assessment challenges remained fairly stable (3.07 to 3.11), Professionalism showed a slight decrease (3.12 to 3.09), possibly due to increased familiarity with virtual teaching standards. Overall, these trends highlight the growing complexity of instructional responsibilities during the pandemic era.

Before the pandemic, the challenges were assessed with mean ratings ranging from 2.99 to 3.12, placing them in the "Often" category and labeling them as "Moderately Challenging." The low standard deviations indicate that

teachers experienced these challenges uniformly, suggesting a consistent perception of difficulty in maintaining robust content knowledge, effective curriculum planning, rigorous assessment practices, and professional behavior. These findings align with the broader study narrative, which highlights that even before traditional educational practices were disrupted, teachers faced moderate challenges likely rooted in systemic issues that could benefit from targeted support or professional development interventions.

These findings align with the broader narrative of the study, which shows that teachers faced moderate challenges even before the pandemic disrupted traditional educational practices. The consistency in the ratings suggests that aspects such as maintaining robust content knowledge, effective curriculum planning, rigorous assessment practices, and professional behavior were uniformly challenging, pointing to systemic issues that could benefit from targeted support or professional development interventions. During the pandemic, the table shows that mean ratings for these same areas ranged slightly higher—from 3.08 to 3.13—with an overall mean challenge rating of 3.10. This marginal increase, while still classified as "Moderately Challenging," reflects the additional pressures and rapid changes experienced during this period. The very low standard deviations again point to a consistent perception of these challenges among teachers, underscoring that the difficulties are systemic and inherent to the teaching process rather than solely due to the pandemic.

These findings are quite comparable to the pre-pandemic data, with a slight upward shift in ratings during the pandemic. Although all components are still classified as "Moderately Challenging," the marginally higher means during the pandemic may reflect the additional pressures and rapid changes experienced during this period. This consistency in challenge ratings across both time periods underscores that these difficulties are likely systemic and inherent in the teaching process, rather than being solely a result of the pandemic.

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Table 3. Coping Mechanisms of Non-Education Science Teacher Respondents

Coping Mechanisms	Prior to Pandemic		During Pandemic	
	Mean	**Interpretation**	**Mean**	**Interpretation**
Problem – Focused Coping	3.16	Moderately Adapted	3.24	Moderately Adapted
Seeking Social Support	2.75	Moderately Adapted	2.64	Moderately Adapted
Blaming Self	2.07	Slightly Adapted	2.15	Slightly Adapted
Wishful Thinking	3.33	Highly Adapted	3.35	Highly Adapted
Avoidance Coping	2.24	Slightly Adapted	2.27	Slightly Adapted
Overall	**2.86**	**Moderately Adapted**	**2.88**	**Moderately Adapted**

Legend: 1.00 – 1.74 = Never (Not Adapted); 1.75 – 2.49 = Sometimes (Slightly Adapted); 2.50 – 3.24 = Often (Moderately Adapted); and 3.25 – 4.00 = Always (Highly Adapted).

The data reveal that non-education science teachers primarily relied on moderately adaptive coping mechanisms both before (M = 2.86) and during the pandemic (M = 2.88). Among the strategies, wishful thinking was the most highly adapted coping mechanism, with a mean score of 3.33 prior to the pandemic and 3.35 during the pandemic, indicating frequent reliance on hope or idealized outcomes to manage stress. Problem-focused coping followed closely, increasing slightly from 3.16 to 3.24, nearing the threshold of being highly adapted, and reflecting a proactive effort to solve teaching-related problems. On the other hand, seeking social support remained moderately adapted, though it slightly declined from 2.75 to 2.64. Less effective strategies like blaming self (M = 2.07 before, 2.15 during) and avoidance coping (M = 2.24 before, 2.27 during) were only slightly adapted, showing minimal changes across the two time periods. Overall, while teachers leaned on practical and emotional coping strategies, a consistent use of passive responses suggests areas for improvement in coping capacity, especially under stressful teaching conditions.

These findings align with other parts of the study, where it was observed that non–education science teachers generally relied on adaptive strategies to manage challenges. Consistent with previous analyses, problem-focused coping and seeking social support emerged as common and effective strategies, while less adaptive strategies like self-blame and avoidance were not prominently used. The high reliance on wishful thinking supports the broader trend of teachers maintaining a positive outlook in challenging situations. Overall, the data suggest that before and during the pandemic, non–education science teachers had a moderately adapted coping profile, though, with an ample increase in using coping strategies during the pandemic situations. They predominantly employed effective strategies such as problem-focused coping and social support, which likely contributed to their resilience. However, the heavy reliance on wishful thinking highlights an area that could be balanced with additional coping strategies to further enhance stress management. This overall adaptive pattern provides a robust foundation for managing stress—a factor that likely influenced their ability to cope during more disruptive periods.

As Mohamad, Ab Wahab, and Kummin (2023) emphasize, coping flexibility—the ability to choose the most appropriate strategies in varying contexts—is crucial for teachers navigating educational disruptions such as those brought about by the pandemic. This highlights the importance of not only promoting adaptive coping styles but also encouraging reflective practices that reduce overreliance on less constructive approaches like wishful thinking.

The qualitative findings highlighted both persistent and evolving challenges experienced by non-education science teachers before and during the pandemic. **Before the pandemic**, many teachers faced instructional difficulties rooted in limited professional training and unfamiliarity with core teaching practices. Several expressed a lack of preparation in terms of content knowledge and teacher identity: *"kasi parang ano talaga po parang wala talaga akong experience… feeling ko nagtuturo akokaya lang di ko alam kung may essence ba?... effective ba ako?"* (T3). Teachers also struggled with classroom management and lesson planning, especially in unpacking and breaking down learning competencies aligned with the curriculum: *"minsan po yung mga learning competencies kailangan pa syang i-break down talaga… hindi talaga naiituro iyon sa mga non-education graduates na katulad ko"* (T9). Assessment posed another significant challenge, particularly in using the Table of Specifications (TOS): *"TOS!...iyong pagcategorized ng remembering, knowledge ba yan, nahihirapan din po kami dyan"* (T1). Professionalism also presented issues, as many depended solely on institutional training for development: *"May binibigay ang DO sa amin na mga trainings… nakakakuha din ako ng mga ideas lalo sa mga speaker…"* (T20).

During the pandemic, these instructional gaps intensified due to the abrupt transition to online and modular learning. While some found content easier to manage because of familiarity with MELCs—*"Ngayong pandemic, okay—kasi ang content ay same lang naman kaya madali lang ang MELCs… kaya wala akong problema sa contents po"* (T4)—others continued to struggle with pedagogy and delivery. Teaching time

was constrained: *"naka-set lang sa akin one hour per subject… halos di na kami makapag-activity"* (T4), limiting interaction and active learning. Traditional approaches remained dominant due to uncertainty about alternative strategies: *"kapag po talagang ano mahirap e ituro sa traditional method po na spoon feeding ang ginagamit ko"* (T4). Curriculum planning remained problematic, especially when MELCs compressed content and removed opportunities to reinforce prior knowledge: *"may lesson na compressed… prior knowledge na dapat ituro… hindi mo na sya maituro… minsan ang mga bata nahihirapan silang sumagot"* (T4). Assessment also continued to be difficult, especially in establishing reliability and administering evaluations: *"Iyong pag-determine nang reliability nang result… challenging at the same time"* (T4). Professionally, some teachers reflected on their lack of readiness: *"Ngayong pandemic na maraming oras, saka ko nare-realize na hindi pa rin pala ko prepared as a teacher… kulang pa talaga ako sa training at knowledge"* (T10). These findings illustrate that while some competencies and coping mechanisms improved due to experience or familiarity with content, many systemic challenges in teaching practices, curriculum planning, and assessment remained unresolved.

In terms of coping mechanisms, before the pandemic, non-education science teachers coped through resourcefulness, independent strategies, and career aspirations. One teacher shared, "*ako talaga isesearch ko talaga kasi nangangapa kasi first time mo makaranas… pero so far naman nakagawa naman ng paraan"* (T2), reflecting a problem-focused approach to overcome unfamiliar teaching situations. Others turned to peers for support, though not always successfully: *"… minsan siguro sa mga colleagues… pero iyong sa head? Hindi haha mahirap"* (T3). Emotional responses such as self-criticism and wishful thinking were also evident. For instance, one expressed, *"napaka-creative naman ng mga ginagamit po ng mga education graduate, naiinggit din ako minsan na parang may magagawa ka pa sana kung marami kang background sa teaching"* (T18), while another shared, *"Napapa-day dream din ako madalas na papasok ako sa school wala akong magiging problem na maencounter… pero siyempre hindi nangyayari"* (T19). Some used avoidance to maintain balance, saying, *"basta ang gawa ko, tatapusin ko lahat ng kaya ko sa school at pag-umuwi na ako, fofocus na lang ako sa family ko… or sa movie kami ng mga anak ko"* (T20). These coping behaviors reveal how teachers relied on both proactive and escapist mechanisms in managing the day-to-day demands of their roles.

During the pandemic, coping strategies became more emotionally driven and adapted to isolation and uncertainty. Teachers increasingly relied on self-sufficiency, as shown in one account: *"Kaya nagkaroon ako ng resolution na magsariling sikap na lang kasi wala akong ibang malapitan dito since limited ang interaction… wala masyadong contact"* (T11). Despite physical distance, social support remained critical: *"Buti na lang one-chat away mga kaibigan ko… doon kami talaga nagkukumustahan… nagtatanungan kung ano balita sa school nila, ano ipapasa, mga ganoon…"* (T3). *However, self-doubt persisted, with one reiterating, "napaka-creative naman ng mga ginagamit po ng mga education graduate; naiinggit din ako minsan na parang may magagawa ka pa sana…"* (T18), highlighting an enduring sense of inadequacy. Wishful thinking remained prominent: *"Kapag araw ng klase, gusto ko lang sana matapos nang maayos lahat… Masaya na ako kung walang hassle"* (T19). Avoidance also took a more psychological form, with one teacher stating, *"Kapag may sablay na nangyari sa klase, minsan nililibing ko na lang sa limot… kinabukasan, fresh start ulit"* (T20). These patterns illustrate a shift from externally supported coping to more internalized, emotion-focused strategies, reinforcing the need for mental health interventions, structured training, and consistent support systems for non-education science teachers.

C. ELEVATE Teacher Training Model: A Framework for Enhancing Science Teaching Competencies

The hallmark of the ELEVATE Teacher Training Model is to enhance the teaching competencies of non-education science teachers by addressing challenges in content knowledge, curriculum planning, instructional delivery, pedagogical strategies, assessment and

evaluation of learners and professional growth by enhancement and elevation of their capabilities and capacities.

The cornerstone of the training model consists of seven core components: Enrich, Leverage, Equip, Validate, Adapt, Transform, and Empower, each targeting specific areas for improvement. The model focuses elevating the low competencies of non-education science teachers and maintain the dominant ones to ensure that the challenges they experience will diminish added with a strong coping mechanism developing flexible teaching approaches and fostering collaboration among educators. By addressing gaps in content specialization, aligned lesson planning, matched and good command use on diverse pedagogical approaches, assessment methods, student engagement, and professional growth as well as conduct, ELEVATE Teacher Training Model provides a structured framework for non-education science teachers enhancement and elevation of capabilities and capacities. The developed ELEVATE Teacher Training Model was validated by experts in the field of science education, educational administration, heads in the Department of Education.

Each component is linked to practical training seminars-workshops and modules that equip non-education science teachers with effective strategies for science instruction. *Enrich* component builds foundational skills in content mastery, lesson planning, students' characteristics, and intrapersonal coping mechanisms while *Leverage* emphasizes active learning pedagogies, engagement techniques, and interpersonal coping mechanisms in terms of support systems. *Equip* focuses on assessment and problem-solving, ensuring that teachers can design effective and efficient evaluations. *Validate* fosters understanding of students' learning traits to provide aligned and authentic curriculum plans, learning materials, teaching strategies, and assessment tools such as table of specifications whilst validating some negative coping mechanisms like self-criticism, distraction and escape. *Adapt* encourages flexible and data-driven instruction with emphasis on collaborative and learner-centered approaches inclusive of parallel learning materials and resources as well as adaptation of best practices. *Transform* integrates innovative teaching practices, including ICT and blended learning, transform assessment analysis into usable information for the teaching and learning processes, and change negative coping perspectives of teachers into positive ones to enhance student learning experiences. Lastly, *Empower*, ensures continuous professional growth, self-reflection, and leadership development to ensure optimistic improvement in content knowledge, pedagogy, curriculum planning, instructional materials, and assessment competencies.

By implementing the ELEVATE Teacher Training Model, non-education science teachers gain access to structured training that directly addresses their instructional challenges. The model serves as a roadmap for professional development, equipping educators with the necessary tools to plan, create, and evaluate engaging and effective science lessons. Ultimately, ELEVATE Teacher Training Model promotes sustainable growth by fostering adaptability, collaboration, and innovation in teaching, ensuring that science educators can meet the evolving needs of students in a post-pandemic learning environment.

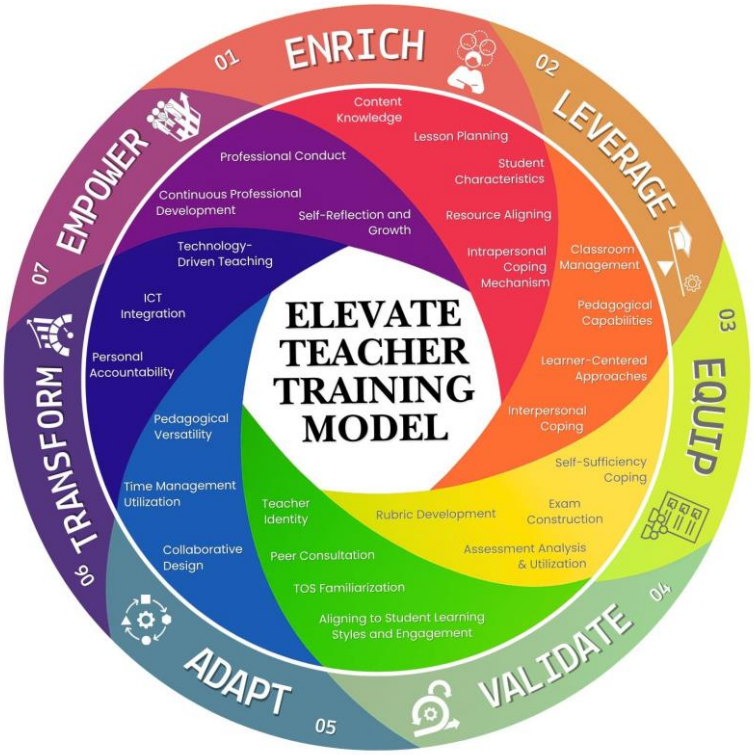

Figure 1. The Elevate Teacher Training Model

D. Proposed ELEVATE Teacher Training Program

The ELEVATE Teacher Training Program is designed to enhance the teaching competencies of non-education science teachers by providing structured professional development that addresses both their strengths and areas for improvement. Rooted in the ELEVATE Teacher Training Model, this program focuses on competency development, enhancement of curriculum planning and pedagogical strategies, equipping assessment and evaluative capabilities, challenge mitigation, support systems, flexible teaching approaches, innovative practices, and sustainable growth. By aligning training sessions with real-world classroom challenges, the program ensures that teachers gain the necessary skills, strategies, and resources to deliver effective science instruction and improve student learning outcomes. Through a combination of interactive workshops, hands-on activities, mentoring, and continuous assessment, the ELEVATE Teacher Training Program fosters professional growth, confidence, and adaptability among science educators.

Unlike existing teacher training frameworks that often use general approaches with limited applicability to out-of-field teachers, the ELEVATE model is tailored specifically to the unique challenges of non-education science teachers. It emphasizes contextual responsiveness, practical application, and sustainable coping strategies—making it more effective in supporting teachers who lack formal education training. By integrating both pedagogical and emotional development, the ELEVATE model provides a holistic and targeted framework that traditional models often overlook. It empowers teachers to not only enhance instructional quality but also adapt to dynamic learning environments such as those presented during the pandemic, making it a more suitable and timely approach for long-term capacity-building.

The ELEVATE Training Program was validated through expert evaluation and pilot feedback from non-education science teacher participants themselves. Each validator assessed the program's relevance, objectives, methodology, monitoring and evaluation, budgetary requirements, sustainability plan, and overall

value using a structured evaluation tool. All components received unanimous approval, with all validators rating the program as fully acceptable. In addition, qualitative feedback emphasized the program's practicality, alignment with current teacher needs, and potential for long-term impact. Suggestions such as incorporating PISA-related assessment workshops were considered and integrated. As a result, the final version of the ELEVATE Program was retained without major revisions, having been affirmed as timely, comprehensive, and suitable for non-education science teachers.

Conclusion

In light of the foregoing findings, non-education science teachers were proficient in curriculum planning and instruction before and during pandemic. Non-education science teachers showed consistent weakest proficiency in assessment competency. The second least dominant competence of non-education science teachers is instruction particularly pedagogy and instructional materials both before and during pandemic. Despite maintaining proficiency, they faced moderate challenges that slightly increased during the pandemic—shifting from professionalism-related issues before the pandemic to curriculum planning and assessment during the pandemic. These challenges involved difficulties in content depth and mastery, lesson planning, pedagogical alignment, assessment design, and professional conduct. Teachers primarily relied on wishful thinking and problem-focused coping, adapting to their circumstances through both internal resilience and external support systems. In response, the ELEVATE Teacher Training Model and ELEVATE Teacher Training Program were developed to systematically enhance competencies and address these challenges. These initiatives aim to build content mastery, strengthen pedagogical and assessment strategies, promote adaptive teaching practices, and support sustainable professional development through structured training, mentorship, and innovative instructional approaches.

The researchers further recommend that schools and educational institutions may integrate the ELEVATE Teacher Training Program into their professional development initiatives to equip non-education science teachers with essential competencies in content knowledge, curriculum planning, pedagogy, instructional materials, assessment, and professional growth. Furthermore, professional development initiatives for non-education science teachers, newly hired science teachers, career shifters transitioning to science education, and teachers handling major science subjects may consider using the developed ELEVATE Teacher Training Model as their guide for a more responsive training. To ensure its practical application and effectiveness, it is also recommended that the program undergo pilot testing in selected public secondary schools with a significant number of non-education science teachers. This may begin with a training needs assessment, followed by modular sessions aligned with the model's seven components. Monitoring and evaluation tools—such as pre- and post-tests, classroom observations, and feedback sessions—should be used to assess its impact. Insights gained from the pilot implementation can be used to make necessary refinements before broader adoption. Partnering with DepEd offices and academic institutions is likewise encouraged to support technical validation and ensure sustainability.

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