Identified Challenges in ALS Science Education: Basis for Developing a Learning Intervention

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ABSTRACT

This study investigates the instructional challenges encountered in teaching science within the Alternative Learning System (ALS) and uses these findings as a basis for developing a targeted learning intervention. Employing a convergent parallel mixed-methods design, the research gathered both qualitative and quantitative data from five ALS teachers in a selected district in Iligan City, Philippines. Data were collected through a needs assessment questionnaire comprising open- and closed-ended items, along with a Likert scale measuring perceived difficulty of selected science topics, particularly weather systems. Thematic analysis revealed that the most prominent challenges include low learner engagement, insufficient learning materials and resources, limited face-to-face instructional time, limited teacher training in science, and difficulties with time management. These barriers significantly affect the quality of science instruction and learners' conceptual understanding. Despite these constraints, teachers employ adaptive strategies such as differentiated instruction, the integration of livelihood skills, the use of personal financial resources, and proactive lesson planning to address instructional gaps. Quantitative findings further indicate that among weather system topics, tropical cyclones are perceived as the most difficult for ALS learners, followed by monsoons, while thunderstorms and tornadoes are considered less challenging due to their observable nature. These results highlight the need for contextualized and learner-centered instructional materials that simplify complex scientific concepts. Overall, the study underscores the importance of strengthening instructional support systems, enhancing teacher training, and designing responsive learning interventions tailored to the unique needs of ALS learners. The findings provide a vital foundation for improving the delivery of science education in non-formal learning environments.

Keywords: alternative learning system; science education challenges; learner engagement; instructional strategies; weather systems

INTRODUCTION

One of the core goals of the United Nations Educational Scientific Cultural Organization (UNESCO) is to provide education for all to mitigate illiteracy worldwide. With this, programs such as the Sustainable Development Goals (SDGs) were formed to expedite the progress toward achieving the global goals. Particularly SDG 4: Quality Education, which emphasizes the significance of education, aiming to provide inclusive, equitable, basic, and high-quality education, as well as lifelong learning opportunities for all. However, despite the continuous improvement in education in the Philippines, promoting equitable education remains a significant challenge, especially for underserved youths and adults who are unable to attend formal schooling for various reasons (Casingal & Guino, 2025; Catyong et al., 2023).

Moreover, according to the Annual Poverty Indicator Survey (APIS), approximately 3.6 million out-of-school youth and adults (OSYA) have not completed basic education (Albert et al., 2024). In response to these challenges, the Department of Education (DepEd) addresses these gaps through the Alternative Learning System (ALS) program, which serves as a parallel education system to provide flexible learning opportunities tailored for out-of-school youth and adults, which enables them to continue their education and earn certification

equivalent to formal education through various delivery modalities (Alvarez, 2024; Mahinay & Manla, 2025). Similar to formal education, ALS curriculum also focuses on scientific and critical thinking skills, equipping learners with academic success and skills necessary for real-world challenges (Borela, 2020), and cultivates critical thinking, problem-solving, creativity, and decision-making, thereby contributing to long-term development (Cortes et al., 2024; Llego, 2022). Despite growing interest in improving education, studies reveal substantial gaps in the effectiveness of science education, especially for marginalized learners.

Research shows that engagement is one of the most prevalent challenges in ALS (Casingal & Guino, 2025), as well as scarcity and limited access to resources (Casingal & Guino, 2025; Mahinay & Manla, 2025; Ricohermoso, 2023). Aside from that, among the learning strands in ALS, the learning strand 2: scientific and critical thinking skills is one of the least developed functional literacy skills (Ocampo, 2021), and one of the reasons is that learners often struggle with abstract concepts in science and a lack of familiarity with scientific tools (Borja & Ecle, 2016), especially that among the science concepts in ALS, weather systems is identified as one of the least mastered competencies based on the Accreditation and Equivalency Test 2024-2025.

Although previous studies have identified challenges in teaching science in ALS, there is still a need to examine whether these challenges are similarly experienced in the present study context to provide a localized basis for developing an appropriate learning intervention. Thus, this study aims to 1) identify the instructional challenges of ALS teachers in teaching science, 2) identify the teaching strategies used to address the challenges, and 3) determine the most difficult topic in learning strand 2: scientific and critical thinking skills, particularly in weather systems.

METHODOLOGY

Research Design

This study employed a convergent parallel mixed-methods design, in which qualitative and quantitative data were collected simultaneously to produce a result (Creswell & Creswell, 2018).

Participants and Setting

The study was conducted in one of the school districts in Iligan City, Lanao del Norte, that has Alternative Learning System Community Learning Centers (ALS CLCs). The research setting was selected because ALS teachers were assigned to teach ALS learners who were unable to attend formal schooling for various reasons.

The researcher employed purposive sampling to select the participants. This sampling method was employed because participants were selected based on specific characteristics, which aligns with the objectives of the study and enabling them to provide relevant and diverse insights. Hence, this study selected five (5) ALS teachers in the Division of Iligan City with at least three (3) years of teaching experience as key informants.

Research Instrument

The research instruments were adapted from Paez (2025) and Lindayao et al. (2025) to assess the challenges and needs of ALS learners and teachers, specifically in terms of mode of delivery, learning materials, and the most difficult topic in weather systems. The research instrument consists of five (5) open-ended questions, four (4) closed-ended questions, and a Likert scale in which teachers rate each topic in weather systems on how difficult they perceive it to be for their learners. The Likert scale was composed of 5 weather system topics, which were divided into four (4) scales, wherein 4 corresponded to the most difficult, 3 corresponded to moderately difficult, 2 corresponded to slightly difficult, and 1 corresponded to not difficult.

Data Gathering Procedure

The researcher initially requested approval to conduct the study from the Division Schools Superintendent, Public School District Supervisor (PSDS), and ALS teachers, respectively. Upon approval, the needs assessment questionnaire was administered to ALS teachers to gather insights into their instructional challenges and needs

in teaching science to ALS learners, as well as to obtain data on the most perceived difficult topic in learning strand 2: scientific and critical thinking skills, particularly in weather systems. After the results were collected, they were organized and analyzed. The acquired data will then be used as a foundation for designing and developing a learning intervention.

This study ensured that participation would be entirely voluntary. Before data collection, respondents were informed of their right to withdraw at any point without penalty or consequence. Moreover, all information obtained was handled with utmost confidentiality in accordance with the Philippine Constitution, specifically Act No. 10173, "Data Privacy Act of 2012". The collected data were used solely for the study and were not shared with third parties without the participant's consent.

Data Analysis

The study employed both quantitative and qualitative data analysis. The study employed thematic analysis to identify the challenges of ALS teachers in teaching science and to determine the strategic approach in overcoming the challenges. This approach was used to systematically identify, organize, and interpret patterns of meaning within the dataset (Nowell et al., 2017).

Whilst the quantitative data used descriptive statistics, such as the mean and its interpretation to determine the most perceived difficult topic in weather systems in ALS.

Results and Discussion

Summary of the Results of the Needs Assessment of the Key Informants

Table 3.1 Challenges in Teaching Science in ALS

Codes	Mentions	Utterances
Learning Engagement	4	*"Learning engagement of the learners (K1).* *"One of the challenges also involved how to engage them during the class and to motivate them to attend the class (K2)."* *"I also found difficulty in engaging my students since they are diverse learners, so you need to think a lot of ways on how to motivate them to go to school and engage them in the discussion since they have short attention span (K4)."*
Insufficient learning material and resources	3	*"Learning materials is really needed but there is insufficient or lacking of learning resources or materials to cater all the students. We lack allowance for transporation and foods for learners (K2)."* *"Develop of instructional materials (K4)."* *"One of the challenges in ALS, especially in resources is the late books / modules distribution (K5)."*
Delivery Mode	1	*"So, the idea of not having an encounter face to face on a daily basis is so challenging for us, ALS teachers (K3)."*
Lack of teacher training in science	2	*"Teachers need to think creatively to create some teacher-made activities (K2)."* *"Lack of training skills in science (K4)."*
Time management	1	*"I'm having difficulties in time management since some of the topics need a lot of time to discuss, but we are only given at most 45 mins to discuss the lesson, and we only meet twice to thrice a week (K5)."*

Table 3.1 shows the identified challenges in teaching in Alternative Learning System (ALS). As shown in Table 3.1, these challenges are multifaceted and affect the teaching and learning process for ALS teachers and learners. The significant challenge identified is keeping learners engaged in class, consistent with Casingal & Guino (2025). Moreover, Shuwara et al. (2025) claimed that one barrier to learner engagement is learners' short attention spans. Aside from engagement, insufficient learning materials are also a prevalent challenge in Alternative Learning Systems (ALS), as supported by Casingal & Guino (2025), Mahinay & Manla (2025), and Ricohermoso (2023), hindering teachers from delivering structured and meaningful science education. Moreover, resource scarcity in the Alternative Learning System (ALS) affects the quality of education and learning outcomes (Albert et al., 2024). Moreover, the lack of teacher training in science is considered a challenge in ALS and can affect instructional quality. Additionally, the limited face-to-face class undermines instructional continuity and engagement, making it more difficult to sustain learning, especially in content-heavy topics. Moreover, Antipuesto et al. (2023) emphasized that time constraints and inadequate academic readiness significantly hinder the learning process of ALS learners, underscoring the need for more adaptive teaching strategies and robust institutional support.

Table 3.2 Teaching Strategies Used to Address the Challenges

Codes	Mentions	Utterances
Skills Training	1	*"Conducted skills training to sustain the program (K1)."*
Financial support	2	*"To overcome such challenges, we use our pocket money to provide materials for them and instead of using gadgets, we opt to create activities for students to understand the lesson better (K2)."* *"...and with regards to the resources, I ask for sponsors thru linkages (K5)."*
Vocational integration	1	*"...we incorporate livelihood training skills, which they can use in their day to day lives (this help them motivate to attend the class) (K2)."*
Differentiated instructions	1	*" I give them differentiated instructions (K4)."*
Time management	2	*"I overcame these challenges through study the lesson ahead of time (K4)."* *"Things that help me overcome these challenges is to be patient with them (K5)."*

As shown in Table 3.2, there are teaching approaches that can help mitigate the challenges in Alternative Learning System (ALS). Teachers demonstrate strong initiative by providing financial support to learners, including personal funds and community linkages, reflecting the need to compensate for limited instructional materials. One of the most frequently used teaching strategies is time management, specifically preparing lessons in advance and being patient with the learners, to compensate for limited contact time and irregular attendance. Similarly, Bi et al. (2023) highlighted that differentiated instruction is an effective inclusive teaching strategy for addressing learners' diverse needs, noting that learners in the Alternative Learning System (ALS) are diverse. Consistent with Casingal (2025), integrating livelihood skills into the Alternative Learning System (ALS) is an effective strategy to improve learners' engagement in class, as is conducting skills training for ALS teachers to help them effectively teach learners.

Table 3.3 Teachers' Perceptions of Learner Difficulty in Weather Systems

Topic	Mean	SD	Interpretation
Northeast and Southwest Monsoon	2.8	0.84	Moderately difficult
Tropical Cyclone	3.4	0.55	Most difficult
Thunderstorms	1.2	0.45	Not difficult
Tornado	1.4	0.55	Not difficult
Weather Fronts	2.2	0.45	Slightly difficult

Note: 1.00-1.74 - Not difficult; 1.75-2.49 - Slightly difficult; 2.50-3.24 Moderately difficult; 3.25-4.00 Most difficult

Table 3.3 shows the perceived difficulty levels of topics in weather systems in ALS, as evaluated by five (5) key informants. The data reveal that, among weather system topics, tropical cyclones are perceived as the most difficult (M = 3.4, SD = 0.55), indicating that learners struggle to understand this topic in Learning Strand 2: Scientific and Critical Thinking Skills. This is followed by the northeast and southwest monsoons (M = 2.8, SD = 0.84), interpreted as moderately difficult. In contrast, the weather fronts topic presented a lower level of difficulty (M = 2.2, SD = 0.45), which is interpreted as slightly difficult. Furthermore, the least difficult topics in weather systems in the Alternative Learning System (ALS) are thunderstorms (M = 1.2, SD = 1.4) and tornadoes (M = 1.4, SD = 0.55), indicating that learners have minimal difficulty understanding them.

The high perceived difficulty level of Tropical Cyclone (M = 3.4, SD = 0.55) stems from the inherent complexity of the natural phenomena, which involves the connection of multi-variable systems (Wang et al., 2024; Kumar, 2022). These complex scientific concepts often lead to persistent learner misconceptions, making these concepts difficult to understand (Guerra-Reyes et al., 2024). This suggests that the topic requires higher-order thinking skills that may exceed the current cognitive capabilities and readiness of Alternative Learning System (ALS) learners. Unlike tropical cyclones, thunderstorms and tornadoes are categorized as "not difficult" because they are short-term and readily observable, allowing learners to visualize the stages of storm development through direct experience. (Roegner et al., 2024).

Nevertheless, these findings can serve as a basis for developing learning interventions to teach science in ALS, helping learners fully understand weather system concepts.

Limitations of the Study

The study's findings were limited to a specific school district in Iligan City, which may have contextual characteristics that differ from other Alternative Learning System (ALS) learning environments across the Philippines. Consequently, the findings may not be fully generalizable to ALS programs implemented in diverse geographic, socio-economic, or institutional environments. Moreover, due to constraints on sample responsiveness, the sample size is limited to 5 participants, which affects the generalizability of the study. Although the in-depth insights from the key informants were sufficient for the study, the sample size limits the extent to which they can be applied to broader Alternative Learning System (ALS) learning environments.

CONCLUSION AND RECOMMENDATIONS

This study concludes that the Alternative Learning System (ALS) faces diverse challenges that affect the quality of instructional delivery, most notably in sustaining learners' engagement. To mitigate these barriers, ALS teachers use a variety of adaptive strategies. These include using personal funds to supplement the limited instructional materials and resources, integrating practical livelihood skills into the curriculum, applying differentiated instruction to address the diverse needs of the learners, participating in continuous professional training, and exercising strategic time management. Furthermore, among the topics in the ALS science curriculum, tropical cyclones were identified as the most challenging topic for ALS learners. Ultimately, these findings provide an essential basis for designing and developing targeted, context-responsive learning interventions. With these findings, the following are recommended: a) develop a context-responsive, bite-sized learning intervention for the Alternative Learning System that focuses on tropical cyclones, ensuring that it integrates the teachers' preferences for interactive, low-cost physical activities to bypass the resource scarcities, b) evaluate the effectiveness of the developed learning intervention by administering a pre-test and post-test among ALS learners, thereby providing empirical evidence of whether the learning intervention effectively mitigates the conceptual difficulties identified through the teachers' needs assessment, c) the Department of Education should provide professional development training for ALS teachers, especially in science to strengthen their content knowledge, improve their use of differentiated instructions, and equip them with effective teaching strategies, and d) strengthen resource support by establishing partnerships with local government, non-government organizations, and stakeholders to help provide essential learning materials. These combined efforts aim to improve instructional delivery, increase learner engagement, and address existing gaps in ALS science education.

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