

Lived Experiences of Alternative Learning System (ALS) Teachers in Delivering Scientific Literacy and Critical Thinking Skills: Towards an Integrated Structural-Pedagogical Support Framework

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ALS teachers, ALS-REST Framework, Alternative Learning System, Colaizzi's method, phenomenology, scientific literacy and critical thinking skills

Abstract. This phenomenological study explored the lived experiences of Alternative Learning System (ALS) teachers in delivering Scientific Literacy and Critical Thinking Skills in the Schools Division of Puerto Princesa. This study examined the significant experiences of ALS teachers, the meanings they attributed to these experiences, the themes that emerged from them, and the framework developed from the findings. Through purposive sampling and defined inclusion criteria, 12 ALS teachers who handle Learning Strand 2: Scientific Literacy and Critical Thinking Skills were selected as co-participants. Data were obtained using semi-structured interviews and were analyzed using Colaizzi's Phenomenological Data Analysis. Consequently, five themes emerged from the analysis. These are the following: (1) Structural and Resource Constraints; (2) Building Teacher Capacity and Support Systems; (3) Contextual and Experiential Science Teaching; (4) Adaptive Pedagogy for Diverse Learners; and (5) Motivation, Accountability, and Fulfillment in ALS. These emergent themes show that ALS teachers remain committed through flexibility, resourcefulness, contextualized instruction, and learner-responsive strategies despite difficult and unstable conditions. These themes indicate that interconnected structural and pedagogical conditions influence the delivery of Learning Strand 2. They further suggest that effective delivery requires an integrated response not only from ALS teachers but also from relevant support systems. Based on the gathered data, the study proposes the ALS-Responsive Experiential Science Teaching Framework (ALS-REST), an integrated structural-pedagogical support framework that is grounded in the five emergent themes and was developed as a support framework to strengthen Learning Strand 2 delivery in ALS. This study recommends stronger resource provision, professional development, collaborative support, and localized instructional practices to better support ALS teachers.

Introduction

Globally, there is a strong emphasis on developing 21st-century skills such as scientific literacy and critical thinking (De Los Santos et al., 2025). Science's main goal is to develop these skills in learners to help them become responsible stewards of nature, inventive thinkers, effective communicators and independent and informed decision-makers who contribute to the betterment of the community (Garcia-Carmona, 2023). However, a gap is present between this importance and actual competency levels. As reported by Gust et al. (2023), a worldwide survey reveals that 66.7% of youth lack the ability to think critically and act scientifically. This is alarming, particularly now that scientific literacy and critical thinking are important not just in school but also in everyday decision-making and problem-solving.

In the Philippines, according to the Science Education Institute–Department of Science and Technology (SEI-DOST) and the University of the Philippines-National Institute for Science and Mathematics Education Development (UP-NISMED) (2011), learners tend to have low retention of scientific concepts and limited critical and analytical skills. This is corroborated in 2023, when the Programme for International Student Assessment (PISA) reported that only 23% of the Filipino students are proficient in terms of meeting the minimum proficiency level of scientific literacy (OECD, 2023). Research shows that

these gaps are associated with poor science curricula and weak teacher preparation in content and pedagogy (Leonardo & Cha, 2021). In addition to these problems, many teachers lack training and resources to effectively integrate higher-order thinking skills into the curriculum (Goraus et al., 2025).

Meanwhile, to ensure Filipino learners have access to quality basic education, the Department of Education (DepEd) developed the Alternative Learning System (ALS), a viable option for marginalized and out-of-school youth and adults (OSYA). In 2019, ALS offered a parallel educational pathway that enables learners to complete their basic education. ALS considers learners' prior learning and aligns with the indicators of functional literacy across six interrelated learning strands. Learning Strand 2: Scientific Literacy and Critical Thinking Skills is one of these strands that focuses on helping learners become more adept at observing, analyzing, and solving problems using scientific principles, which will enable them to navigate a technologically advanced world and enhance the quality of life for the community.

However, ALS teachers face many challenges that hinder the delivery of scientific literacy and critical thinking skills nationwide. In Geographically Isolated and Disadvantaged Areas (GIDA), the lack of basic infrastructure, facilities, and services, is one of the problems that make the delivery of science lessons difficult. Another challenge is to cover all the learning competencies while managing groups of learners at different levels. ALS teachers also face personal sacrifices as they cope with high rates of learner absenteeism and insufficient support from local government units (Salcedo, 2023). ALS teachers continue to struggle because they lack specialized training and subject-matter competency. This mismatch has made ALS implementation even more difficult across different regions in the Philippines (Caingcoy et al., 2021).

These challenges faced by ALS teachers may directly contribute to learners' low performance in ALS. Recent studies investigating the functional literacy of ALS learners have often found low levels of acquisition in Scientific Literacy and Critical Thinking Skills. One study reported that these skills are among the lowest developed functional literacy skills among ALS learners (Ocampo, 2021). Another study revealed that a cumulative Mean Percentage Score (MPS) of 71.42 among Junior High School ALS learners indicated a relatively low performance in Learning Strand 2 (Mangao et al., 2024). Similarly, 2025 post-FLT results collected from ALS teachers' records in the Schools Division of Puerto Princesa showed that Learning Strand 2 obtained an estimated MPS of 78.90, making it the lowest performing of the other learning strands. This gap poses a significant concern for learner performance in ALS.

Meanwhile, this study originates from the extension activity of the Department of Secondary Education (DSEd) at Palawan State University-College of Teacher Education, where the researcher is affiliated. Based on the results of the needs assessment, 12 out of 17 ALS teachers (71%) in the Schools Division of Puerto Princesa identified their primary challenge as the difficulty in facilitating lessons in the learning strands outside their specialization. These findings are supported by the Second Congressional Commission (EDCOM 2), which found that 62% of high school teachers teach subjects outside their area of specialization, and that more than half of science teachers in the Philippines lack a background in teaching science. This mismatch clearly represents another gap in terms of teacher competence and student learning.

Aside from the gaps and professional experiences highlighted in this section, there is a dearth of research on the lived experiences of ALS teachers and on the delivery of scientific literacy and critical thinking skills in local contexts, such as Puerto Princesa City. Most research on alternative education focuses primarily on learners, with relatively few studies dedicated to ALS teachers. Considering all these points, the importance of conducting this study and the need to capture the ALS teachers' lived experiences in delivering Learning Strand 2 are highlighted. Ultimately, this study leads to the development of an integrated structural-pedagogical support framework anchored in the Sustainable Development Goals (SDGs) and AmBisyon Natin 2040.

Corollary Questions

This study aimed to understand the lived experiences of ALS teachers in delivering Scientific Literacy and Critical Thinking Skills to ALS learners. This study specifically sought to address the following corollary research questions:

1. How do the ALS teachers describe their most significant experiences in delivering Scientific Literacy and Critical Thinking Skills?
2. What meanings can be formulated from the most significant experiences of the ALS teachers?
3. What emergent themes can be derived from the formulated meanings of ALS teachers' lived experiences?
4. Based on the results, what science teaching framework may be recommended to effectively support ALS teachers in delivering Scientific Literacy and Critical Thinking Skills?

Methodology

Research Design

This study employed phenomenology as the research design. Being a type of qualitative research, it relies on non-quantitative data to understand people's experiences, perceptions and personal meanings. It primarily uses research methods, such as in-depth interviews, to collect thick, rich information of first-person experiences. It seeks to understand the unique meanings derived from participants' lived experiences and how they make sense of the world.

Considering the central research question, the corollary questions, and the points mentioned in this section, phenomenology was well-suited for use. Through this design, the researcher understood the essence of a phenomenon from the perspectives of those who had experienced it. Furthermore, this design was adopted because it helped to establish the reality being lived by ALS teachers by collecting rich information through in-depth interviews to capture the personal and subjective nature of their narratives.

Research Locale

This study was conducted within the jurisdiction of the Schools Division Office (SDO) of Puerto Princesa, located in the MIMAROPA region. The City Division of Puerto Princesa is the local DepEd office responsible for managing public elementary and secondary schools in Puerto Princesa City, Palawan, including the ALS program. Operating under DepEd-MIMAROPA, the division comprises 44 Community Learning Centers (CLCs) distributed across the city's rural and urban barangays, serving as learning hubs for ALS learners and teachers. The diverse setting of these CLCs provides an ideal context for exploring and understanding the lived experiences of ALS teachers in delivering Learning Strand 2: Scientific Literacy and Critical Thinking Skills.

Participants

Participants were selected using a nonprobability sampling technique called purposive sampling, also known as judgment sampling. Specifically, in this case, a homogeneous purposive sampling was used, as it seeks to collect a sample of individuals who share the same experience or traits. The participants were selected by the researcher based on a list of characteristics or criteria developed for the study. This technique is suitable for qualitative phenomenology because it primarily selects "information-rich cases" in which participants are familiar with the phenomenon at hand.

In this study, participants were selected according to the selection criteria. First, the participants were currently employed in the Schools Division of Puerto Princesa. Second, they had one to three years of experience as ALS teachers. Participants with this experience had enough exposure to ALS practices and dynamics. Third, they had taught the Learning Strand 2: Scientific Literacy and Critical Thinking Skills. Fourth, they were willing to share their experiences in the field. Lastly, they agreed to participate in the study.

Data Gathering Procedure

Data collection in this study focused on semi-structured interviews with ALS teachers in the Schools Division of Puerto Princesa. The research instrument used in this study was an interview guide consisting of researcher-developed questions. To allow the researcher to probe deeper and ask follow-up questions, a semi-structured interview (SSI) format was used. Moreover, SSI provided the researcher and participants with flexibility to explore ideas that might emerge during the conversation while still adhering to a predetermined guide with a central point of discussion.

The interview guide was structured around several key areas that aimed to explore the participants' experiences across various dimensions of their roles. First, it explored how the participants became teachers in ALS, including their motivation and professional development activities. Second, it focused on participants' understanding of the ALS curriculum, particularly the goals of Learning Strand 2: Scientific Literacy and Critical Thinking Skills. Third, it examined the teaching methods and pedagogical strategies that the participants used to deliver the learning strand. Fourth, it investigated the support systems available to the participants, exploring the assistance they received from colleagues, administrators, local government units, and other stakeholders. Lastly, it addressed the challenges participants faced in teaching the learning strand and how they navigated these obstacles.

The interview guide questions underwent validation to ensure content relevance, clarity, and alignment. Two language experts in Filipino and English, two science experts from the University of Perpetual Help System DALTA Graduate School, one ALS Education Program Specialist from the Schools Division of Puerto Princesa, and four experts from Palawan State University were requested to examine the questions. The guide questions also underwent a technique called Back

Translation by experts who have a background in language teaching. This method involved translating the guide questions into Filipino. To test the effectiveness of this translation, the Filipino version was then independently translated back into English by a different language expert who had not seen the original guide questions. The result was then analyzed to determine whether the guide questions from “back translation” had the same meaning as the original English questions.

Using the translated interview guide questions in Filipino, a pilot interview was conducted with a non-participant to test readability and comprehension. This was important because it allowed the researcher to identify difficult-to-understand questions, ensuring that participants could comfortably and accurately respond in their first language. This step also refined the questions to ensure the results were both meaningful and trustworthy.

Data Analysis

In the analysis of data, the researcher used Colaizzi’s Phenomenological Data Analysis. This analytical method offers a clear and systematic way to describe participants’ lived experiences by identifying significant statements, formulating meanings, clustering themes, and developing an exhaustive description of the phenomenon (Gumarang et al., 2021). It was suitable for the present study because it enabled the researcher to carefully examine the lived experiences of ALS teachers in delivering Scientific Literacy and Critical Thinking Skills in an organized and rigorous manner. In analyzing the data, the study followed Colaizzi’s Phenomenological Data Analysis. These steps were adapted from the procedure used by Gumarang et al. (2021), who likewise employed Colaizzi’s seven-step method of analysis.

Ethical Considerations

This study obtained approval from the University of Perpetual Help System DALTA - Las Piñas and the Schools Division of Puerto Princesa before the study was conducted. Numerous ethical considerations were carefully addressed, as this study involved human participants. The researcher adhered to the fundamental principles of research ethics outlined in the National Ethics Guidelines for Research Involving Human Participants (NEGRIHP) from the Philippine Health Research Ethics Board (PHREB) (2022).

Results and Discussion

The five emergent themes in this section were developed from the formulated meanings, which were based on the significant statements of 12 ALS teachers. The significant statements were selected using Colaizzi’s approach because they demonstrated recurrent meanings among participants. Similar meanings were clustered into subthemes and integrated into broader emergent themes that represent ALS teachers’ lived experiences in delivering Learning Strand 2: Scientific Literacy and Critical Thinking Skills. The five themes that emerged after the thematic analysis are the following: (1) Structural and Resource Constraints; (2) Building Teacher Capacity and Support Systems; (3) Contextual and Experiential Science Teaching; (4) Adaptive Pedagogy for Diverse Learners; and (5) Motivation, Accountability, and Fulfillment in ALS.

Emergent Theme 1: Structural and Resource Constraints

Representative Statement	Formulated Meaning	Cluster Theme
<i>“During a home visit, I asked a learner about his irregular attendance. The learner responded, ‘Ma’am, should I prioritize attending school when we do not even have food to eat?’”</i>	Survival needs limit learner engagement. This suggests that absenteeism stems from deprivation rather than a lack of drive or discipline.	Instructional Continuity Under Structural Constraints
<i>“One of the most significant challenges is the excessive heat, inadequate facilities, and noise within the learning center, which create an environment that is not conducive to effective learning.”</i>	The poor physical conditions in the CLC regularly interfere with instruction and reduce learners’ attention and engagement during LS 2 delivery.	Material and Infrastructure Constraints

Table 1. Thematic Structure of the Emergent Theme 1: Structural and Resource Constraints

Structural and Resource Constraints captures the structural, logistical, and resource-related constraints that shape ALS teachers’ lived experiences in delivering Learning Strand 2: Scientific Literacy and Critical Thinking Skills. Participants’ narratives converged around the idea that, beyond pedagogical challenges, ALS delivery is affected by environmental conditions, limited infrastructure, inconsistent learner attendance, and systemic realities inherent in non-formal settings. These constraints significantly influence how lessons are delivered, how competencies are prioritized, and how ALS teachers continuously adapt to ensure learning continuity.

The results support Sacabin et al. (2025), who argue that family obligations, community responsibilities, and work demand influence ALS learners' participation. The results are in lined with recent studies on social and economic barriers as conditions that affect attendance among ALS learners (Coronel & Miasco, 2025). Additionally, the learning spaces in ALS are often makeshift or resource-limited, confirming Flores' (2022) findings that the lack of learning facilities or materials includes unreliable venues, limited utilities, and exposure to environmental distractions. This is corroborated by policy research on school infrastructure, stating that inadequate infrastructure creates uncomfortable learning environments (Navarro, 2024).

Emergent Theme 2: Building Teacher Capacity and Support Systems

Representative Statement	Formulated Meaning	Cluster Theme
<i>"In ALS, there is no specialization, which means we are required to teach all learning strands. This becomes particularly challenging when we are not sufficiently familiar with the subject."</i>	ALS teaching is experienced as generalist work beyond teachers' expertise, creating a mismatch that demands additional preparation.	Teaching Beyond Specialization
<i>"When I encounter lessons I do not fully understand, I turn to my colleagues, who readily provide support and share additional activities for use in class."</i>	Colleagues are a support system that fills in gaps in comprehension by giving guidance and learning materials that are ready to use.	Peer, Administrative, and Stakeholder Support
<i>"Our supervisors ensure that we are adequately prepared and equipped. The knowledge and skills we gain from trainings are applied to address the needs of our learners."</i>	Training functions as an institutional support mechanism that equips ALS teachers and translates into more responsive instruction for learners.	Professional Development for ALS Delivery

Table 2. Thematic Structure of the Emergent Theme 2: Building Teacher Capacity and Support Systems

Building Teacher Capacity and Support Systems represents how ALS teachers build their capacity to deliver Learning Strand 2: Scientific Literacy and Critical Thinking Skills despite working beyond their field of specialization. The participants' lived experiences reveal that collaborative support systems, peer support, administrative guidance, and professional development are all important components of effective teaching in ALS. Collectively, these elements enable participants to address content-related challenges while responding to the diverse needs of ALS learners in community-based settings.

The findings resonate with the literature on ALS teaching, which describes it as structurally generalist and non-specialized. That is, ALS teachers are expected to handle multiple learning strands (Velasco & Lomibao, 2024). The results on peer collaboration as an effective response to address content gaps are also supported by several studies (Bautista & Baniqued, 2021; Bugwak, 2021). According to Romorosa and Ucang (2025), teachers gain support when they share ideas, discuss challenges and adopt strategies in managing subject matter outside their specialization. The results also align with the view that ALS effectiveness improves when teachers gain continuous professional development, especially when many ALS teachers need capacity-building to strengthen science instruction (Almojano, 2025).

Emergent Theme 3: Contextual and Experiential Science Teaching

Representative Statement	Formulated Meaning	Cluster Theme
<i>"I use a combination of inquiry-based instruction, experiential learning, cooperative learning, and formative assessment as my teaching approach."</i>	Lessons are structured around hands-on activities to promote experiential rather than passive learning.	Activity-Based and Experiential Learning
<i>"Their initial perception was that science is difficult. That is why I teach it in a simpler way and connect it to real-life situations so they can see that science is not difficult when properly understood."</i>	When science is connected to learners' real-life experiences, it becomes less difficult and more understandable as it builds on what is familiar.	Community Relevance and Practical Application
<i>"It needs to be realistic, not abstract. When video lessons and actual materials are used, learners become more interested and interactive."</i>	Real objects and video demonstrations make abstract science more concrete, increasing interest and interaction.	Technology and Materials as Learning Scaffolds

Table 3. Thematic Structure of the Emergent Theme 3: Contextual and Experiential Science Teaching

Contextual and Experiential Science Teaching refers to an ALS approach to delivering Learning Strand 2: Scientific Literacy and Critical Thinking Skills, where science understanding is built primarily through experience (i.e., doing, seeing, discussing, and applying) rather than through explanation alone. In this theme, learning happens when lessons are grounded in learners' real-life situations and translated into tangible, activity-based tasks that are supported by available resources, technology, and visuals. These experiential learning strategies encourage learning engagement, make abstract ideas easier to understand, and enable learners to communicate their understanding in practical ways relevant to their daily lives. This emergent focuses on the form of science delivery itself, such as activities, contextualization, and the use of materials, rather than on how instruction is adjusted across different learner levels and language needs, which is more specifically captured in emergent theme 4.

The findings concur with the claim of Buendia et al. (2025) that inquiry-based learning in science improves learner involvement, stimulates higher-order thinking, and promotes deeper thinking. The findings parallel those of Lansita and Dalayap (2025), which evaluated the "science-on-the-go" program and concluded that experiential science learning can be effective in nonformal education. However, a study revealed that while science contextualization is policy-mandated and generally beneficial, the implementation may face challenges (Banzuelo & Quiñones, 2026). The results indicate that technology bridges content gaps and compensates for the lack of laboratory facilities in delivering Learning Strand 2. Several related studies by Salic and Basmayor (2024) and Rabanes and Paglinawan (2025) support the participants' use of technology and instructional materials for making science concepts more observable and understandable.

Emergent Theme 4: Adaptive Pedagogy for Diverse Learners

Representative Statement	Formulated Meaning	Cluster Theme
<i>In ALS, we do not handle just one level. We need to simplify the lesson because the learners are varied: BLP, lower elementary, and advanced elementary.</i>	ALS teaching requires differentiating and simplifying lessons to address varied learner levels.	Multi-Level Differentiation in ALS
<i>"I explain the lessons in English and then translate it into Filipino. When learners respond in Filipino, I encourage them to identify the equivalent terms in English."</i>	Code-switching is used as scaffolding to support understanding through Filipino while gradually developing learners' ability to connect concepts to English.	Localized Communication Practices

Table 4. Thematic Structure of the Emergent Theme 4: Adaptive Pedagogy for Diverse Learners

Adaptive Pedagogy for Diverse Learners refers to teachers' deliberate adjustments to instruction and communication so that all learners can access Learning Strand 2: Scientific Literacy and Critical Thinking Skills meaningfully within a shared learning space. This theme is anchored in teachers' experiences with handling multi-level, mixed-age groups, where differences in literacy, readiness, learning pace, and ability require teaching that is not one-size-fits-all. ALS teachers respond by differentiating tasks according to learners' capacity, simplifying concepts when needed, and shifting strategies as learner needs emerge. This adaptive approach also includes language-responsive teaching, using translation, code-switching, and localization of scientific terms. So, communication becomes a bridge rather than a barrier to understanding and participation. While emergent theme 3 highlights the contextual and experiential character of LS 2 delivery, this emergent theme specifically captures the teachers' adaptive responses to learner diversity within ALS.

The findings are consistent with the literature, which describes learner diversity as a major challenge in Learning Strand 2 delivery. Learners in ALS are usually classified into three levels called Basic Literacy Program, Elementary, and High School (DepEd, 2026). The challenge of learner diversity prompts ALS teachers to use differentiated instruction in delivering Learning Strand 2 by providing targeted activities that match learners' current skill levels. Unfortunately, differentiating instruction becomes an added management burden rather than a simple technique for teachers (Quiñones, 2024). The findings also indicate that difficulty in Learning Strand 2 delivery is influenced by language and communication. Learners have trouble understanding English-based materials and scientific terminology. Consequently, when learners first struggle to understand the language used to convey concepts, science learning may not be effective (Delos Santos, 2025).

Emergent Theme 5: Motivation, Accountability and Fulfillment in ALS

Representative Statement	Formulated Meaning	Cluster Theme
<i>"They really need encouragement. We constantly remind them about the national examination. It is important to emphasize that a national exam is approaching."</i>	Encouragement is sustained when learners have a clear goal, as reminders of the national exam provide direction, urgency, and a defined endpoint.	Sustaining Participation Through Encouragement

Representative Statement	Formulated Meaning	Cluster Theme
"The most fulfilling moment is when many learners pass the exam. You need to see the results of your hard work. When there are no passers, it feels like nothing has been achieved."	Exam results become a felt measure of whether learning is sustained, making accountability both professional and personally weighted.	Assessment Practices for Accountability and Continuity
"When I entered ALS, it felt like hitting two birds with one shot. There is a difference between simply teaching and teaching with the intention of inspiring other people's lives."	ALS teaching is lived as a value-driven identity where commitment unites professional duty and a personal mission to inspire learners' lives.	Teacher Identity, Perseverance, and Fulfillment

Table 5. Thematic Structure of the Emergent Theme 5: Motivation, Accountability and Fulfillment in ALS

Motivation, Accountability, and Fulfillment in ALS reflects the motivational processes, instructional accountability, and personal meaning that shape ALS teachers' lived experiences as they deliver LS 2: Scientific Literacy and Critical Thinking Skills. This emergent theme highlights sustaining learner motivation, ensuring learning continuity and fostering a supportive classroom climate to achieve desired learning outcomes. At the same time, ALS teachers derive a strong sense of identity, perseverance, and fulfillment from witnessing learners' progress, examination success, and life transformation. The results indicate that motivation is more stable when it is tied to a concrete goal, such as the A&E test, which mirrors how this path and the opportunities that come along with it affect learners' decisions to continue in ALS (Sacabin et al., 2025). ALS teachers also inculcate responsibility and accountability among their learners. This confirms Cabalida's (2024) statement that accountability practices in ALS can be strengthened through attendance monitoring, follow-ups, and engagement supports. The participants' descriptions of ALS teaching as a personal mission or calling are consistent with Jimenez et al. (2026), who reported that work in ALS is human-centered and transformative, sustained by passion, patience, and moral commitment.

The ALS-Responsive Experiential Science Teaching Framework (ALS-REST)

The ALS-REST framework has several defining features. First, it is context-responsive, grounded in the actual conditions of ALS teaching and learning. Second, it is integrated into the design, combining structural, pedagogical, motivational, and feedback mechanisms within a single framework. Third, it is teacher-supportive and learner-responsive because it addresses both teacher needs and learner diversity in the delivery of LS 2. Fourth, it is actionable since it is supported by implementation and monitoring mechanisms. Lastly, it is adaptive and developmental, as it includes continuous monitoring and feedback to refine across implementation cycles. The framework is data-grounded, where each component corresponds to an emergent theme, and the listed strategic interventions reflect the key strategies derived from the subthemes. The following figure presents the components of the ALS-REST framework by aligning each component with its corresponding strategic interventions and intended outcomes. It shows how the study's themes were translated into actionable support mechanisms to strengthen the delivery of LS 2 in ALS. This presentation provides a concise overview of the framework's structure and the outcomes it aims to achieve. The implementation of the ALS-REST framework must be guided by ethical principles that protect the welfare, dignity, rights, and learning conditions of ALS teachers and learners. Since the framework involves teacher support, learner monitoring, contextualized instruction, adaptive interventions, progress tracking, remediation, and collaboration with stakeholders and community partners, its application should ensure that all activities are carried out with fairness, sensitivity, and respect for all participants.

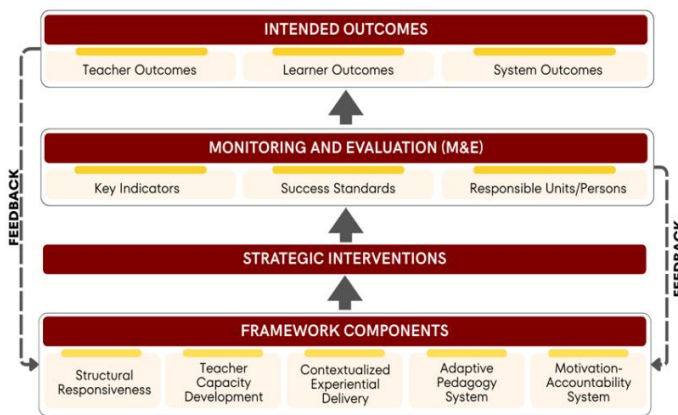


Figure 1. ALS-REST Framework for LS 2 Delivery

Figure 1 shows the ALS-REST Framework as an integrated structural-pedagogical support system for the delivery of LS 2. It consists of 5 framework components that guide the strategic interventions, which are then monitored and evaluated through key indicators, success standards, and responsible units or persons. Ultimately, these processes lead to the intended outcomes. The dashed loops show that the framework supports continuous monitoring, feedback, and refinement. This figure provides a visual overview of the framework.

Conclusion and Recommendations

The findings suggest that the delivery of Scientific Literacy and Critical Thinking Skills in ALS begins within a setting marked by Structural and Resource Constraints (Emergent Theme 1), where limited resources, unstable learning environments, and irregular attendance make sustained science instruction difficult. In response to these realities, Building Teacher Capacity and Support Systems (Emergent Theme 2) becomes necessary, as training, mentoring, collaboration, supervision, and stakeholder support help teachers address these constraints more effectively. As ALS teachers are strengthened through these support mechanisms, they become better able to carry out Contextual and Experiential Science Teaching (Emergent Theme 3) and Adaptive Pedagogy for Diverse Learners (Emergent Theme 4) by using concrete, real-life, differentiated and language-responsive strategies suited to ALS learners' varied needs. Consequently, these responsive teaching strategies help sustain Motivation, Accountability, and Fulfillment in ALS (Emergent Theme 5), as both teachers and learners are better supported in maintaining engagement, responsibility, and meaningful participation in science learning.

Based on the results, the proposed output is the ALS-Responsive Experiential Science Teaching Framework (ALS-REST), anchored in the five emergent themes and the theoretical framework of the study. The framework is conceptualized as an integrated structural-pedagogical system intended to support ALS teachers in delivering Scientific Literacy and Critical Thinking Skills. The results of the study are translated into a context-responsive framework that addresses structural constraints, strengthens teacher capacity, supports contextualized and adaptive instruction, and promotes accountability and fulfillment. As such, it provides a practical basis for improving the delivery of Scientific Literacy and Critical Thinking Skills in ALS. The framework ultimately contributes to achieving Sustainable Development Goal 4 and aligns with AmBisyon Natin 2040 by advancing inclusive and responsive educational opportunities for marginalized learners.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Access to the data used in this study may be granted upon formal request to the author, subject to ethical approval and participant confidentiality.

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Appendices

No appendices are included in this article.