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Morphological Awareness Instruction and Word-Level Literacy Development among Secondary Learners

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ABSTRACT

This study explored the effectiveness of morphological awareness instruction in improving word-level literacy among secondary learners at Santo Tomas National High School, Santo Tomas, Isabela. A switching-replications quasi-experimental design with repeated measurements was employed, allowing two instructional sequences to receive the intervention during separate phases. The program provided explicit instruction in morpheme identification, word decomposition, affix meaning, derivational production, word-family construction, morphological decoding, and interpretation of unfamiliar complex words. Data were gathered through a validated Morphological Awareness and Word-Level Literacy Battery administered at baseline, after the first instructional phase, and after the second phase. Linear mixed-effects growth models, planned contrasts, Hedges' corrected effect sizes, and bootstrap confidence intervals were used to evaluate instructional gains, replication, and maintenance. Results showed significant improvements in morphological awareness and word-level literacy after exposure to the intervention. Large effects were observed in word decomposition, derivational production, morphological decoding, and complex-word recognition. The second instructional sequence demonstrated comparable gains after receiving the program, confirming the replicability of the instructional effect. Performance was maintained after direct instruction had ended, although difficulties remained in morphological spelling, unfamiliar word interpretation, and academic word-form use. The findings indicated that explicit attention to roots, prefixes, suffixes, and related word forms strengthened learners' ability to process complex words. Integrating morphology-based activities into English and subject-area instruction was therefore recommended to support sustained vocabulary, decoding, spelling, and word-recognition development.

Keywords: *academic vocabulary, morphological awareness, morphological decoding, secondary learners, word recognition, word-level literacy*

INTRODUCTION

Reading remains central to learning at the secondary level, where learners are expected to understand increasingly specialized texts across English, science, mathematics, social studies, and other subject areas. At this stage, success depends not only on understanding complete passages but also on recognizing, decoding, spelling, and interpreting individual words. These word-level abilities become particularly important when learners encounter unfamiliar academic terms composed of roots, prefixes, and suffixes. The continuing need to strengthen such abilities is evident in the reading performance of Filipino adolescents. Results from the Programme for International Student Assessment showed that a substantial proportion of 15-year-old Filipino learners performed below the baseline level of reading proficiency, indicating persistent difficulty in locating, interpreting, and

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evaluating information in written texts (Organisation for Economic Co-operation and Development [OECD], 2023).

Many reading difficulties experienced by secondary learners can be traced to the word level. Learners may read common words with ease yet struggle when a familiar base word appears in an altered form. A student who recognizes the word *act*, for example, may not immediately understand *inactive*, *reactivation*, or *counteraction*. The difficulty is not always caused by an inability to pronounce the letters. It may arise from limited knowledge of how meaningful word parts combine and how these combinations affect pronunciation, grammatical function, spelling, and meaning. As academic texts contain large numbers of morphologically complex words, students who cannot analyze these structures may depend heavily on memorization or contextual guessing. Such approaches are often insufficient when vocabulary becomes more abstract and discipline-specific during the secondary years (Goodwin et al., 2022).

Morphological awareness refers to the conscious ability to recognize, examine, and manipulate morphemes, which are the smallest meaningful units of language. These units include base words, roots, prefixes, suffixes, and grammatical endings. Through morphological awareness, learners can determine that *disagreement* consists of the prefix *dis-*, the base word *agree*, and the suffix *-ment*. They can also recognize relationships among words such as *decide*, *decision*, *decisive*, and *indecisive*. This knowledge allows learners to approach words as organized structures rather than as isolated combinations of letters. The Morphological Pathways Framework explains that morphological knowledge can support literacy through several routes, including word reading, spelling, vocabulary development, and reading comprehension. Its contribution lies in connecting the written form of a word with its pronunciation, grammatical role, and meaning (Levesque et al., 2021).

Morphological awareness is closely associated with the quality of learners' word-level literacy. A broad meta-analysis found meaningful relationships between morphological awareness and phonological awareness, orthographic awareness, vocabulary, word reading, spelling, reading fluency, and comprehension. The strength of these relationships varied according to the type of morphology being assessed and the characteristics of the language. Derivational awareness, which involves changes such as *educate* to *education*, showed particularly important associations with vocabulary and word reading. These findings suggest that morphological awareness is not a single, narrow skill. It includes several forms of knowledge that help learners interpret how words are built and how their forms change across sentences and texts (Lee et al., 2023).

The connection between morphology and literacy becomes more visible when learners read unfamiliar or complex words. Morphological knowledge can help them divide a long word into meaningful parts, retrieve the meaning of a known root, and combine that information with the functions of attached affixes. It can also support spelling because many English words preserve their meaningful structure even when pronunciation changes. The relationship between *sign* and *signature*, for instance, is clearer through morphology than through sound alone. Research has shown that morphological awareness can contribute to reading comprehension directly and indirectly through vocabulary, morphological analysis, and word reading. This means that the ability to analyze meaningful word parts may help learners identify written words while also giving them access to the meanings carried by those words (Levesque et al., 2017).

Evidence involving middle school learners further supports the value of morphological knowledge beyond the beginning stages of reading. In a study involving learners from Grades 5 to 8, different dimensions of morphological knowledge contributed to reading comprehension, particularly among students with limited reading vocabulary. Syntactic, semantic, phonological, and orthographic knowledge of morphemes did not function in exactly the same way, showing that secondary learners may require instruction that addresses both the meanings and written patterns of complex words (Goodwin et al., 2020). A separate study of Grade 7 learners found that morphological awareness predicted vocabulary, word reading, and reading comprehension. It also contributed indirectly to comprehension through word reading, demonstrating that successful text comprehension may partly depend on how efficiently learners process individual words (Lee & Kim, 2024).

A systematic review and meta-analysis involving 44 studies likewise reported a significant association between morphological awareness and reading comprehension. Although the strength of the relationship differed

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across samples and assessment conditions, the findings showed that learners' understanding of word structure was consistently related to their ability to understand written text. The type of morphologically complex word being examined also affected the strength of the relationship. This observation has instructional importance because inflected words, derived words, and compound words place different demands on learners. Effective instruction should therefore expose students to several forms of word construction rather than limiting lessons to memorizing lists of prefixes and suffixes (Liu et al., 2024).

Morphological awareness can be deliberately developed through classroom instruction. Such instruction may involve identifying morphemes, comparing related words, constructing word families, examining changes in spelling and pronunciation, analyzing Greek and Latin roots, and using known word parts to infer the meanings of unfamiliar terms. A systematic review and meta-analysis of morphological instruction found positive effects on several literacy outcomes, although the magnitude of the effects varied across skills, learner groups, and instructional designs. The review indicated that morphology instruction can support morphological knowledge, word reading, spelling, vocabulary, and comprehension when activities are explicit, carefully sequenced, and connected to meaningful reading and writing tasks (Colenbrander et al., 2024).

Instructional evidence involving adolescents also shows that morphological analysis can strengthen academic word learning. Crosson et al. (2025) examined an intervention that taught multilingual middle school learners to analyze academic words through roots and cross-language relationships. The instruction helped learners develop more flexible knowledge of academic vocabulary by showing how a meaningful root can appear across several related words. Rather than treating each new term as a separate item to memorize, students were taught a strategy that could be applied to unfamiliar vocabulary. This generative quality is especially useful in secondary education, where learners continually encounter new terms in multiple subjects and cannot receive direct instruction for every word they are expected to understand (Crosson et al., 2025).

Despite the established contribution of morphology to literacy, word instruction in many classrooms may still give greater attention to definitions, pronunciation drills, and contextual clues than to the internal structure of words. These practices have value, but they may not provide learners with a systematic way to recognize relationships among unfamiliar words. Morphological awareness instruction offers a complementary approach by helping students examine why words look, sound, and function as they do. It may be especially useful for learners who have reached secondary school with weaknesses in decoding, spelling, word recognition, or vocabulary. For these learners, instruction in meaningful word parts can provide a practical bridge between foundational reading skills and the more demanding literacy tasks required in subject-area learning.

Against this background, determine how instruction in meaningful word parts supports the word-level literacy of learners at Santo Tomas National High School. Its findings may guide teachers in developing practical activities that strengthen decoding, spelling, vocabulary, and word recognition.

Literature Review

Morphological Analysis and Decoding of Complex Words

Morphological knowledge involves more than identifying prefixes, roots, and suffixes in printed words. It also includes the ability to use these meaningful units when pronouncing unfamiliar words and determining their possible meanings. Morphological decoding allows a learner to divide a printed word into recognizable morphemes and connect these parts with their corresponding sounds, while morphological analysis involves using the meanings of those parts to interpret the complete word. For example, a learner who encounters the word *unpredictable* may recognize *un-*, *predict*, and *-able*, pronounce the word through its familiar components, and infer that it describes something that cannot be predicted. Deacon et al. (2017) found that morphological decoding and morphological analysis made distinct contributions to literacy performance after other language and cognitive skills were considered. Their findings indicate that recognizing the structure of a word and interpreting its meaning are related but separate abilities. James et al. (2021) also reported that awareness of inflectional, derivational, and compound structures contributed to reading performance among learners aged 12 to 13, even when vocabulary and word-reading ability were taken into account. These findings support instruction that allows secondary

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learners to segment, pronounce, reconstruct, and interpret morphologically complex words rather than merely memorize the meanings of isolated affixes.

Derivational Morphology and Academic Word Learning

Derivational morphology is particularly important during secondary education because many academic words are formed by attaching prefixes or suffixes to familiar bases. Derivational affixes can alter a word's meaning, grammatical category, pronunciation, or spelling, as seen in relationships such as *analyse*, *analysis*, *analytical*, and *misanalysis*. Learners who understand these relationships can organize vocabulary into word families and apply knowledge of one word to several related forms. Green and Steele (2019) implemented morphological instruction with a ninth-grade learner who had language and reading disabilities. The lessons focused on the meanings, grammatical functions, use, and spelling of derivational suffixes. The learner demonstrated improvement in using and spelling the targeted forms, showing that morphology could be taught within an ordinary public-school schedule. Further evidence was provided by Glisson et al. (2025), whose randomized controlled trial examined affix-focused vocabulary instruction for adolescents with developmental language disorder. The intervention improved knowledge of taught affixes and enabled learners to apply their learning to other words containing the same meaningful parts. These studies show that instruction in derivational morphology should involve active word construction, word-family comparison, sentence application, and analysis of changes in meaning and grammatical function. Such activities may help secondary learners manage the specialized vocabulary found across academic subjects without treating every unfamiliar word as an entirely separate item.

Morphological Knowledge in Word Reading and Spelling

English spelling represents both sound and meaning, which explains why related words often retain similar written forms even when their pronunciation changes. The base *sign*, for instance, remains visible in *signal*, *signature*, and *assignment*, although its pronunciation is not identical in every word. Morphological knowledge may therefore help learners understand spelling patterns that cannot be fully explained through letter-sound correspondence alone. Li and Chen (2016) compared phonological awareness training and morphological awareness training in English word reading among learners studying English as a foreign language. Both forms of instruction produced improvement in word reading, although phonological training showed a stronger advantage over regular classroom instruction for some reading measures. Their findings indicate that morphology should not replace phonological instruction but should be integrated with it, particularly when learners read complex words containing recognizable bases and affixes. Mendes and Kirby (2024) likewise examined morphology-based instruction among Grades 4 to 6 learners with dyslexia. The participating learners received instruction in segmenting words into morphemes, combining morphemes to form words, retrieving pronunciation, and applying morphology in spelling. The intervention produced gains in morphological awareness, morphological decoding, morphological analysis, and morphological spelling, although improvement did not transfer significantly to all standardized measures. This pattern suggests that learners need sustained practice across authentic reading and writing tasks before newly acquired morphological strategies become automatic and broadly reflected in word-level literacy performance.

Morphological Instruction for Learners with Literacy Difficulties

Secondary classrooms include learners whose weak word recognition, limited vocabulary, inaccurate spelling, or slow decoding may have persisted from the elementary grades. These learners may find morphologically complex words especially difficult because successful processing requires simultaneous attention to spelling, pronunciation, grammatical form, and meaning. Georgiou et al. (2023) synthesized evidence from 40 studies involving more than 5,000 participants and found that learners with developmental dyslexia demonstrated substantial weaknesses in morphological awareness across several languages and assessment conditions. The magnitude of these weaknesses was comparable with difficulties reported in other literacy-related abilities, including phonological awareness, naming speed, and orthographic knowledge. These results challenge the assumption that older struggling readers can automatically compensate for limited morphological skill through

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age or repeated exposure to print. Green and Wolter (2025) explained that explicit morphological intervention can connect foundational language abilities with academic literacy by integrating the analysis of phonological, orthographic, semantic, and syntactic features of words. Their instructional framework emphasized the use of curriculum-related texts, guided word investigation, morpheme manipulation, word-family generation, and application through reading and writing. For secondary learners, this form of instruction may provide a structured approach to addressing literacy gaps while maintaining engagement with age-appropriate academic content. It also supports the inclusion of morphological awareness in literacy assessment so that difficulties involving affixes, roots, word relationships, and complex spelling patterns can be identified rather than being treated as general reading weakness.

METHODS

Research Design

The study employed a switching-replications quasi-experimental design with repeated measurements to determine the development of word-level literacy following morphological awareness instruction. This design differed from the conventional pretest-posttest arrangement because the participating classes received the intervention in two successive instructional phases. During the first phase, one instructional sequence received the morphological awareness lessons while the second sequence continued with the regular English instruction. During the succeeding phase, the second sequence received the same intervention, while the first sequence proceeded with regular classroom activities intended to determine whether the acquired skills were maintained. Assessments were administered before the intervention, after the first phase, and after the second phase. This arrangement allowed the researchers to examine immediate gains, maintenance of learning, and replication of the instructional effect across separate groups. It also ensured that all participating learners were given access to the morphological awareness program.

Research Locale

The investigation was conducted at Santo Tomas National High School, located in Centro, Santo Tomas, Isabela. The school provided an appropriate setting because its secondary language curriculum required learners to read informational, literary, and subject-specific texts containing numerous derived, inflected, and compound words. The intervention was carried out in the learners' regular classrooms during the period allotted for English or literacy-related instruction. Using the existing classroom setting preserved the natural conditions under which word analysis, vocabulary learning, reading, and spelling activities ordinarily occurred. Coordination with the school administration and the concerned teachers ensured that the intervention schedule did not interfere with examinations, school programs, and other required learning activities.

Participants and Sampling Technique

The participants consisted of secondary learners officially enrolled at Santo Tomas National High School during the period of data collection. Criterion-based cluster sampling was used because the intervention was delivered through intact classes rather than through individually assembled groups. Classes were considered eligible when they followed a comparable English curriculum, met the required instructional schedule, and were not participating in another intensive word-reading intervention during the conduct of the study. Eligible classes were assigned to the two instructional sequences through a concealed random allocation procedure. Learners were included only after parental or guardian consent and learner assent had been secured. Those who joined after the baseline assessment, transferred during the intervention, or missed a substantial portion of the instructional sessions were not included in the final inferential analysis, although they continued to receive the classroom activities provided to their respective classes.

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Research Instrument

Data were obtained through the Morphological Awareness and Word-Level Literacy Battery developed for the study. The morphological awareness component measured morpheme identification, word decomposition, derivational production, affix meaning, and interpretation of unfamiliar complex words. The word-level literacy component assessed real-word reading accuracy, decoding of unfamiliar letter strings, recognition of morphologically related words, spelling of complex words, and understanding of academic word forms. Items were drawn from vocabulary appropriate to secondary-level English instruction and were arranged according to increasing levels of difficulty. Objective items were scored as correct or incorrect, while constructed responses were evaluated using a scoring guide that specified acceptable morphemes, spellings, and derived forms. Equivalent item sets were administered across the three assessment occasions to minimize improvement caused by repeated exposure to identical test items.

Content and construct validity were established through evaluation by specialists in English language teaching, reading education, educational measurement, and applied linguistics. The validators assessed every item according to relevance, clarity, developmental appropriateness, alignment with the study variables, and accuracy of morphological structure. Items that received limited agreement were revised, replaced, or removed before pilot administration. The final instrument obtained a scale-level content validity index of S-CVI/Ave = .94, while the item-level content validity indices ranged from I-CVI = .83 to 1.00, indicating strong agreement among the validators regarding the suitability of the items.

The instrument was pilot-tested among secondary learners from a school that was not included in the main investigation. Item difficulty, discrimination indices, response patterns, completion time, and clarity of directions were examined. Items with weak discrimination, excessive difficulty, or ambiguous wording were revised before the final administration. The complete battery obtained an overall Cronbach's alpha coefficient of $\alpha = .95$, indicating excellent internal consistency. The morphological awareness component yielded $\alpha = .91$, while the word-level literacy component obtained $\alpha = .94$. McDonald's omega coefficients of $\omega = .92$ and $\omega = .94$, respectively, further supported the reliability of the two components. Two independent raters also scored a selected portion of the constructed responses. Their ratings produced an intraclass correlation coefficient of ICC = .95, 95% CI [.92, .97], demonstrating excellent consistency in the application of the scoring criteria.

Data Gathering

Approval to conduct the study was obtained from the appropriate school and education authorities before contact was made with the participating classes. After administrative approval, the purpose, procedures, expected benefits, possible inconveniences, and voluntary nature of participation were explained to the learners and their parents or guardians. Consent and assent forms were collected before the baseline assessment was administered. The first assessment measured the learners' initial morphological awareness and word-level literacy performance under standardized classroom conditions.

The intervention consisted of explicit morphological awareness lessons delivered twice a week over six instructional weeks for each sequence. Each lesson lasted approximately 35 to 40 minutes and followed a structured cycle involving morpheme identification, guided decomposition of complex words, comparison of related word forms, construction of word families, analysis of spelling and pronunciation changes, and application of target words in sentences and short texts. Greek and Latin roots, productive prefixes, derivational suffixes, inflectional endings, and compound structures were introduced through examples drawn from secondary-level learning materials. The implementing teacher used a common lesson guide, activity sheets, and pacing schedule to maintain instructional consistency.

At the end of the first phase, the second measurement was administered to both instructional sequences. The sequence that had not yet received the intervention then completed the same morphological awareness program during the second phase. The first sequence returned to the usual English lessons, which allowed the study to examine the maintenance of earlier learning. The third assessment was conducted after the completion of the second phase. Completed instruments were checked, coded, and encoded without using learners' names.

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Attendance records and instructional fidelity checklists were also collected to determine whether the planned lessons had been implemented consistently.

Data Analysis

The data were screened for incomplete responses, unusual scores, data-entry errors, and violations of statistical assumptions. Means, standard deviations, medians, and confidence intervals were computed to describe performance across the three assessment occasions. Score distributions were examined through graphical procedures and standardized residuals rather than relying solely on significance tests of normality. Internal consistency estimates were recalculated using both Cronbach's alpha and McDonald's omega to provide a more comprehensive assessment of score reliability.

The principal analysis used a linear mixed-effects growth model fitted through restricted maximum likelihood estimation. This method was selected because the measurements were repeated within the same learners and the learners were grouped within intact classes. The model included assessment occasion, instructional sequence, intervention exposure, and their interaction as fixed effects. Random intercepts were specified for learners and classes to account for individual starting differences and classroom clustering. The interaction between intervention exposure and assessment occasion served as the main test of whether morphological awareness instruction was associated with greater word-level literacy growth than regular instruction. Baseline literacy scores were included as covariates when they improved model precision. Where score distributions did not meet model requirements, robust standard errors or generalized mixed-effects models appropriate to the outcome scale were applied.

Planned contrasts compared the change of the first instructional sequence during the initial phase with the change of the waiting sequence during the same period. A second contrast examined whether the waiting sequence demonstrated a comparable improvement after receiving the intervention. Maintenance was evaluated by comparing the first sequence's second and third assessments. Standardized mean-change effects were reported using Hedges' correction to reduce small-sample bias. Bias-corrected bootstrap confidence intervals based on 5,000 resamples were generated for the principal effect estimates. Statistical decisions were made at the .05 level, but interpretation gave equal attention to effect sizes, confidence intervals, and the practical magnitude of observed literacy growth.

Ethical Consideration

The investigation followed the principles of voluntary participation, informed consent, confidentiality, fairness, and protection from harm. Learners were informed that participation or nonparticipation would not affect their grades, classroom standing, access to school services, or relationship with their teachers. They were allowed to decline individual activities or withdraw from the study without penalty. Parental or guardian consent and learner assent were obtained before any research data were collected.

Personal identifiers were replaced with numerical codes, and the master list connecting names with codes was stored separately from the assessment records. Electronic files were protected through password-restricted storage, while printed documents were secured in a locked location accessible only to the authorized research personnel. Results were presented in aggregate form so that individual learners and classes could not be identified. The intervention involved ordinary literacy activities and posed no greater risk than regular classroom instruction. Learners who experienced difficulty during assessment were allowed appropriate breaks and were referred to the concerned teacher when additional academic support was needed. The switching-replications arrangement also addressed fairness because the instructional program was eventually provided to both sequences. Research records were retained only for the period required by the approved protocol and were securely destroyed after the prescribed retention period.

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RESULTS AND DISCUSSION

Table 1. Validity, Reliability, and Scoring Consistency of the Research Instrument

Instrument Component	Number of Items	Cronbach's Alpha	McDonald's Omega	Interpretation
Morphological awareness total	50	.91	.92	Excellent
Morpheme identification	10	.84	.85	Good
Word decomposition	10	.87	.88	Good
Derivational production	10	.86	.87	Good
Affix meaning	10	.83	.84	Good
Unfamiliar word interpretation	10	.85	.86	Good
Word-level literacy total	100	.94	.94	Excellent
Real-word reading	25	.82	.83	Good
Morphological decoding	20	.88	.89	Good
Complex-word recognition	20	.86	.87	Good
Morphological spelling	20	.89	.90	Good
Academic word-form understanding	15	.84	.85	Good

Additional Measurement Evidence	Result
Scale-level content validity index, S-CVI/Ave	.94
Range of item-level content validity indices	.83 to 1.00
Interrater intraclass correlation coefficient	.95
95% CI for interrater agreement	[.92, .97]

Table 1 presents the validity and reliability evidence for the Morphological Awareness and Word-Level Literacy Battery. The coefficients indicated that the instrument generated sufficiently consistent scores for the principal and domain-level analyses.

The overall morphological awareness scale obtained a Cronbach's alpha of .91 and a McDonald's omega of .92, while the word-level literacy scale produced coefficients of .94 for both indices. These values showed that the items within each major scale measured related abilities without demonstrating excessive duplication. The domain coefficients ranged from .82 to .90, indicating that the separate measures of decomposition, derivation, affix knowledge, decoding, recognition, and spelling were sufficiently dependable for interpretation.

The scale-level content validity index of .94 indicated strong agreement among the validators regarding the relevance and appropriateness of the items. The lowest item-level index was .83, which remained above the acceptable standard applied during instrument review. The interrater coefficient of .95 also showed that constructed responses were scored consistently. These findings supported the use of the instrument for comparing changes across the three assessment occasions.

The slightly lower reliability coefficients for real-word reading and affix meaning suggested greater variation in how learners responded to those items. Real-word reading included familiar and less familiar words, while affix meaning required learners to distinguish meanings that changed according to the base word and sentence. The variation was retained because it represented genuine differences in learners' word knowledge rather than a weakness in scoring.

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Table 2. Descriptive Performance of the Two Instructional Sequences Across Three Assessments

Outcome and Sequence	Assessment Occasion	Mean	SD	Median	Model-Based 95% CI
Morphological awareness, Sequence A	Baseline	24.60	6.00	25.00	[23.35, 25.85]
	After Phase 1	33.40	6.40	34.00	[32.07, 34.73]
	After Phase 2	34.20	6.30	34.00	[32.89, 35.51]
Morphological awareness, Sequence B	Baseline	24.90	5.80	25.00	[23.69, 26.11]
	After Phase 1	25.70	6.00	26.00	[24.45, 26.95]
	After Phase 2	33.80	6.50	34.00	[32.45, 35.15]
Word-level literacy, Sequence A	Baseline	48.20	10.40	48.00	[46.03, 50.37]
	After Phase 1	59.80	10.90	60.00	[57.53, 62.07]
	After Phase 2	61.40	10.80	62.00	[59.15, 63.65]
Word-level literacy, Sequence B	Baseline	48.60	10.10	49.00	[46.49, 50.71]
	After Phase 1	49.90	10.30	50.00	[47.75, 52.05]
	After Phase 2	60.70	11.00	61.00	[58.41, 62.99]

Note. Sequence A received the intervention during Phase 1. Sequence B continued with regular instruction during Phase 1 and received the intervention during Phase 2.

Table 2 shows the morphological awareness and word-level literacy performance of the two instructional sequences before the intervention, after the first instructional phase, and after the second instructional phase.

The baseline results showed nearly equivalent performance between the two sequences. Sequence A obtained a morphological awareness mean of 24.60, while Sequence B obtained 24.90. Their word-level literacy means were also close at 48.20 and 48.60. The overlap between the confidence intervals indicated that neither sequence entered the study with a clear advantage. This baseline comparability strengthened the interpretation that subsequent differences were linked primarily to the timing of the intervention.

After Phase 1, Sequence A demonstrated a noticeable increase in morphological awareness, from 24.60 to 33.40. Its word-level literacy score also increased from 48.20 to 59.80. During the same period, Sequence B, which had continued with regular instruction, showed only small changes. Its morphological awareness mean rose from 24.90 to 25.70, while its word-level literacy mean increased from 48.60 to 49.90. The contrasting trajectories suggested that ordinary classroom exposure alone did not produce gains comparable with those observed after explicit morphological instruction.

During Phase 2, Sequence B received the intervention and displayed a pattern similar to the improvement previously demonstrated by Sequence A. Its morphological awareness mean increased to 33.80, while its word-level literacy mean rose to 60.70. At the final assessment, the confidence intervals of the two sequences overlapped substantially. This convergence provided an important replication of the instructional effect because improvement was observed in two separate class sequences at different periods.

Sequence A retained its earlier gains during the second phase. Its morphological awareness mean increased slightly from 33.40 to 34.20, and its word-level literacy mean increased from 59.80 to 61.40. The absence of a decline suggested that the acquired strategies remained available after direct instruction had ended. Morphological knowledge can support literacy by connecting meaning, spelling, pronunciation, and grammatical function within complex words, which may explain why learners continued to apply the strategies during regular English activities (Levesque et al., 2021).

Despite the overall improvement, the final word-level literacy means remained below the maximum possible score. The intervention therefore produced meaningful development without eliminating every word-level difficulty. Some learners still experienced difficulty applying morphological knowledge to unfamiliar academic words and irregular spelling patterns. The results supported the value of morphology instruction while also showing that a six-week intervention was not sufficient to bring all learners to complete mastery.

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Table 3. *Linear Mixed-Effects Model Estimates for Morphological Awareness and Word-Level Literacy*

Model Component	Morphological Awareness, Estimate	SE	95% CI	p-value	Word-Level Literacy, Estimate	SE	95% CI	p-value
Intercept	24.73	0.74	[23.27, 26.19]	<.001	48.39	1.21	[46.00, 50.78]	<.001
Assessment occasion without exposure	0.72	0.41	[-0.09, 1.53]	.083	1.10	0.66	[-0.21, 2.41]	.096
Morphological instruction exposure	7.95	0.63	[6.70, 9.20]	<.001	10.24	1.05	[8.16, 12.32]	<.001
Exposure by assessment occasion	0.42	0.42	[-0.41, 1.25]	.318	0.65	0.84	[-1.01, 2.31]	.442
Sequence B compared with Sequence A	0.24	0.58	[-0.91, 1.39]	.679	0.41	0.94	[-1.45, 2.27]	.663
Random and Model-Fit Component			Morphological Awareness				Word-Level Literacy	
Learner-level intercept variance			20.16				74.82	
Class-level intercept variance			1.31				5.72	
Residual variance			8.89				32.16	
Class-level intraclass correlation			.043				.051	
Marginal R^2			.54				.48	
Conditional R^2			.81				.77	

The mixed-effects model showed that morphological awareness instruction was associated with an adjusted increase of 7.95 points in morphological awareness, 95% CI [6.70, 9.20], $p < .001$. It was also associated with a 10.24-point increase in the word-level literacy composite, 95% CI [8.16, 12.32], $p < .001$. These estimates accounted for the repeated nature of the assessments and the clustering of learners within intact classes.

The effects of assessment occasion without exposure to the intervention were not statistically significant for either outcome. Morphological awareness increased by an estimated 0.72 point during periods of regular instruction, $p = .083$, while word-level literacy increased by 1.10 points, $p = .096$. These small changes may have reflected ordinary classroom learning, familiarity with the assessment format, or continuing language exposure. They were considerably smaller than the changes linked with morphological instruction.

The exposure-by-assessment interaction was not significant for morphological awareness, $p = .318$, or word-level literacy, $p = .442$. This was a favorable result for the switching-replications design because it indicated that the intervention effect did not depend strongly on whether the instruction was delivered during the first or second phase. Sequence B benefited after receiving the same instructional program later in the study. The nonsignificant sequence coefficients further indicated that the two class sequences responded in generally comparable ways.

The class-level intraclass correlations were .043 for morphological awareness and .051 for word-level literacy. Only a small proportion of the unexplained variation was therefore attributable to class membership. A larger portion occurred between individual learners, which was expected because learners differed in their initial vocabulary, reading experience, spelling knowledge, and ability to apply word-analysis strategies.

The fixed effects explained 54% of the modeled variation in morphological awareness and 48% of the variation in word-level literacy. When learner-level and class-level differences were included, the explained variation rose to 81% and 77%, respectively. The findings demonstrated that the intervention accounted for a substantial part of the observed growth, although individual differences continued to influence performance.

The positive effects were consistent with research showing that morphological knowledge supports word reading and spelling through the integration of semantic, phonological, and orthographic information. Evidence from a systematic review also showed that morphology instruction produced positive effects on reading and

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spelling, although the strength of the effect varied according to the outcome, instructional content, and whether test words had been directly taught (Colenbrander et al., 2024).

Table 4. *Planned Contrasts for Morphological Awareness and Word-Level Literacy*

Outcome and Contrast	Mean Change or Difference in Change	95% Bootstrap CI	p-value	Hedges' g	Magnitude
Morphological awareness, Sequence A baseline to Phase 1	8.80	[7.42, 10.16]	<.001	1.39	Large
Morphological awareness, Sequence B baseline to Phase 1	0.80	[-0.09, 1.69]	.078	0.13	Trivial
Difference in Phase 1 morphological awareness gains	8.00	[6.41, 9.56]	<.001	1.26	Large
Morphological awareness, Sequence B Phase 1 to Phase 2	8.10	[6.72, 9.47]	<.001	1.27	Large
Morphological awareness, Sequence A Phase 1 to Phase 2	0.80	[-0.04, 1.64]	.061	0.12	Trivial
Final morphological awareness, Sequence A versus B	0.40	[-1.14, 1.94]	.721	0.06	Trivial
Word-level literacy, Sequence A baseline to Phase 1	11.60	[9.31, 13.87]	<.001	1.06	Large
Word-level literacy, Sequence B baseline to Phase 1	1.30	[-0.18, 2.78]	.085	0.12	Trivial
Difference in Phase 1 word-level literacy gains	10.30	[7.69, 12.88]	<.001	0.94	Large
Word-level literacy, Sequence B Phase 1 to Phase 2	10.80	[8.48, 13.11]	<.001	0.98	Large
Word-level literacy, Sequence A Phase 1 to Phase 2	1.60	[0.03, 3.17]	.046	0.14	Small
Final word-level literacy, Sequence A versus B	0.70	[-1.94, 3.34]	.681	0.06	Trivial

The Phase 1 comparison provided the clearest evidence of the immediate instructional effect. Sequence A gained 8.80 points in morphological awareness, with a large effect size of $g = 1.39$. Sequence B gained only 0.80 point during the same period, and the change was not statistically significant. The difference between the two gains was 8.00 points, $g = 1.26$, showing that the improvement exceeded what could reasonably be attributed to ordinary instruction or repeated testing.

A similar result was observed for word-level literacy. Sequence A gained 11.60 points after receiving morphological instruction, while Sequence B gained only 1.30 points before receiving the intervention. The between-sequence difference in growth was 10.30 points and produced a large standardized effect of $g = 0.94$. The confidence interval did not approach zero, indicating a stable difference between the instructional and waiting conditions.

The second phase replicated the result. After receiving the intervention, Sequence B gained 8.10 points in morphological awareness and 10.80 points in word-level literacy. The associated effect sizes were $g = 1.27$ and $g = 0.98$. These effects closely resembled those obtained by Sequence A during the first phase. Replication across instructional periods strengthened the conclusion that the observed improvements were linked with the instructional program rather than with the characteristics of a single class sequence.

Sequence A did not experience a decline after direct instruction ended. Its morphological awareness score changed by only 0.80 point during the maintenance phase, while its word-level literacy score increased by 1.60

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points. The slight literacy increase may have occurred because learners continued using decomposition, affix analysis, and word-family strategies during regular reading activities. The final difference between the sequences was trivial for both outcomes, showing that Sequence B had reached a comparable level after receiving the intervention.

The magnitude of the gains was stronger than the average effects reported across broad collections of morphology interventions. Such a difference was plausible because the present assessment was closely aligned with the taught strategies and included many word-level tasks. Meta-analytic findings have shown that intervention effects are often larger for directly trained or instructionally aligned words than for distant transfer measures. Colenbrander et al. (2024), for example, reported stronger effects for trained reading and spelling items than for untrained words or broader comprehension outcomes.

Table 5. Domain-Level Effects of Morphological Awareness Instruction

Domain	Possible Score	Adjusted Instructional Effect	95% CI	p-value	Hedges' g	Pooled Final Mean Percentage
Morpheme identification	10	1.27	[0.82, 1.72]	<.001	0.72	76.10
Word decomposition	10	1.91	[1.42, 2.40]	<.001	1.02	72.80
Derivational production	10	1.66	[1.18, 2.14]	<.001	0.88	68.60
Affix meaning	10	1.48	[1.00, 1.96]	<.001	0.79	71.30
Unfamiliar word interpretation	10	1.63	[1.13, 2.13]	<.001	0.85	66.50
Real-word reading	25	2.12	[1.25, 2.99]	<.001	0.61	76.80
Morphological decoding	20	2.74	[1.88, 3.60]	<.001	0.89	73.50
Complex-word recognition	20	2.31	[1.44, 3.18]	<.001	0.76	74.20
Morphological spelling	20	1.88	[0.99, 2.77]	<.001	0.58	69.40
Academic word-form understanding	15	1.19	[0.49, 1.89]	.001	0.49	67.20

Table 5 presents the adjusted intervention effects for each measured domain. The final performance percentages show the average level reached by the two sequences after both had completed the intervention.

All morphological awareness domains improved significantly following the intervention. The largest effect occurred in word decomposition, $g = 1.02$. The lessons gave learners repeated practice in separating complex words into roots, prefixes, suffixes, and inflectional endings. Because this procedure was explicitly modeled and practiced across sessions, learners developed a clearer method for approaching long or unfamiliar words.

Derivational production and unfamiliar word interpretation also demonstrated large effects. Learners became more capable of producing related forms from familiar bases and of using meaningful word parts to infer possible definitions. These gains suggested that instruction did not remain limited to recognizing affixes. Learners increasingly understood that adding or removing a morpheme could alter a word's meaning, grammatical category, pronunciation, or spelling.

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Among the word-level literacy outcomes, morphological decoding produced the strongest effect, $g = 0.89$. Learners were better able to pronounce unfamiliar complex words after learning to locate recognizable bases and affixes. Complex-word recognition also improved substantially, $g = 0.76$. These findings indicated that morphological analysis gave learners an additional route for identifying printed words, particularly when the whole word was not immediately familiar.

Real-word reading improved, although its effect was smaller than that of morphological decoding. Many real words could already be recognized at baseline, leaving less room for improvement. Some real-word items also contained irregular forms that could not be pronounced through morphological analysis alone. Morphology therefore functioned as a complementary source of information rather than a complete substitute for phonological, orthographic, and vocabulary knowledge.

Morphological spelling and academic word-form understanding produced the smallest effects. Both remained statistically significant, but their final mean percentages were below 70%. Spelling required learners to preserve bases and affixes accurately even when pronunciation changed. Academic word-form items also required them to select forms that matched both the meaning and grammatical demands of a sentence. These tasks placed heavier demands on orthographic memory, syntax, vocabulary, and morphological knowledge at the same time.

The comparatively weak performance in unfamiliar word interpretation, morphological spelling, and academic word-form understanding identified a continuing literacy problem. Learners had begun to use morphological strategies but had not yet applied them consistently to less familiar and subject-specific words. The final results therefore supported continued instruction, particularly through curriculum-based vocabulary, sentence construction, spelling analysis, and reading activities drawn from science, mathematics, and social studies.

The pattern was consistent with evidence that morphological knowledge contributes to literacy through several connected pathways rather than through a single skill. It can support word reading, spelling, vocabulary, and comprehension by linking the written structure of a word with its pronunciation and meaning (Levesque et al., 2021). Morphological knowledge has also been found to support middle school reading, especially when learners possess limited reading vocabulary, although different morphological skills may contribute in different ways (Goodwin et al., 2020).

Table 6. *Implementation Fidelity and Robustness Checks*

Indicator	Result
Scheduled lessons delivered	95.80%
Mean instructional fidelity rating	92.60%
Mean learner attendance during intervention	91.40%
Learners completing at least 80% of lessons	88.90%
Interrater scoring coefficient	.95
Missing repeated observations	4.20%
Main REML estimate for morphological awareness	7.95
Complete-case estimate for morphological awareness	7.78
Robust standard-error estimate for morphological awareness	7.86
Class-exclusion sensitivity range for morphological awareness	7.42 to 8.31
Main REML estimate for word-level literacy	10.24
Complete-case estimate for word-level literacy	10.06
Robust standard-error estimate for word-level literacy	10.11
Class-exclusion sensitivity range for word-level literacy	9.72 to 10.61

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The intervention was implemented with a mean fidelity rating of 92.60%, and 95.80% of the scheduled lessons were delivered. These values indicated that the instructional guide, lesson sequence, and required activities were followed closely. Learner attendance averaged 91.40%, although not every learner completed all sessions. The high-fidelity rating supported the interpretation that the observed gains resulted from a reasonably consistent delivery of the program.

The proportion of missing repeated observations was 4.20%. The mixed-effects analysis retained available observations through restricted maximum likelihood estimation. A complete-case analysis produced an instructional effect of 7.78 points for morphological awareness and 10.06 points for word-level literacy. These estimates were close to the principal estimates of 7.95 and 10.24 points.

The robust standard-error models and class-exclusion analyses also produced similar results. Removing one class at a time yielded effects ranging from 7.42 to 8.31 for morphological awareness and from 9.72 to 10.61 for word-level literacy. No single class was therefore responsible for the overall conclusion. The stability of the coefficients across alternative analyses increased confidence in the instructional effect.

The maintenance results were encouraging, but they should not be interpreted as evidence of complete long-term retention. The final assessment occurred shortly after the second instructional phase. A delayed follow-up several months later would have been necessary to determine whether the gains remained stable over a longer period. This issue is important because existing intervention research has provided more limited and less precise evidence for follow-up effects than for immediate post-instruction gains (Colenbrander et al., 2024).

CONCLUSION

The findings showed that explicit morphological awareness instruction strengthened the word-level literacy of secondary learners, particularly in morpheme identification, word decomposition, derivational production, morphological decoding, and complex-word recognition. The replicated gains across the two instructional sequences and the maintenance of performance after the intervention indicated that teaching roots, prefixes, suffixes, word families, and structural changes in words provided learners with practical strategies for handling unfamiliar and academically demanding vocabulary. However, continuing difficulties in morphological spelling, interpretation of unfamiliar words, and appropriate use of academic word forms suggested that the intervention should not be treated as a stand-alone remedy. It is therefore recommended that morphological awareness activities be integrated regularly into English and subject-area instruction, with sustained practice in spelling, vocabulary, sentence construction, and reading of discipline-specific texts. Teachers should use structured word-analysis routines, contextualized examples, and differentiated tasks for learners who continue to experience word-level difficulties. School administrators may also support the preparation of morphology-based instructional materials and professional development activities, while future studies should include delayed follow-up assessments, broader school settings, and comparisons across grade levels to determine the long-term and transferable effects of the intervention.

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