RESEARCH ARTICLE

JENER Journal of Empirical and Non-Empirical Research
Volume 2, Issue 8, Page 110-114 | Article No. 19
DOI: 10.4898/jener.v2i8.a19
ISSN: 7895-9216
Journal homepage: https://jenerjournal.com
Journal email: editor@jenerjournal.com

JENER Journal
JENER Journal of Empirical and Non-Empirical Research

The Effect of the Supplementary Self-Learning Module on the Academic Performance of Grade 7 Learners in Anib National High School, Sipocot 1 District, Division of Camarines Sur

Aldhem Nesortado Aldave[1]

[1]University of Northeastern Philippines, School of Graduate Studies

ARTICLE INFORMATION

Article history:
Published: August 2026

Keywords:
Localized Module
Science 7
Contextualization
Bilingual Scaffolding
Quasi-Experiment

ABSTRACT

This study evaluated a localized supplementary self-learning module for fourth-quarter Grade 7 Science at Anib National High School, Sipocot 1 District, Division of Camarines Sur, during School Year 2024–2025. A pretest-posttest control-group design involved 60 learners in two intact sections, with 30 learners assigned to the experimental group and 30 to the control group. The intervention added Filipino explanations, localized examples, diagrams, and structured activities to lessons on geological faults, earthquake magnitude and intensity, sunlight as an energy source, Earth's tilt, and rotation and revolution. Both groups began at Needs Improvement on the 75-item pretest (experimental performance level=41.20; control=42.25). After the intervention, the experimental group was Very Satisfactory overall (performance level=85.00), whereas the control group remained at Needs Improvement (55.37). Experimental pretest-posttest improvement was significant for all topics ($z=5.15–6.91$, all reported $p<.001$) and the whole test ($z=5.88$, $p<.001$). Posttest comparisons also favored the experimental group for every topic ($z=1.97–2.68$, reported $p<.05$) and the whole test ($z=14.92$, $p<.001$). The evidence is consistent with a beneficial intervention effect, but intact-section assignment, inconsistent descriptive and inferential means, implausible standard-deviation fields, and absence of effect sizes and fidelity evidence limit the precision of causal inference. Replication should use validated parallel tests, transparent scoring, baseline-adjusted estimates, confidence intervals, and implementation measures.

1. Introduction

Earth and space science requires learners to reason about processes that are spatial, dynamic, large in scale, and often not directly observable. Fault movement, earthquake measures, energy transfer, axial tilt, rotation, and revolution can remain abstract when instruction depends mainly on dense English text or static definitions.

Contextualization can bridge abstract science with familiar experience. Local hazards, community uses of solar energy, observable day–night patterns, and Philippine contexts can provide meaningful anchors. Localization is most educationally defensible when the context clarifies the scientific model without distorting it.

Language is another access condition. Strategic use of Filipino explanations can reduce unnecessary linguistic load while preserving and building the English terminology learners need for science. Translanguaging and bilingual scaffolding should support conceptual reasoning rather than become word-for-word translation without attention to meaning.

Self-learning modules can organize goals, explanations, examples, diagrams, guided tasks, checks for understanding, and opportunities for independent pacing. Their effectiveness depends on alignment, readability, accuracy, cognitive load, feedback, and learner ability to navigate the material (Mayer, 2021).

The Philippine curriculum encourages contextualized and learner-centered instruction under the Enhanced Basic Education Act. The MATATAG curriculum for Grade 7 Science continues the need for coherent, accessible learning resources and strong teacher support (Department of Education, 2024; Republic Act No. 10533, 2013).

A control-group pretest-posttest design can provide stronger evidence than a perception survey, but intact sections remain vulnerable to selection, teacher, schedule, contamination, and baseline differences. Valid inference also requires trustworthy test scores, consistent descriptive statistics, and effect-size reporting.

The present study provides topic-specific and whole-test results. This article foregrounds the comparative evidence while openly identifying inconsistencies in the source tables. The objective is a useful, credible interpretation—not an inflated claim of proof.

1.1 Research Purpose and Analytical Focus

The study aimed to describe pretest and posttest science performance, test improvement within the experimental group, compare posttest performance between experimental and control groups, and derive implementation guidance for localized supplementary modules. The analytical focus was the extent to which the observed pattern is consistent with an intervention effect, the scientific and language mechanisms that could plausibly explain it, and the design and reporting conditions needed for replication.

1.2 Conceptual and Empirical Synthesis

The intervention is understood through an access–processing–practice model. Filipino explanations and local contexts support access; diagrams and structured explanations support mental-model construction; guided and independent tasks support retrieval and application; and feedback supports correction.

Context is a scaffold, not the learning outcome. Effective localization maintains scientific accuracy, explicitly connects the familiar example with the disciplinary concept, and gradually supports transfer to unfamiliar situations and formal terminology.

A pretest-posttest contrast estimates change, while the control comparison helps separate intervention-related change from history or maturation. Baseline adjustment, validated parallel measurement, fidelity, and effect size are still necessary for a robust causal estimate.

2. Methodology

A pretest-posttest control-group design was implemented in Anib National High School during the fourth quarter of School Year 2024–2025. Sixty Grade 7 learners from two intact sections participated, with 30 in the experimental group and 30 in the control group.

The experimental group used a supplementary self-learning module with Filipino explanations, local examples, visuals, and structured tasks. The control group used the standard material without the localized supplement. Five 15-item topic components formed a 75-item assessment.

The topics were geological faults; magnitude and intensity; sunlight as a source of energy; the effect of Earth's tilt; and rotation and revolution. Frequencies, means, reported performance levels, standard deviations, and z procedures were used for within-group improvement and posttest group comparison.

The article prioritizes performance levels and test statistics that were internally coherent. It does not rely on the reported standard deviations, several of which exceed plausible limits for 15-item topic tests, and it discloses inconsistent whole-test means across descriptive and inferential tables.

Table 1. Research Design, Participants, Measures, and Analysis

Component	Specification
Design and setting	Pretest-posttest control-group study; Anib National High School; fourth quarter, SY 2024–2025
Participants	60 Grade 7 learners in two intact sections: experimental n=30; control n=30
Intervention	Localized supplementary Science 7 module with Filipino explanations, local examples, diagrams, and structured activities
Assessment	Five 15-item topic components; 75 items total
Analysis	Descriptive performance levels and reported z tests for improvement and posttest comparison

2.1 Analytical Rigor and Boundaries

The inclusion of a control group, baseline measurement, topic-specific outcomes, and whole-test comparison strengthens the design relative to a posttest-only or perception study. Both groups began within the Needs Improvement category.

Several source fields require verification: standard deviations for 15-item topic tests exceeded plausible score ranges; the experimental whole-test post mean was 63.75 in one table and 59.47 in an inferential table; and narrative means were sometimes taken from adjacent columns. The article therefore emphasizes verified performance levels and reported z decisions.

The sections were intact rather than individually randomized, and no baseline-adjusted model, allocation procedure, test reliability, fidelity measure, missing-data rule, confidence interval, or effect size was reported. These omissions limit causal precision and external validity.

3. Results and Discussion

3.1 Baseline Science Performance

Both groups began below the stated proficiency threshold.

Table 2. Pretest Performance Levels by Topic

Topic	Experimental PL	Control PL	Interpretation
Geological faults	36.87	38.40	Both Needs Improvement
Magnitude and intensity	41.13	50.47	Both Needs Improvement
Sunlight as energy	44.00	38.67	Both Needs Improvement
Effect of Earth's tilt	40.20	41.53	Both Needs Improvement
Rotation and revolution	43.80	42.20	Both Needs Improvement
Whole test	41.20	42.25	Both Needs Improvement

The groups shared the same overall performance category, and their whole-test performance levels differed by 1.05 points. Topic differences were larger for magnitude and intensity and for sunlight, so equivalence should not be inferred from category labels alone.

The baseline pattern identifies broad gaps across geological, energy, and astronomical concepts. Diagnostic follow-up should distinguish vocabulary, representation, misconception, and reasoning errors. A low total score cannot specify which scaffold is needed. Intact sections may differ in prior instruction, attendance, or composition. A baseline-adjusted analysis would provide a more defensible estimate than relying only on posttest differences.

3.2 Posttest Performance after the Intervention

The experimental group reached Very Satisfactory performance in every topic; the control group remained at Needs Improvement.

Table 3. Posttest Performance Levels by Topic

Topic	Experimental PL	Control PL	Profile
Geological faults	85.00	50.47	VS vs. NI
Magnitude and intensity	86.00	56.40	VS vs. NI
Sunlight as energy	85.50	54.87	VS vs. NI
Effect of Earth's tilt	87.00	58.00	VS vs. NI
Rotation and revolution	88.00	57.13	VS vs. NI
Whole test	85.00	55.37	VS vs. NI

The posttest profile shows a large and consistent separation across all five topics. Localization may have supported comprehension by connecting terminology and processes with familiar language, visuals, and situations, while structured module tasks may have increased opportunity for self-paced review.

The strength of the pattern across conceptually different topics is noteworthy. However, the module bundled several components—Filipino explanation, local examples, visuals, structure, practice, and perhaps additional time. The design cannot isolate which component or combination produced the difference.

The control group's improvement from baseline was insufficient to move beyond Needs Improvement. This comparison supports the value of additional structured support, but differences in teaching time, attention, or expectations should be documented as part of fidelity.

3.3 Experimental-Group Improvement

All topic-specific and whole-test improvement statistics were reported at $p<.001$.

Table 4. Reported Pretest-Posttest Improvement in the Experimental Group

Topic	z	Reported p	Decision
Geological faults	5.21	<.001	Significant improvement
Magnitude and intensity	5.76	<.001	Significant improvement
Sunlight as energy	6.91	<.001	Significant improvement
Effect of Earth's tilt	5.15	<.001	Significant improvement
Rotation and revolution	5.69	<.001	Significant improvement
Whole test	5.88	<.001	Significant improvement

The largest test statistic occurred for sunlight as an energy source, although z magnitude should not be interpreted as an effect size. Every topic showed a reported statistically significant improvement, supporting the conclusion that change was not confined to one content area. A within-group improvement can reflect intervention, maturation, repeated testing, concurrent teaching, or regression. The control comparison is therefore essential, and effect sizes based on transparent means and standard deviations are still required.

3.4 Posttest Comparison between Groups

Every posttest comparison favored the experimental group according to the source decisions.

Table 5. Reported Posttest Group Comparisons

Topic	z	Reported Significance	Decision
Geological faults	2.22	p<.05	Experimental higher
Magnitude and intensity	1.97	p<.05	Experimental higher
Sunlight as energy	2.01	p<.05	Experimental higher
Effect of Earth's tilt	2.05	p<.05	Experimental higher

Topic	z	Reported Significance	Decision
Rotation and revolution	2.68	p<.05	Experimental higher
Whole test	14.92	p<.001	Experimental higher

The topic-specific group comparisons were all significant as reported, and the whole-test statistic indicated a strong separation. The convergence of topic and total results strengthens the case that the experimental condition was associated with higher posttest performance. The whole-test z=14.92 is unusually large relative to the topic statistics and should be recomputed from the raw data. A transparent independent-samples or baseline-adjusted model should report group means, standard deviations, mean difference, 95% confidence interval, standardized effect, and assumptions.

The most credible substantive claim is that the localized supplementary module, as implemented in these two sections, was associated with higher fourth-quarter Science 7 performance. Generalization beyond the school requires replication.

3.5 Instructional Mechanisms and Replication Requirements

Localization can operate through multiple mechanisms that should be specified and measured.

Table 6. Intervention Components and Required Evidence

Component	Plausible Mechanism	Replication Evidence
Filipino explanation	Reduces language barrier; supports conceptual access	Accuracy review; language profile; learner explanation
Local examples	Connects abstract concept to familiar experience	Alignment map; transfer to unfamiliar context
Diagrams	Supports spatial and process representation	Design review; interpretation task
Structured tasks	Guides practice, retrieval, and feedback	Dosage; completion; item response
Self-paced module	Enables review and learner control	Time-on-task; navigation; support received

The module should be treated as a designed package rather than a generic supplement. Replication requires a component map, content and language validation, teacher guidance, clear dosage, and fidelity monitoring.

Transfer is a critical criterion. Learners should not only recognize localized examples; they should use the scientific model to explain new cases, interpret data, distinguish related concepts, and communicate using appropriate scientific language.

3.6 Integrated Interpretation of the Findings

The pattern is internally consistent at the level of performance categories and reported significance decisions: similar low baselines, very strong experimental posttest performance, significant within-group improvement, and significant posttest separation.

The most plausible explanation is a combination of linguistic access, contextual relevance, visual representation, structured practice, and self-paced review. The study cannot isolate these components.

Source inconsistencies prevent precise effect-size estimation. The intervention may be promising, but a publishable empirical claim requires reconciled raw scores, valid tests, correct standard deviations, transparent analyses, and fidelity evidence.

Scale-up should therefore proceed as a monitored replication: validate the module, train teachers, establish common assessments, document implementation, compare outcomes fairly, and revise the resource from learner evidence.

4. Conclusions and Implications

4.1 Conclusions

Both groups began at Needs Improvement on the whole test. After implementation, the experimental group reached Very Satisfactory performance while the control group remained at Needs Improvement.

Experimental-group improvement was significant across all topics and the whole test as reported. Posttest comparisons also favored the experimental group throughout.

The evidence is consistent with a beneficial effect of the localized supplementary module in these two intact sections, but the bundled intervention prevents identification of the active component.

Causal precision is limited by nonrandom intact groups, inconsistent means, implausible standard-deviation fields, and absent effect sizes, confidence intervals, reliability, and fidelity measures.

4.2 Study Limitations

The study used two intact sections in one school. Unmeasured baseline, teacher, schedule, attendance, or peer differences may have influenced the results, and the sample does not support broad generalization.

Several descriptive and inferential fields were internally inconsistent. Standard deviations exceeded plausible topic-score ranges, and whole-test post means differed across tables. Raw-data verification and reanalysis are required before external journal submission.

No test reliability, item quality, allocation procedure, missing-data rule, implementation-fidelity measure, effect size, or confidence interval was reported.

The intervention combined language scaffolding, localization, visuals, structure, and additional practice, so the design cannot isolate which component caused the observed difference.

4.3 Implications for Practice and Policy

Validate scientific accuracy, Filipino explanations, readability, visuals, cultural relevance, and alignment before wider use.
Use common parallel pretest and posttest forms with documented reliability, item difficulty, discrimination, and scoring procedures.
Train teachers to connect familiar examples explicitly with scientific models and then require transfer to unfamiliar cases.
Monitor dosage, time-on-task, teacher support, module completion, contamination, and adherence to both experimental and comparison conditions.
Scale through staged replication with baseline-adjusted analyses, effect sizes, confidence intervals, and subgroup equity checks.

5. Policy and Implementation Priorities

Table 7. Monitored Scale-Up Framework for Localized Science Modules

Priority Area	Recommended Direction	Expected Evidence
Validation	Review science, language, context, visuals, assessment, and accessibility.	Expert ratings; revision log; pilot feedback
Assessment	Use reliable parallel forms and transparent scoring and data checks.	Technical report; reconciled dataset
Implementation	Specify dosage, teacher role, learner support, and comparison conditions.	Fidelity checklist; time and completion log
Analysis	Use baseline-adjusted models, effect sizes, confidence intervals, and sensitivity checks.	Full statistical output and codebook
Transfer	Assess explanation and application beyond localized examples.	Novel-item and performance-task results
Scale-up	Replicate across teachers and schools before institutional adoption.	Multi-site evidence; cost and feasibility report

6. Directions for Future Research

Replicate across multiple schools using random assignment where feasible or strong matching with baseline-adjusted multilevel analysis.
Conduct component studies that compare bilingual explanation, local context, visuals, and structured practice separately and in combination.
Measure retention, transfer, science vocabulary, motivation, and independent module navigation in addition to immediate achievement.
Examine differential effects by prior achievement, language proficiency, attendance, disability, and access to learning support.

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