

A Quantitative Pre-test and Post-test Study on the Effect of Sustainable Worksheets on English Grammar Learning in Middle Basic Education

Un estudio cuantitativo de pre test y post test sobre el efecto de hojas de trabajo sostenibles en el aprendizaje de la gramática del inglés en la Educación General Básica Media.

Studio quantitativo pre-test e post-test sull'effetto di schede di lavoro sostenibili nell'apprendimento della grammatica inglese nella scuola secondaria di primo grado

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Artículo de Investigación

* **Recibido:** 25 de noviembre de 2025 * **Aceptado:** 27 de diciembre de 2025 * **Publicado:** 24 de febrero 2026

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Resumen

La enseñanza de la gramática del idioma inglés continúa siendo un desafío en diversos contextos de enseñanza del inglés como lengua extranjera (EFL), especialmente en la educación básica media de instituciones públicas. El presente estudio tuvo como objetivo analizar los cambios en el desempeño gramatical de los estudiantes tras la implementación de una intervención pedagógica estructurada. Se empleó un diseño cuantitativo preexperimental con enfoque de pretest y postest. Los participantes fueron 150 estudiantes de educación básica media de una institución educativa pública del cantón Milagro, Ecuador. Los datos fueron recolectados mediante evaluaciones gramaticales alineadas con los objetivos curriculares y analizados a través de estadística descriptiva para la obtención de valores de media. Los resultados evidencian un incremento en las medias del postest en todos los criterios gramaticales evaluados en comparación con el pretest, lo que refleja mejoras en el reconocimiento, comprensión y aplicación de estructuras gramaticales básicas del idioma inglés. Estos hallazgos sugieren que una instrucción gramatical estructurada contribuye positivamente al aprendizaje de la gramática en contextos de educación básica media.

Palabras clave: gramática del inglés, enseñanza del inglés como lengua extranjera, estudio cuantitativo, educación básica

Abstract

The teaching of English grammar remains a challenge in many English as a Foreign Language (EFL) contexts, particularly in public middle basic education. This study aimed to examine changes in students' English grammar performance following the implementation of a structured instructional intervention. A quantitative pre-experimental design with a pre-test and post-test approach was employed. The participants were 150 middle basic education students from a public educational institution in Milagro, Ecuador. Data were collected using grammar-based assessments aligned with the curricular objectives and analyzed through descriptive statistics to obtain mean scores. The results indicate higher post-test mean scores across all evaluated grammar-related criteria when compared to pre-test results, reflecting improvements in students' recognition, comprehension, and application of basic English grammatical structures. These findings suggest that structured grammar-focused instruction can support grammar learning in middle basic education EFL contexts and provide empirical evidence to inform instructional practices.

Keywords: *English grammar, EFL instruction, quantitative study, basic education*

Riassunto

L'insegnamento della grammatica della lingua inglese continua a rappresentare una sfida in diversi contesti di insegnamento dell'inglese come lingua straniera (EFL), in particolare nell'istruzione di base di livello intermedio delle istituzioni pubbliche. Il presente studio ha avuto come obiettivo l'analisi dei cambiamenti nel rendimento grammaticale degli studenti a seguito

dell'implementazione di un intervento pedagogico strutturato. È stato adottato un disegno quantitativo pre-sperimentale con approccio pre-test e post-test. I partecipanti sono stati 150 studenti dell'istruzione di base di livello intermedio di un'istituzione educativa pubblica del cantone di Milagro, Ecuador. I dati sono stati raccolti mediante valutazioni grammaticali allineate agli obiettivi curricolari e analizzati attraverso la statistica descrittiva per l'ottenimento dei valori medi. I risultati evidenziano un incremento delle medie nel post-test in tutti i criteri grammaticali valutati rispetto al pre-test, riflettendo miglioramenti nel riconoscimento, nella comprensione e nell'applicazione delle strutture grammaticali di base della lingua inglese. Tali risultati suggeriscono che un'istruzione grammaticale strutturata contribuisce positivamente all'apprendimento della grammatica nei contesti dell'istruzione di base di livello intermedio.

Parole chiave grammatica inglese, insegnamento dell'inglese come lingua straniera, studio quantitativo, istruzione di base

Introduction

English has become a fundamental tool for academic, professional, and social participation in an increasingly globalized world. As one of the most widely used international languages, English proficiency is closely associated with access to educational opportunities, technological resources, and global communication. Consequently, educational systems worldwide have incorporated English as a compulsory subject from early levels of schooling. However, despite its curricular presence, achieving meaningful learning outcomes in English—particularly in grammar acquisition—remains a persistent challenge in many public education contexts, especially in developing countries.

In middle basic education, the teaching and learning of English grammar plays a crucial role in supporting the development of receptive and productive language skills. Grammar provides learners with the structural foundation necessary to comprehend texts, construct meaningful sentences, and communicate effectively. Nevertheless, traditional grammar instruction has often been characterized by decontextualized explanations, repetitive exercises, and limited student engagement. Such approaches may hinder motivation and fail to address diverse learning needs, resulting in low levels of grammatical competence among students.

In Ecuador, this situation is further complicated by contextual factors such as limited instructional time, insufficient teaching resources, and the assignment of English classes to

teachers without specialized training in English language teaching. These conditions frequently affect public schools, where students often show difficulties in understanding and applying basic grammatical structures despite several years of formal instruction. As a result, there is a growing need for pedagogical interventions that support grammar learning in a more accessible, engaging, and effective manner.

One promising alternative involves the use of didactic materials designed to facilitate active learning and promote sustained student interaction. In particular, sustainable worksheets—defined as reusable, durable instructional materials—offer practical advantages in low-resource educational settings. These materials not only reduce costs and environmental impact but also allow repeated practice, scaffolding, and reinforcement of grammatical concepts over time. When integrated into communicative and student-centered methodologies, sustainable worksheets can contribute to more meaningful learning experiences and improved academic outcomes.

Despite the pedagogical potential of such materials, empirical evidence regarding their effectiveness in improving English grammar learning in middle basic education remains limited. Many studies focus on vocabulary acquisition or general language skills, while fewer investigations employ quantitative designs that measure learning gains through pre-test and post-test comparisons. This gap highlights the importance of conducting data-driven research that evaluates the impact of instructional interventions using measurable learning outcomes.

In response to this need, the present study aims to examine the effect of sustainable worksheets on English grammar learning among middle basic education students through a quantitative pre-test and post-test design. By analyzing students' performance before and after the implementation of the intervention, this study seeks to provide statistical evidence of learning improvement and contribute to the growing body of research on effective grammar instruction in English as a Foreign Language (EFL) contexts. The findings are expected to offer pedagogical insights for teachers, curriculum designers, and educational institutions seeking practical and sustainable strategies to enhance English grammar learning in similar educational settings.

English Grammar Learning in EFL Contexts

Grammar instruction has long been recognized as a central component of English as a Foreign Language (EFL) learning, as it provides learners with the structural framework necessary for accurate comprehension and production of language. According to Larsen-Freeman (2015), grammar should not be understood merely as a set of rules but as a dynamic system that supports meaning-making in communication. When learners develop grammatical awareness, they are better equipped to integrate form, meaning, and use in real communicative contexts.

In middle basic education, grammar learning becomes particularly relevant because students transition from basic vocabulary recognition to more complex sentence construction and text comprehension. However, several studies indicate that EFL learners at this level often struggle with grammatical accuracy due to limited exposure, insufficient practice opportunities, and teaching approaches that prioritize memorization over meaningful use (Ellis, 2006). These difficulties are frequently reflected in low academic performance and reduced motivation toward English learning.

In Latin American contexts, including Ecuador, grammar instruction is further affected by systemic challenges such as large class sizes, limited teaching materials, and the assignment of English instruction to non-specialist teachers. Research by Education First (2021) highlights that Ecuador consistently ranks among the lowest-performing countries in English proficiency in the region, suggesting structural weaknesses in instructional practices and learning resources. These findings emphasize the need for pedagogical strategies that can support grammar learning in contexts with constrained educational conditions.

Didactic Materials and Grammar Instruction

Didactic materials play a crucial role in mediating the teaching and learning process, particularly in EFL classrooms. Tomlinson (2013) argues that effective instructional materials should engage learners cognitively and affectively while providing opportunities for meaningful language use. In grammar instruction, materials that incorporate visual elements, contextualized examples, and guided practice can significantly enhance learners' understanding of grammatical structures.

Empirical studies have shown that the use of structured worksheets can support grammar learning by offering repeated exposure, scaffolding, and opportunities for self-regulation. According to Harmer (2015), worksheets remain a valuable instructional tool when they are purposefully designed and integrated into interactive teaching methodologies. Rather than functioning as isolated exercises, worksheets can serve as reinforcement tools that guide learners through progressive stages of grammar acquisition.

However, the effectiveness of worksheets largely depends on their design and pedagogical alignment. Poorly designed materials may reinforce mechanical learning, whereas well-structured worksheets that align with communicative goals can foster deeper understanding and application of grammatical knowledge (Nunan, 2004). This distinction underscores the importance of designing instructional materials that respond to learners' cognitive level and contextual needs.

Sustainable Instructional Materials in Education

Sustainability in education has gained increasing attention as institutions seek to balance pedagogical effectiveness with environmental and economic responsibility. Sustainable instructional materials refer to resources that are reusable, durable, and adaptable across multiple learning sessions, reducing both material waste and long-term costs (UNESCO, 2017). In educational contexts with limited resources, such materials offer practical advantages by ensuring continuity of instruction without requiring constant reproduction.

In the context of EFL instruction, sustainable worksheets—such as laminated or reusable materials—enable learners to practice grammatical structures repeatedly without the constraints of disposable paper-based resources. This repeated engagement supports reinforcement and consolidation of learning, which are essential for grammar acquisition (Ellis, 2006). Moreover, sustainable materials encourage active participation and allow teachers to provide immediate feedback, fostering a more interactive learning environment.

Studies examining the pedagogical impact of sustainable materials suggest that their consistent use can positively influence learner motivation and engagement. According to Santos et al.

(2019), the integration of reusable didactic resources in basic education settings contributes to improved learning experiences and facilitates the long-term use of instructional materials by teachers. These findings support the notion that sustainability and pedagogical effectiveness are not mutually exclusive but can be mutually reinforcing.

Quantitative Approaches to Evaluating Grammar Learning

Quantitative research designs play a fundamental role in evaluating the effectiveness of instructional interventions in education. Pre-test and post-test designs are particularly useful for measuring learning gains and identifying statistically significant changes in student performance over time (Creswell & Creswell, 2018). In EFL research, such designs have been widely employed to assess the impact of teaching strategies, materials, and methodologies on language learning outcomes.

Several studies have demonstrated that quantitative analyses of grammar learning provide valuable insights into instructional effectiveness. For instance, Norris and Ortega (2000) found that form-focused instructional interventions yield measurable improvements in grammatical accuracy when assessed through controlled testing instruments. Similarly, Ellis (2017) emphasizes that empirical evidence derived from pre-test and post-test comparisons strengthens the validity of pedagogical claims and informs evidence-based decision-making in language education.

Despite the relevance of quantitative approaches, research focusing specifically on the statistical impact of sustainable worksheets on grammar learning in middle basic education remains scarce. Many studies examine digital tools or communicative strategies, while fewer investigate low-cost, sustainable materials using rigorous quantitative designs. This gap highlights the need for studies that combine pedagogical innovation with empirical measurement to support effective grammar instruction in EFL contexts.

Methodology

Participants

The participants in this study were 150 students enrolled in middle basic education at a public educational institution located in the canton of Milagro, Ecuador. The students belonged to different grade levels within the middle basic education cycle and were part of the regular English as a Foreign Language (EFL) program offered by the institution. The selection of participants was based on non-probabilistic convenience sampling, as all students enrolled in the targeted grades during the intervention period were included in the study.

The participants represented a heterogeneous group in terms of prior exposure to English; however, most students demonstrated limited grammatical knowledge at the beginning of the study, particularly at the pre-A1 level according to the Common European Framework of Reference for Languages (CEFR). Participation in the study was voluntary, and institutional authorization was obtained to conduct the intervention and collect academic data. Ethical considerations were respected throughout the research process, ensuring confidentiality and the exclusive use of data for academic purposes.

Instruments

To collect quantitative data on students' English grammar learning, several instruments were employed. The primary instrument was a grammar knowledge test, administered as both a pre-test and a post-test. The test was designed to assess students' understanding and application of basic grammatical structures aligned with the curricular objectives for middle basic education. Test items included multiple-choice questions, matching exercises, and short contextualized grammar tasks. The same instrument was used in both administrations to ensure comparability of results.

In addition to the grammar tests, a Likert-scale questionnaire was applied to measure students' levels of interest and engagement with the instructional materials. The questionnaire consisted of closed-ended statements related to students' perceptions of the learning activities and the use of sustainable worksheets. Responses were rated on a five-point Likert scale ranging from strong disagreement to strong agreement.

All instruments were reviewed by subject-matter experts in English language teaching to ensure content validity and alignment with instructional objectives. The instruments were administered in Spanish when necessary to guarantee students' comprehension of instructions and statements.

Design, Procedure, Data Analysis

This study adopted a quantitative, descriptive, pre-experimental design, using a one-group pre-test and post-test approach. The design aimed to measure changes in students' English grammar learning following the implementation of sustainable worksheets as the main instructional intervention. No control group was included, as the study focused on evaluating learning gains within a real educational context.

The independent variable of the study was the use of sustainable worksheets, while the dependent variable was students' English grammar learning, as measured by the pre-test and post-test scores. This design allowed for the identification of learning improvements attributable to the instructional intervention over the course of the study period.

The study was conducted over a period of 96 instructional hours, distributed across multiple sessions within the academic term. The procedure consisted of three main phases.

In the first phase, a diagnostic pre-test was administered to all participants to establish a baseline of their grammatical knowledge. The results of this initial assessment were analyzed to identify students' strengths and weaknesses and to guide the instructional planning.

During the second phase, the instructional intervention was implemented. Students participated in English lessons that incorporated sustainable worksheets, defined as reusable and durable instructional materials designed to facilitate repeated practice of grammatical structures. The worksheets were integrated into communicative and interactive activities following a presentation–practice–production sequence. Instruction focused on basic grammatical structures appropriate to students' cognitive and linguistic levels, and sessions encouraged active participation, peer interaction, and guided practice.

In the final phase, a post-test was administered using the same grammar assessment instrument applied at the beginning of the study. Additionally, the Likert-scale questionnaire was distributed to gather data on students' perceptions of the instructional materials and learning experience. All data were collected under standardized conditions to ensure consistency.

Data collected from the pre-test and post-test were analyzed using descriptive statistical methods. Measures such as mean scores, percentages, and score differences were calculated to identify changes in students' grammar learning before and after the intervention. Learning gains were determined by comparing pre-test and post-test results at the group level.

Responses from the Likert-scale questionnaire were analyzed using frequency distributions and percentage calculations to describe students' levels of interest and engagement with the sustainable worksheets. The quantitative results were organized into tables to facilitate interpretation and comparison.

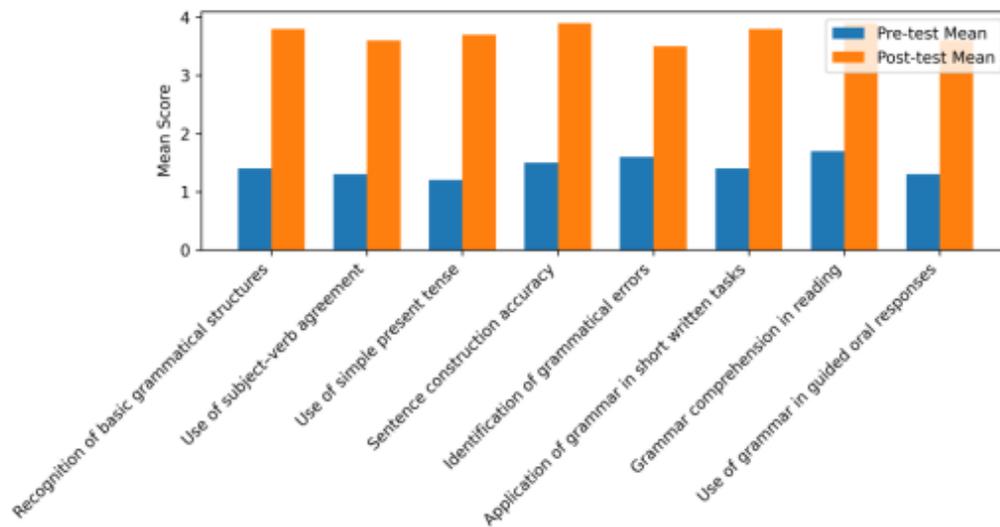
The analysis focused on identifying overall trends in grammar learning improvement and evaluating the effectiveness of sustainable worksheets as an instructional resource in middle basic education EFL contexts.

Results

Data analysis

This research was based on quantitative instruments to conduct the data analysis. The data were collected through pre-test and post-test assessments and analyzed using descriptive statistical procedures to obtain measures such as mean values. The pre- and post-test data were examined to identify variations in students' grammatical performance before and after the instructional intervention. These statistical values were summarized and represented in tables and figures, which detail the main grammar-related criteria assessed in the study and provide a visual comparison of pre-test and post-test results.

Figure 1. Pre-test and Post-test Mean Scores by Grammar Criteria



This figure presents the comparison between pre-test and post-test mean scores across the grammar-related criteria assessed in the study. The chart shows that post-test mean scores are higher than pre-test mean scores for all evaluated criteria. Pre-test mean values indicate lower initial performance in areas such as recognition of basic grammatical structures, use of subject-verb agreement, and use of the simple present tense. In contrast, post-test mean values show higher scores across criteria related to sentence construction accuracy, identification of grammatical errors, application of grammar in short written tasks, grammar comprehension in reading, and use of grammar in guided oral responses. The figure provides a visual summary of the distribution of mean scores for each criterion before and after the instructional intervention.

Discussion

The purpose of this study was to examine changes in students' English grammar performance following the implementation of an instructional intervention supported by structured and sustainable learning materials. The comparison of pre-test and post-test mean scores across all evaluated criteria indicates consistent improvements in students' grammatical knowledge and use. These findings suggest that targeted instructional support can contribute to measurable gains in grammar learning among middle basic education students.

One of the most notable patterns observed in the results is the increase in post-test mean scores across foundational grammar components, such as recognition of basic grammatical structures, subject–verb agreement, and use of the simple present tense. These components are essential for early stages of language development, particularly at the pre-A1 level, where learners require repeated exposure and guided practice to internalize grammatical forms. The observed improvements align with previous research indicating that explicit and structured grammar instruction can support learners' understanding of form and accuracy in EFL contexts.

In addition, higher post-test mean scores in criteria related to sentence construction accuracy and identification of grammatical errors suggest that students developed greater awareness of grammatical patterns and rules. This improvement may be associated with the systematic practice opportunities provided during the intervention, which allowed learners to engage with grammar not only at the recognition level but also through application and correction. Such findings are consistent with studies that emphasize the role of form-focused instruction in strengthening learners' grammatical competence.

The results also reveal gains in criteria related to the application of grammar in short written tasks and grammar comprehension in reading activities. These outcomes indicate that improvements were not limited to isolated grammar knowledge but extended to functional language use in receptive and productive skills. This supports the view that grammar instruction, when integrated into meaningful tasks, can enhance learners' ability to apply grammatical structures in context rather than treating grammar as an abstract set of rules.

Furthermore, improvements observed in the use of grammar in guided oral responses suggest progress in students' ability to transfer grammatical knowledge to controlled spoken production. Although oral grammar development is often slower and more complex than written accuracy, the increase in post-test mean scores reflects gradual development in this area, which is particularly relevant for learners at early proficiency levels.

Overall, the findings of this study contribute to the growing body of evidence supporting the effectiveness of structured grammar-focused interventions in basic education EFL settings.

While the study employed a pre-experimental design without a control group, the consistent pattern of improvement across all criteria provides empirical support for the instructional approach implemented. Future research may benefit from incorporating control groups, longer intervention periods, or inferential statistical analyses to further examine the impact of similar grammar-based instructional strategies.

Conclusions

The results of this study demonstrate an overall improvement in students' English grammar performance, as evidenced by higher post-test mean scores across all evaluated criteria. The consistent increase in scores indicates that students developed greater understanding and use of basic grammatical structures following the instructional intervention. These findings confirm the relevance of structured grammar-focused instruction in middle basic education EFL contexts.

Improvements were observed not only in grammar recognition but also in the application of grammatical rules in written, reading, and guided oral tasks. This suggests that the intervention supported the transfer of grammatical knowledge from controlled practice to functional language use. Such outcomes highlight the importance of integrating grammar instruction into meaningful and skill-based activities.

The use of quantitative pre-test and post-test assessments provided clear evidence of changes in students' grammatical performance over time. The descriptive analysis allowed for the identification of learning progress across multiple grammar-related criteria. These results contribute empirical data to the field of English language teaching in basic education, particularly in contexts with similar instructional conditions.

Recommendations

It is recommended that English teachers in middle basic education incorporate structured grammar-focused activities into their regular instructional practices. Emphasis should be placed

on repeated practice, guided application, and contextualized grammar use. This approach may support more consistent grammar development among EFL learners.

Educational institutions should promote the use of pre-test and post-test assessments to monitor students' grammatical progress. Such assessments allow teachers to identify learning gaps and adjust instructional strategies accordingly. Systematic evaluation can contribute to more informed and data-driven pedagogical decisions.

Future research is encouraged to expand upon this study by including control groups and inferential statistical analyses. Longer intervention periods could also be explored to examine sustained grammar development over time. These extensions would strengthen the generalizability and methodological rigor of future studies.

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