



**INSTRUCTIONAL STRATEGIES TO ENHANCE SCIENTIFIC LITERACY AND
CRITICAL THINKING SKILLS AMONG JUNIOR HIGH SCHOOL
LEARNERS IN ALTERNATIVE LEARNING SYSTEM**

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ABSTRACT

This study focused on determining the instructional strategies to enhance Scientific Literacy and Critical Thinking Skills among Junior High School Learners in Alternative Learning System as the basis for the preparation of Learning Intervention Guides. Conducted in Albay, Philippines, the descriptive method utilizing survey technique was used to gather data. Seventy-one (71) ALS teachers and five (5) Education Program Specialists served as respondents. Statistical tools used include Frequency Count, Percentage Technique, Weighted Mean, and the Kruskal–Wallis Test. The extent of instructional strategies was highest along Application of Scientific Concepts in Daily Life (WM = 3.51, Always Used) and lowest along Development of Scientific Thinking and Inquiry (WM = 3.26, Often Used). No significant difference was found in instructional strategies among the variables ($H = 7.762, p > 0.05$). The extent of application by ALS learners was highest along Planning for the Future (WM = 3.11) and lowest along Day-to-Day Life (WM = 3.04), both Often Applied. No significant difference existed among learner variables ($H = 0.047, p > 0.05$). A Learning Intervention Guide was prepared to strengthen scientific literacy and critical thinking instruction in ALS.

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Keywords: *Instructional Strategies, Scientific Literacy, Critical Thinking Skills, Alternative Learning System (ALS), Learning Intervention Guide, Junior High School Learners*

INTRODUCTION

Scientific literacy and critical thinking are essential skills that help individuals solve problems, make informed decisions, and improve their lives. In the Alternative Learning System (ALS), Learning Strand 2 focuses on developing these competencies by helping learners understand scientific ideas and apply them in real-life situations. These skills are not only important for academic success but also for managing everyday tasks and contributing to community development. Learning Strand 2 follows the spiral progression approach of the K to 12 Science Curriculum, where science concepts are introduced from basic to more advanced levels. ALS learners, many of whom come from disadvantaged backgrounds, need instructional strategies that are flexible, relevant, and meaningful to ensure they can effectively engage with the curriculum and overcome barriers.

Republic Act No. 11510, or the ALS Act of 2020, promotes quality education by institutionalizing the ALS Program to provide Out of School Youth, Youth, and Adults with opportunities to improve their knowledge, skills, and readiness for work and self-employment through tailored non-formal education. It emphasizes context-based instruction and learner-centered strategies. Likewise, DepEd Order No. 13, s. 2019, mandates the full implementation of the ALS K to 12 Basic Education Curriculum, which includes Learning Strand 2 as one of its

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core areas. Despite these efforts, many ALS implementers still face challenges in delivering LS2 effectively. Some strategies may not match the learners' backgrounds or everyday realities, while others may fall short in promoting critical thinking and engagement. As a result, there is a need to assess the current instructional strategies used in LS2 and their impact on learners' understanding and practical use of scientific and critical thinking skills.

The study was conducted in the province of Albay, in the southeastern part of Luzon in the Bicol Region, Philippines. There are twenty-five (25) district schools managing a network of Alternative Learning System (ALS) and one hundred seventy-four (174) Community Learning Centers (CLCs), strategically located to serve learners across both urbanized and geographically isolated areas. This study aimed to identify instructional strategies, evaluate their effectiveness, and determine how they influence learners' mastery, daily life, and future goals. The findings serve as the basis for developing a Learning Intervention Guide (LIG) to help teachers enhance instruction and support learners more effectively in Learning Strand 2.

Statement of the Problem

This study determined the instructional strategies to enhance scientific literacy and critical thinking skills among Junior High School Learners in Alternative Learning System as the basis for the preparation of Learning Intervention Guides. Specifically, it answered the following questions:

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- *****
1. What is the extent of the instructional strategies used by ALS teachers in teaching Learning Strand 2 along: (a) Development of Scientific Thinking and Inquiry; (b) Application of Scientific Concepts in Daily Life; (c) Development of Critical Thinking Skills; and (d) Contextualization?
 2. Is there a significant difference in the extent of instructional strategies used by ALS teachers in Learning Strand 2 among the variables?
 3. What is the extent of application of the scientific literacy and critical thinking skills by the ALS learners as rated by respondents along: (a) Mastery of the Concepts; (b) Day-to-Day Life; and (c) Plans for the Future?
 4. Is there a significant difference in the extent of application of the scientific literacy and critical thinking skills by the ALS learners as rated by respondents among the variables?
 5. What Learning Intervention Guides can be prepared based on the findings?

Theoretical Framework

This study is anchored on three theoretical foundations. Constructivist Learning Theory (Dewey, 1938) emphasizes active learning where learners construct knowledge through reflection and real-world engagement. Mastery Learning Theory (Bloom, 1968) focuses on providing adequate time and instructional strategies so all learners achieve the same mastery level. Multiple Intelligences Theory (Gardner, 1983) recognizes that each learner has unique strengths and learning styles, suggesting instruction should include a range of activities—hands-on experiments, group discussions, reflective tasks, and artistic projects—to engage all learners effectively.

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MATERIALS AND METHODS

Research Design

The descriptive research method utilizing survey technique was employed. The descriptive method was used to systematically observe, describe, and interpret the instructional strategies in Learning Strand 2 – Scientific Literacy and Critical Thinking Skills as applied in the ALS. The survey technique was the primary data collection tool, enabling data to be efficiently collected from ALS teachers and education program specialists using structured questionnaires.

Participants of the Study

The respondents of this study were 71 ALS teachers and 5 Education Program Specialists in the setting of the study. Purposive sampling was used in the selection of teacher respondents, as the ALS teachers are the direct implementers of instructional strategies, while Education Program Specialists provide monitoring and supervision in ALS.

Table 1

Respondents of the Study

Community Learning Centers	ALS Teachers	Education Program Specialist	Total
Cluster A	18	1	19
Cluster B	15	1	16

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Cluster C	14	1	15
Cluster D	10	1	11
Cluster E	14	1	15
Total	71	5	76

Research Instrument

A two-part researcher-made survey questionnaire was utilized. Part I measured the extent of instructional strategies used by ALS teachers in teaching Learning Strand 2, using a four-point Likert scale: 4-Always Used, 3-Often Used, 2-Sometimes Used, and 1-Rarely Used. Variables included Development of Scientific Thinking and Inquiry, Application of Scientific Concepts in Daily Life, Development of Critical Thinking Skills, and Contextualization. Part II gauged the extent of application of Scientific Literacy and Critical Thinking Skills by the ALS learners (4-Always Applied, 3-Often Applied, 2-Sometimes Applied, and 1-Rarely Applied).

Validity of the Research Instrument

The Division ALS Focal Person and Education Program Specialists were tapped to ensure validity of the evaluation checklist. The instrument was anchored in the ALS K to 12 Basic Education Curriculum. A pilot test was also conducted among ALS teachers and Education Program Specialists II for ALS outside the setting of the study to further validate the instrument.

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Data Gathering Procedures

A letter of request with approval recommendation by the dean of the graduate school was forwarded to the Schools Division Superintendent. Upon approval, coordination with the Division ALS Focal Person and ALS teachers was done to facilitate data collection. Respondents were given a clear explanation of the study's purpose, assured of confidentiality, and gave consent before participation. The researcher personally administered and retrieved all 76 survey questionnaires, achieving a 100% retrieval rate across all clusters.

Table 2

Distribution and Retrieval of the Research Instrument

Community Learning Centers	Distributed	Retrieved	Percent (%)
Cluster A	19	19	100
Cluster B	16	16	100
Cluster C	15	15	100
Cluster D	11	11	100
Cluster E	15	15	100
Total	76	76	100

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Data Analysis

The data were analyzed using the following statistical tools: (1) Frequency Count to determine the number of respondent responses; (2) Percentage Technique to describe the distribution of responses; (3) Weighted Mean to determine the average rating of responses; and (4) Kruskal-Wallis Test (H test) to determine significant differences among groups at the 0.05 level of significance.

RESULTS AND DISCUSSIONS

Extent of Instructional Strategies Used in Teaching Learning Strand 2 Along Development of Scientific Thinking and Inquiry

Table 3 presents the extent of instructional strategies used by ALS Teachers in Learning Strand 2 along the development of scientific thinking and inquiry. The average weighted mean for this variable is 3.26 (Often Used). Among the indicators, using open-ended questions to guide learners in thinking critically and forming their own scientific questions received the highest weighted mean of 3.38. Leading learners through step-by-step inquiries received the lowest weighted mean of 3.04, both interpreted as Often Used.

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Table 3

Extent of Instructional Strategies Used by ALS Teachers in Teaching Learning

Strand 2 Along Development of Scientific Thinking and Inquiry

Indicators	4	3	2	1	WM	VI
1. Encourages learners to observe everyday phenomena (e.g., plant growth, weather changes) to foster inquiry skills.	26	39	9	2	3.17	OU
2. Uses open-ended questions to guide learners in thinking critically and forming their own scientific questions.	39	27	10	0	3.38	OU
3. Incorporates simple experiments using household materials (e.g., vinegar and baking soda) to explore scientific principles.	38	30	6	2	3.37	OU
4. Leads learners through step-by-step inquiries (predicting outcomes and recording observations) to simulate the scientific method.	22	38	13	3	3.04	OU
5. Uses concept maps and flowcharts to help learners organize information and think logically.	35	33	8	0	3.36	OU
6. Guides learners to identify problems (e.g., sanitation issues) and propose possible solutions.	37	23	14	2	3.25	OU
Weighted Average					3.26	OU

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This finding implies that strategies using open-ended questions are most frequently employed because they are flexible, easy to integrate into diverse classrooms, and encourage learners to explore ideas independently without requiring extensive materials. ALS teachers frequently employ strategies to develop scientific thinking, with a preference for flexible, discussion-based methods over highly structured, procedural approaches. This aligns with Mallilin (2022), who found that active-learning strategies consistently outperform traditional lectures in improving performance, particularly when these strategies are intentionally structured.

Extent of Instructional Strategies Used in Teaching Learning Strand 2 Along Application of Scientific Concepts in Daily Life

The average weighted mean for application of scientific concepts in daily life is 3.51 (Always Used). Issues such as climate change, waste segregation, and water conservation received the highest weighted mean of 3.68 (Always Used), while linking scientific explanations to everyday farming practices received the lowest mean of 3.43 (Often Used). This indicates a stronger emphasis on broad environmental topics than on explaining scientific principles behind agricultural practices—a gap between hands-on practice and conceptual understanding. This finding partially supports Zhang et al. (2023), who found that meaningful learning gains are strongest when learning is grounded in authentic, context-rich tasks connected to learners' real-world contexts and lived experiences.

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Extent of Instructional Strategies Used in Teaching Learning Strand 2 Along

Development of Critical Thinking Skills

The average weighted mean along Development of Critical Thinking Skills is 3.48 (Often Used). Asking learners to compare, contrast, and evaluate different solutions or scientific claims received the highest mean of 3.64 (Always Used), while prompting learners to justify their answers and facilitate small group argumentation each received the lowest mean of 3.37 (Often Used). While teachers consistently engage learners in analytical comparison, deeper practices such as structured argumentation and justification of reasoning are less consistently implemented. This aligns with Alarcón et al. (2023), who noted that without explicit instructional models integrating questioning and model-based explanation, classroom inquiry often remains at a surface level.

Extent of Instructional Strategies Used in Teaching Learning Strand 2 Along

Contextualization

The average weighted mean along Contextualization is 3.33 (Often Used). Designing lessons around local concerns such as waste disposal, agriculture, or typhoon preparedness received the highest mean of 3.72 (Always Used), while relating science lessons to indigenous practices like herbal medicine received the lowest mean of 3.07 (Often Used). This pattern—where practical, observable activities are more consistently taught than deeper conceptual or cultural connections—reflects a need to strengthen the explicit integration of indigenous knowledge alongside scientific explanations. This aligns with Belen (2022), who found that

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contextualization based on practical issues is effective but rarely extends to culturally-rooted indigenous knowledge systems.

Significant Difference in the Extent of Instructional Strategies Used in Teaching Learning Strand 2 Among the Variables

Through the Kruskal-Wallis Test, the computed H value of 7.762 is less than the tabular χ^2 value of 7.815 at the 0.05 level of significance with 3 degrees of freedom; thus, the null hypothesis is accepted. There is no significant difference in the extent of instructional strategies used by ALS teachers in Learning Strand 2 among the variables. This means ALS teachers apply instructional strategies in a uniform and consistent manner, indicating that the ALS program has successfully established standardized teaching guidelines allowing comparable implementation across settings.

Extent of Application of Scientific Literacy and Critical Thinking Skills by ALS Learners Along Mastery of the Concepts

The average weighted mean along Mastery of the Concepts is 3.07 (Often Applied). Repeating key concepts in different formats—written, oral, and activity-based—to strengthen retention has the highest mean of 3.16. Relating concepts to familiar things in the learners' environment has the lowest mean of 2.97, both often applied. Teachers tend to rely more on repetition across modalities rather than consistently connecting scientific concepts to everyday experiences, potentially limiting deeper conceptual grasp. Villastique (2025) supports the effectiveness of repetition through clear learning targets and frequent formative routines,

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while also noting that deeper learning occurs when these routines are paired with contextual evidence-sharing.

Extent of Application of Scientific Literacy and Critical Thinking Skills by ALS Learners Along Day-to-Day Life

The average weighted mean along Day-to-Day Life is 3.04 (Often Applied). Demonstrating learning around real-life situations like cooking, budgeting, and farming received the highest mean of 3.18, while simulating real-world interactions such as visiting a doctor or reading medicine labels received the lowest mean of 3.00. Educational practices grounded in authentic, familiar everyday experiences are more frequently implemented and easily internalized compared with structured simulations of real-world interactions. This supports Tang and Zhang (2020), who found that informal science experiences enhance learner performance by boosting interest and self-efficacy.

Extent of Application of Scientific Literacy and Critical Thinking Skills by ALS Learners Along Planning for the Future

The average weighted mean along Planning for the Future is 3.11 (Often Applied). Expressing goals and steps through drawings, journals, or sharing sessions received the highest mean of 3.43, while planning small businesses or livelihood projects received the lowest mean of 2.91. While learners are frequently encouraged to reflect on and express their goals, designing and implementing livelihood projects requires more complex scaffolding, structured guidance, and multi-step feedback that are challenging to implement routinely.

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This finding partially aligns with Sortwell et al. (2024), who noted that higher-order decision-making tasks require extended scaffolding to achieve meaningful learning gains.

Significant Difference in the Extent of Application of Scientific Literacy and Critical Thinking Skills Among the Variables

The Kruskal-Wallis Test yielded a computed H value of 0.047, which is less than the tabular χ^2 value of 5.991 at 2 degrees of freedom and 0.05 level of significance; thus, the null hypothesis is accepted. There is no significant difference in the extent of application of scientific literacy and critical thinking skills by the ALS Junior High School learners among the variables. This implies that instructional practices, curriculum delivery, and learning experiences are generally consistent across different indicators, ensuring equitable opportunities for learners to engage with science content.

Summary of Findings

The gathered data yielded the following findings: (1) The extent of instructional strategies was highest along Application of Scientific Concepts in Daily Life (WM = 3.51) and lowest along Development of Scientific Thinking and Inquiry (WM = 3.26); (2) No significant difference existed in instructional strategies among variables ($H = 7.762 < \chi^2 = 7.815$); (3) Learner application was highest along Planning for the Future (WM = 3.11) and lowest along Day-to-Day Life (WM = 3.04), all Often Applied; (4) No significant difference in learner application among variables ($H = 0.047 < \chi^2 = 5.991$); and (5) A Learning Intervention Guide was prepared addressing the least-applied indicators.

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Recommendations

From the findings and conclusions drawn, the following recommendations are forwarded:

1. Curriculum writers may develop culturally grounded science modules integrating indigenous knowledge systems alongside environmental and socio-economic contexts.
2. The Department of Education may provide contextualized teaching aids linking science concepts to everyday objects, supplying localized materials and visual aids that make abstract ideas more understandable through real-life analogies.
3. Teachers may introduce low-cost real-world simulations for practical life skills, including modules that simulate doctor visits, medicine label reading, or household problem-solving using materials accessible in ALS centers.
4. Teachers may strengthen integration of science with livelihood and entrepreneurship lessons by creating science-based livelihood projects to support learners' economic empowerment.
5. Administrators may provide teacher training on facilitating step-by-step scientific inquiry, including workshops on designing simple experiments, recording observations, and guiding learners through the scientific method.
6. Administrators may provide resource packets explaining the science behind farming practices, simplifying the scientific principles of composting, planting, and pest control for easier lesson integration.

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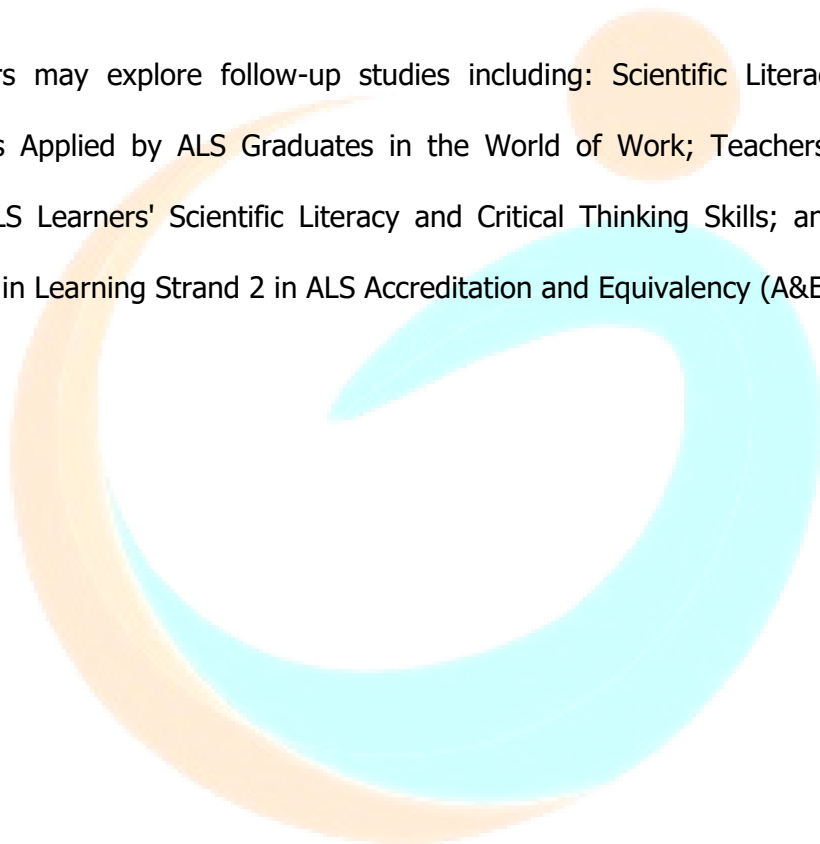
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7. Teachers may apply reflective science learning connected to real-life aspirations and provide support activities that help learners connect science to personal goals, livelihood dreams, and community improvement initiatives.

8. Educators may adopt the Learning Intervention Guide (LIG) for Teachers as an output of this study.

9. Researchers may explore follow-up studies including: Scientific Literacy and Critical Thinking Skills Applied by ALS Graduates in the World of Work; Teachers' Readiness in Developing ALS Learners' Scientific Literacy and Critical Thinking Skills; and Instructional Requirements in Learning Strand 2 in ALS Accreditation and Equivalency (A&E) Program.



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