

Assessing the Efficacy of Morphological Analysis Intervention (MAI) with 4th Class EAL Pupils Experiencing Language and Reading Difficulties

This study investigated the efficacy of a morphological analysis intervention (MAI) as a pedagogical approach for pupils learning English as an additional language (EAL) who were also experiencing language and reading difficulties. Participants were 4th class EAL pupils (n=12), age range 9y 7m - 11y 3m, attending a large, urban, DEIS Band 2 school. Participants, equal in terms of the number of boys and girls involved, were randomly assigned to either the intervention (n=8) or comparison condition (n=4). The intervention group received MAI over a six-week period, while the comparison group received their typical guided reading instruction. Performance gains on measures of language and literacy were compared between intervention and comparison groups to evaluate the impact of MAI. Analysis of findings suggest that MAI has a positive impact on pupils' motivation and engagement during guided reading. Although academic gains on norm-referenced assessments were not found to be statistically significant, intervention participants performed better overall on norm-referenced and researcher-designed measures of vocabulary, word-level reading accuracy, reading comprehension and spelling than comparison-group participants.

Keywords: Morphology, morphological analysis, EAL (English as an additional language), LMY (language minority youth), ELL (English language learners), affixes, root words, cognates

CHRISTINA HANNIFY is an Assistant Professor at the School of Inclusive and Special Education, Dublin City University Institute of Education, St. Patrick's Campus. MARIE RAFTERY is a former lecturer in Language/Communication and SEN, Froebel College of Education and currently, part-time lecturer in the School of Inclusive and Special Education, DCU.

Corresponding author: christina.hannify@dcu.ie

INTRODUCTION

According to Singleton, Smyth and Debaene (2009), “Ireland is probably the most dramatic example of how rapidly a society can become multicultural and plurilingual” (p. 197). The 2017 Irish census revealed 612,018 residents (twelve and a half per cent of the population) speak a language at home that is not one of the country’s two official national languages (Central Statistics Office [CSO], 2017). These societal changes are now reflected in the composition of most primary and post-primary schools. English as an additional language, the term adopted by the National Council for Curriculum and Assessment (DES, 2011, 2012), describes pupils who speak and/or are learning more than one language outside of school and for whom their knowledge of the language of the classroom, English, is, over varying timeframes, limited. On arrival at school, such pupils may present a complex profile in terms of their levels of linguistic knowledge/functioning in the different language(s) they speak, as well as in English. Data has revealed that many EAL pupils have less-successful learning experiences in key subjects such as literacy, mathematics and science than their monolingual peers (Organisation for Economic Cooperation and Development [OECD], 2006).

While most native English speakers come to the task of reading with substantial oral language skills, EAL pupils are faced with the dual challenge of learning a new language while simultaneously learning to read (Reed, 2008). Despite the cognitive advantage associated with bilingualism (Bialystok, 2009), a gap in achievement is evident between native English-speaking pupils and EAL learners (Smyth, Darmody, McGinnity, & Byrne, 2009; OECD, 2006). Within the Primary Language Curriculum (NCCA, 2015; 2018), an explicit focus on cross-curricular integration between languages promotes the use of “existing language skills and knowledge to decipher text in other languages” (p. 26), indicating a potential response to addressing linguistic diversity in the classroom.

In the mixed DEIS mainstream primary school in which this study took place, English is spoken as an additional language by approximately 95% of the pupils. In total, 56 different heritage languages are spoken in this school; 12 heritage languages appear among the 12 participants in this study.

Morphology

There are two strands to English grammar: morphology and syntax. Morphology concerns the analysis of the internal structure of words. Words are divided into major categories called ‘closed category words’ and ‘open category words.’ Closed category words include articles, prepositions, conjunctions and pronouns. Open

category words, on the other hand, include nouns, verbs, adjectives and adverbs; newly coined words and borrowings into English are included in this category. Morphology is concerned with this latter category. Open category words can be simple or complex. The branch of linguistics concerned with the application of grammatical morphemes, be those free morphemes or bound morphemes, relates to complex words. In this paper, the focus is bound morphemes, that is, those morphological markers described by Brown (1973) as semantic modulators. Bound morphemes constitute such markers as plurals and tense endings, known as inflectional morphemes. These can be used to signify person, number, case, tense, gender and voice (O’Grady, Dobrovolsky and Arnoff, 1989). Of significance also to this study are derivational affixes – prefixes and suffixes as well as compounding. The application of morphological markers can result in the formation of new words as well as in changes to word meaning. There are strict rules applying to the application of such morphological markers in terms of the position of an affix and the lexical category to which it may be applied. The application of these morphological rules whether written or oral, result in the deepening of our knowledge about root words, word stems, word categories, word formation and the influence of changes to and within word structure in terms of word stress, and syllabification. The application of morphological rules and the transformation of words and word categories forms the core of this study.

Why Morphological Analysis?

Morphological analysis requires pupils to identify and analyse units of meaning (roots and affixes) within words to support literacy endeavours. Academic texts are characterised by a significant prevalence (60-80%) of morphologically-complex words (Nagy and Anderson, 1984) with a substantial increase of such from 3rd class onwards (White, Power and White, 1989; Kieffer and Lesaux, 2008; Orosco and O’Connor, 2011). As an orthographically deep language, lack of grapheme consistency is a distinctive feature in English words, yet morphology can help to explain phonetic inconsistencies where relations between written and spoken words are less transparent (Reed, 2008). As children progress through primary school, understanding academic vocabulary is crucial for scholastic success (Nagy and Townsend, 2012) and morphological instruction provides pupils with a strategy to extrapolate meaning from unfamiliar words. For every word a child learns, Nagy and Anderson (1984) estimate “an average of one to three additional related words that should be understandable to the child”, depending on the child’s ability to utilise “morphology to induce meaning” (p. 304). Since the same morphemes recur in a large number of words (Bratlie, Brinchmann, Melby-Lervåg, and Torkildsen, 2022) morphological instruction holds potential to expand a pupil’s lexicon, while also increasing their capacity to deduce meaning

from complex words not previously encountered (Goodwin and Ahn, 2013; Nagy, Carlisle and Goodwin, 2014).

Extensive studies with typically-developing pupils have found morphological awareness to make a unique and predictive contribution to decoding, encoding and reading comprehension, over and above robust predictors, such as phonological awareness, vocabulary, and nonverbal ability (Deacon, Benere and Pasquarella, 2013; Deacon, Kieffer, and Laroche, 2014; Diamanti, Mouzaki, Ralli, Antoniou, Papaioannou and Protopapas, 2017; Kruk and Bergman, 2013; Levesque, Deacon, 2017). While morphological instruction has been shown to benefit all learners (Bowers and Kirby, 2010), extensive research indicates that targeting morphology may be especially effective for those experiencing language, literacy and learning difficulties (Goodwin and Ahn, 2010), suggesting that morphology is not only an important element of effective literacy instruction in mainstream education, but a critical component of intervention for low-achieving pupils.

Morphological Instruction for EAL learners

EAL pupils frequently encounter difficulty acquiring the nuanced knowledge and awareness of English word structure (August and Shanahan, 2010). For EAL pupils, their development of morphological awareness is heavily dependent upon explicit instruction or exposure to printed words in textbooks (Zhang and Koda, 2013). Since morphemes are the building blocks of academic words, instruction in the application of morphological analysis provides EAL learners with a strategy to infer the pronunciation, spelling and meaning of unfamiliar words. Recent studies have revealed a bilingual advantage in the domain of morphology for bilingual and trilingual children (Krenca, Hipfner-Boucher and Chen, 2020; Vender et al., 2018).

Where cross-linguistic units of meaning or cognates are present, knowledge of morphemes in one language can assist with “meaning-making” in the other (Kelley and Kohnert, 2012). Considering cognates are easier to detect in print versus oral modality, cognate awareness offers a potential scaffold for EAL learners in accessing reading material (Kelley and Kohnert, 2012) as well as a mechanism to leverage the learner’s L1 in deciphering meaning from unfamiliar English words (Garcia, 1995). Lack of knowledge transfer is a challenge for many vocabulary interventions (Elleman, Lindo, Morphy and Compton, 2009; Marulis and Neuman, 2010; Rogde, Hagen, Melby-Lervåg and Lervåg, 2019). Morphological instruction may capitalize on the metalinguistic skills of EAL learners to a larger degree than item-by-item vocabulary teaching (Bratlie et al., 2022). The generalisation power of morpheme knowledge and its potential to offer a bridge between a pupil’s

L1 and English suggest that morphological analysis offers substantial gains by comparison to traditional vocabulary interventions, compensating for EAL pupils' more limited vocabulary in the instructional language.

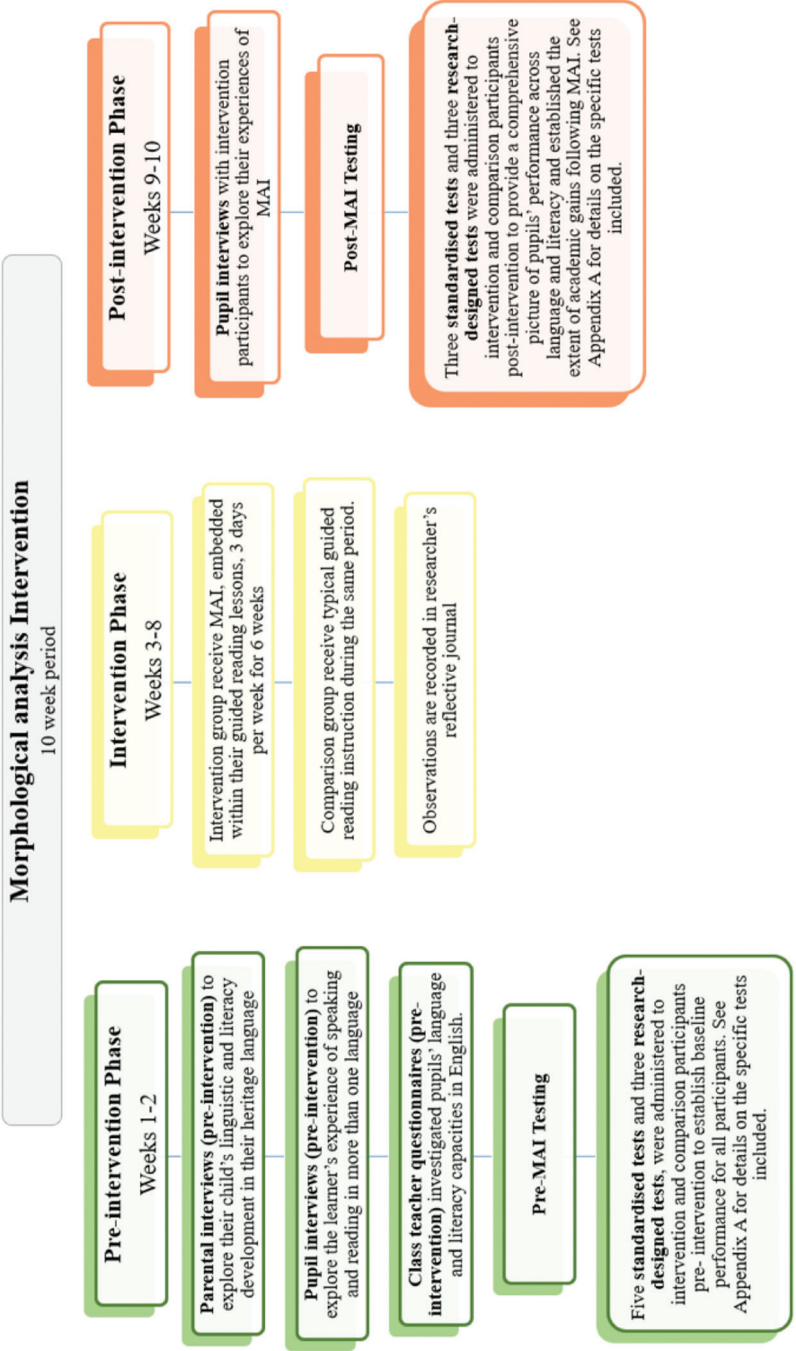
Bilingual children who have dyslexia have been shown to perform consistently better on morphological tasks than their monolingual peers who have dyslexia, and, in some cases, even better than monolingual children without reading difficulties (Vender et al., 2018). Interventions have been found to be most effective when contextualised within language and literacy-related instruction and as part of a multiple-linguistic approach (Goodwin & Ahn, 2010; Goodwin & Ahn, 2013; Reed, 2008). Considering the absence of any morphological intervention research from an Irish context, a discrepancy remains as to how morphological instruction can be integrated within the Irish Primary Curriculum as an approach to support literacy achievement in EAL pupils experiencing language and reading difficulties.

METHODOLOGY

Research Design

This research set out to investigate the impact of MAI on the academic development and motivation of 4th class EAL pupils experiencing language and reading difficulties. A mixed-method design which integrated action research was used to implement and assess the impact of MAI. Mixed-methods enabled the integration of qualitative stakeholder engagement with quantitative outcomes to inform intervention planning, implementation, evaluation and monitoring (Carr and Kemmis, 1986). Qualitative approaches facilitated the exploration of different participant perspectives (pupils and researcher-teacher), while quantitative methods provided numerical data to facilitate “triangulation, complementarity and expansion” (Johnstone, 2004, p. 264), enhancing the overall interpretation of findings (Greene, Caracelli and Graham, 1989; Sechrest and Sidana, 1995). Action research provided the appropriate vehicle to implement, evaluate and enhance the efficacy of MAI, bridging “the gap between research and practice” in relation to efficient literacy instruction for EAL learners (Somekh, 1995, p. 340). Findings were translated into directional changes, providing the means to devise sustainable improvements in guided reading practice (Stringer, 2007). An overview of the phases of the action research is provided in Figure 1.

Figure 1: The Phases of the Action Research



Participants

Given the small-scale, time-bound and predominantly qualitative nature of this study, participants were selected using homogenous purposive sampling (Patton, 1990). Selection criteria required that participants were enrolled in one of the 4th classes in the school; were learning EAL and had performed at or below the 12th percentile in their most recent Drumcondra Primary Reading Assessment – the 12th percentile was identified as the cut-off point for participant selection as this corresponds with school policy for delivering additional support to pupils. Twelve pupils were recruited and randomly assigned to either an intervention group (n=8) comprising four girls and four boys receiving MAI over a six-week period, or to a comparison group (n=4), two girls and two boys, where they received typical reading instruction. The age of participants across both groups ranged from 9y 7m - 11y 3m. While it was also initially intended to balance groups in terms of their linguistic backgrounds, the range of languages represented among participants was too diverse to achieve this goal. With twelve different heritage languages spoken among participants, participants represent a combination of bilingual and multilingual communicators. From the sample, four pupils had less than two years of English language exposure and are hence described in this study as English Language Learners (ELLs) (Goodwin, 2015). The other eight pupils had varying levels of language exposure greater than two years and are therefore described as Language Minority Youth (LMY) (Goodwin, 2015). Understanding the heterogeneity within the sample helps to interpret the differential responses of participants to MAI (Abbott and Berninger, 1993; Goodwin and Ahn, 2010; Wolter and Apel, 2010). A synopsis of the individual language profiles of the participants is presented in Appendix A, including the languages spoken at home, their level of exposure to English and their educational backgrounds.

Ethical Considerations

The research was conducted in accordance with the ethical approval obtained prior to data collection from the Faculty Ethics Review Panel of the Dublin City University Institute of Education. Following ethical approval, informed written consent was sought from the school's Board of Management and from the families of potential participating children. To address possible language difficulties, the research was explained orally and in writing for parents, who were invited to bring another person to serve as a translator. Pupil-friendly versions of plain language statements and informed assent forms were also completed by pupils. Pseudonyms were used in reporting research findings in order to protect the identities of the participants.

Pre- and post-MAI testing

The intervention and comparison group participants were administered a battery of assessments pre- and post-MAI. In total, five norm-referenced assessments

were administered to participants focusing on discrete areas of language and literacy. Baseline measures of pupils' receptive vocabulary and grammar were documented using the British Picture Vocabulary Scale- 3rd Edition (BPVS-III) and the syntactic formulations component of the Assessment of Comprehension and Expression (ACE). Parallel forms of three literacy assessments were employed at the pre- and post-testing phases in order to assess pupil progress over the course of the intervention period. The Single Word Reading Test (SWRT) and the York Assessment of Reading Comprehension (YARC) were administered individually to participants and yielded a standard measure of pupils' word-reading accuracy and reading comprehension respectively. Consistent with test manual guidelines, the Diagnostic Spelling Test (DST) was administered pre- and post-MAI to groups of four participants at a time.

Researcher-Designed Assessments

Parallel forms of three researcher-designed tests were developed for the purpose of assessing participants' progress over the course of the intervention period. These included the Transfer Words Receptive Vocabulary Test (TWRVT), Transfer Words Reading Test (TWRT) and Transfer Words Spelling Test (TWST). The researcher-designed tests focused on vocabulary, word-reading accuracy and spelling but test items were aligned to the instructional content of MAI. Based on the design of Baumann et al. (2002) Morphemic Recognition Assessment, the TWRVT examined participants' ability to infer the meaning of a word based on taught word parts, i.e. using morphological analysis. The TWRT measured participants' decoding accuracy for morphologically complex words, while the TWST assessed participants' progress in spelling transfer words, containing affixes and roots taught during MAI. The combined use of norm-referenced and researcher-designed tests provided a comprehensive picture of pupils' performance across the areas of language and literacy.

Data Analysis

Inductive thematic analysis was used to analyse qualitative data derived from interviews and reflective journal accounts (Braun and Clarke, 2006). Emergent patterns and themes were identified rather than pre-determined. Member checking of interview transcripts by participants and the involvement of an independent peer-debriefer to review and evaluate themes and codes served to optimise the rigour, validity and reliability of qualitative data (King, 2004; Mills, 2011). Quantitative data derived from questionnaires and assessments were coded and analysed using descriptive statistics in SPSS-25. An inter-rater, independent of the study, marked pre- and post-intervention tests, enhancing the validity of these results (Creswell, 2014). Confidence intervals on pre- and post-standardised assessments

were examined to determine if performance gains were statistically significant. Quantitative and qualitative methods were used separately, independently and concurrently, and results were compared to assess convergence (Robson, 2011). Triangulation of qualitative and quantitative data facilitated robust analysis of emerging themes. Corroboration between data enabled examination of data consistency, enhanced the validity of findings (Robson, 2011) and presented “more comprehensive responses to research questions” (Sugrue, 1997, p. 18).

The Intervention

MAI drew on previous research in the design of the intervention programme (Baumann, Edwards, Boland, Olejnik and Kame’enui, 2003; Goodwin, 2015; Zhang, 2016). The intervention was known to the pupils as *Word Detectives*. This took a problem-solving approach to morphological analysis and involved modelling, scaffolding and ongoing practice throughout reading activities. Active, collaborative and inquiry-based learning opportunities were provided with the view to developing generative word-structure knowledge, fostering pupil engagement and enhancing motivation to attend closely to words (Bowers and Kirby, 2010; Baumann et al., 2003; Berninger et al., 2003).

The intervention was implemented as part of guided reading lessons, three times per week, each of forty-minute duration, over a six-week period. Two intervention groups were formed with four participants in each group, which was the typical size of reading groups within the school. A group of four pupils formed the comparison group, who continued to receive typical guided reading instruction with another teacher during this period. The main difference between the intervention group and typical guided reading instruction was the inclusion of morphological instruction and morphological analysis as an additional comprehension strategy.

In line with previous research, MAI focused not only on the explicit identification of root words and affixes but also strategies to apply target affixes/root words in literacy-related activities (Carlisle, 2010; Zhang, 2016). Morphological analysis skills were developed and refined through guided reading of instructional-level texts. Development of students’ vocabulary, encoding and decoding skills and reading comprehension were the focus of these lessons. Three revision lessons were included in the intervention to allow for re-teaching, re-learning and practice of instructional content.

Tasks used for instruction in MAI

Tasks were created to teach pupils that: (a) many words can be broken into two or more meaningful parts, including a root and one or more affixes; (b) the root

carries the core meaning of the word which may be modified by the addition or removal of affixes; (c) adding suffixes may alter the pronunciation and/or spelling of the base word; (d) suffixes have the power to alter the grammatical category of the base word (e.g. sing – singer). Pupils were explicitly taught the phonological, orthographic and semantic features of target affixes and roots in order to build and deepen their morphophonemic knowledge. Pupils were taught to apply morphological problem solving when decoding words in isolation and also in the context of instructional level texts. Specific learning activities included breaking words apart, building words from morphemes, linking morphemic meanings to connected instructional level texts as part of guided reading, and examining how morphologically complex words are manipulated to fit into academic phrases as tools to convey meaning. Appendix B provides an outline of the structure of MAI lessons and Appendix C provides an overview of the specific roots and affixes taught throughout the intervention.

The intervention drew on colourful and fun activities, games and teaching approaches designed to reinforce learning and enhance pupil engagement. A vocabulary notebook was maintained by pupils to record the intervention affixes and roots taught. A colour-coded system supported the identification of prefixes, suffixes and root words as well as the placement of such affixes within word structures. Pupils practised breaking up words and building words using morphemes. Additional resources included root and affix jigsaws, Lego morphemes, word webbing as well as morphological ‘Cloze’ procedures.

FINDINGS AND DISCUSSION

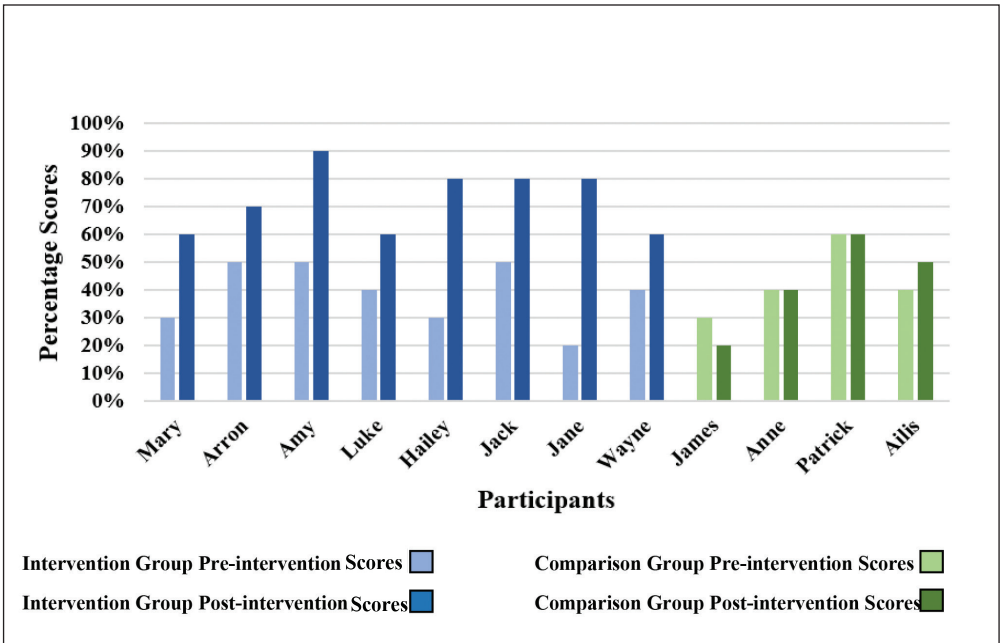
Overview of Findings

Quantitative and qualitative data derived from pre- and post-MAI testing revealed that the intervention group performed better overall on standardised and researcher-designed measures of vocabulary, word-level reading accuracy, reading comprehension and spelling, although academic gains on standardised measures were not found to be statistically significant. As expected, performance gains for intervention participants were greatest on researcher-designed measures which were more closely aligned to the instructional focus of the intervention. Quantitative and qualitative findings are discussed concurrently in terms of the impact of MAI on participants’ vocabulary, word level reading accuracy, reading comprehension, spelling, and motivation and engagement.

Vocabulary

Although the language levels of both groups were closely matched on baseline assessments, considerable gains for the intervention group on TWRVT (Figure 2) are consistent with the literature which highlights the contribution of morphological awareness to vocabulary knowledge (Anglin, 1993; Baumann et al, 2002; Baumann et al, 2003; Carlisle and Fleming, 2003; Nagy, Berninger and Abbott, 2006). The potential of MAI to alter the rate of pupils’ vocabulary acquisition relates to the morphological generalisation hypothesis (Wysocki and Jenkins, 1987) in which learners “draw upon knowledge of familiar words to aid them in deriving the meaning of an unfamiliar but related word” (p. 69). As suggested by Pacheco and Goodwin (2013), instruction in root words and affixes may reduce the word learning demands for these pupils by teaching them to consider the semantic information contained within morphemes instead of that contained within a whole word. The problem-solving approach reinforced through MAI may have facilitated deeper processing of language, strengthening pupils’ lexical representations of new vocabulary.

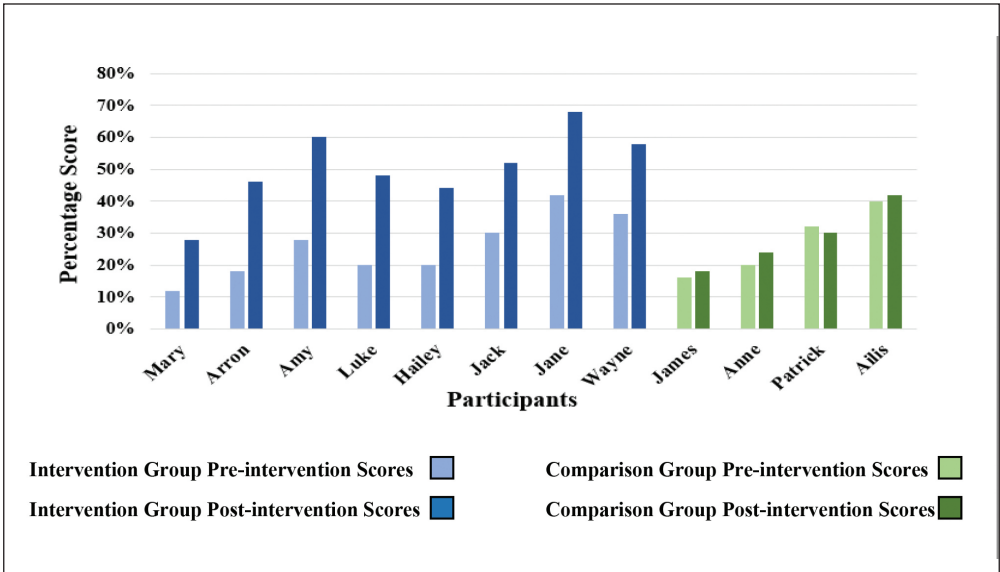
Figure 2: Transfer Words Receptive Vocabulary Test (TWRVT) Pre-test and Post-test Scores for Intervention and Comparison Groups



Word Reading Accuracy

It is likely that increased knowledge of the orthographic and phonological patterns of affixes combined with enhanced morphological analysis skills facilitated the performance gains on measures of word-reading accuracy for intervention participants (Figure 3). Processing of morphemes over letter-by-letter decoding allows words to be recognised more efficiently (Carlisle and Stone, 2005), supports more accurate pronunciation (Kirby et al., 2012) and reduces demands on working memory (Apel and Lawrence, 2011). The most sizeable gains were demonstrated by Amy, an ELL with strong literacy skills in her L1. This outcome may be attributable to the transfer of linguistic skills from her L1 (Urdu) to English. Urdu is a recipient language of English and demonstrates linguistic features including loan affixes (Saddiq, 2018), which may explain why Amy demonstrated the most substantial improvement following MAI. Previous research corroborates that many bilingual pupils possess skills in their first language that can support their reading development in English (Cheung and Slavin, 2013). In the case of EAL pupils who are introduced to English in the middle to late years of primary school, morphological instruction may leverage the linguistic skills of the pupil’s L1 and support the transfer of these skills for word reading in English.

Figure 3: Transfer Words Reading Test (TWRT): Pre- and Post-test Percentage Scores for Intervention and Comparison groups



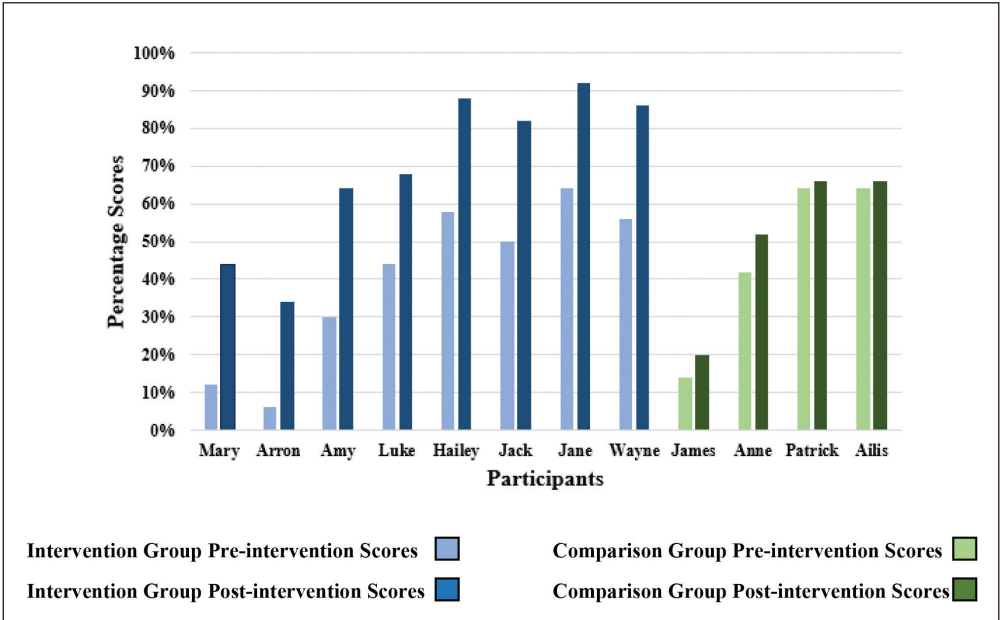
Reading Comprehension

While participants in both groups received targeted reading comprehension instruction, the additional component of morphological analysis for intervention participants may account for greater gains in reading comprehension ages for this group (Appendix D). Repeated practice in applying the morphological analysis strategy by actively reflecting on the meaning of words, may have provided an added bridge for intervention participants in evaluating the meaning of text, while heightened awareness of morphemes may have assisted in sentence parsing, subsequently leading to enhanced textual comprehension (Nagy, 2007; Zhang and Koda, 2013). This finding is consistent with previous research highlighting the critical role of morphological awareness in reading comprehension (Deacon and Kirby, 2004; Tong, Deacon, Kirby, Cain and Parrila, 2011) and substantiates that word-learning strategies such as morphological analysis constitute an essential component of a balanced reading comprehension programme (Graves, 2000).

Spelling

Intervention participants showed greater performance gains post-MAI on the TWST, which focused on transfer words containing affixes taught during the intervention (Figure 4). The multi-linguistic word-study approach adopted during MAI promoted pupils' phonological and orthographic awareness of common morphemes. Explicit instruction that spelling preserves the semantic relationships across derivationally-related words (Frisson and Sandra, 2002) further connected the various components of MAI including decoding, encoding and understanding morphologically-complex words. Performance gains in spelling for intervention participants are consistent with previous research (Birgisdottir et al. 2006; Kelman and Apel, 2004; Wolter and Dilworth, 2013) and demonstrate the value of morphological instruction in facilitating spelling success. Analysis of participants' individual test items indicated that intervention participants were more successful in using their morphological knowledge to spell words which were phonologically/orthographically regular, but less able to transfer this skill onto irregular test items which underwent phonological/orthographic changes. Analysis of test responses indicated a shift in strategy from a phonological to a morphological approach for some intervention participants. Although participants may require more extensive practice in applying spelling principles of irregular suffix endings, findings corroborate the positive impact of morphological analysis as a word study strategy to promote spelling success.

Figure 4: Transfer Words Spelling Test (TWST): Pre- and Post-test Percentage Scores for Intervention and Comparison groups



Enhanced motivation and engagement for MAI participants

Literature emphasises the importance of vocabulary instruction which develops generative interest and engagement in word study (Beck, McKeown and Kucan, 2013; NCCA, 2015; National Reading Panel, 2000). Qualitative analysis of diary entries and pupil interviews provided evidence that pupils were engaged during lessons, motivated by activities and valued morphological analysis as an effective reading strategy. In a post-intervention interview, one MAI participant reported:

I love working like a detective when I’m reading. Before em... like I would stop when there was a long word or... or if I didn’t know it, it would put me off. Now I think I can figure it out myself, if I break it up in my head or em... write it on paper and break it up that way. It’s fun if I get it right. (Jack, Post-MAI Interview)

While another, Mary, questioned

...the meaning of ‘dormant’ as in a dormant volcano. She said that she heard the word on a TV programme and knows that “addormentato” means sleepy in Italian. When questioned as to what she thinks dormant volcano might mean,

she suggested a sleepy volcano. This was not a root word which this child had come across previously. (Reflective Journal)

This demonstrates how one pupil was able to apply her morphological analysis skills to infer the meaning of a complex academic word. It further illustrates cross-linguistic transfer of skills as the pupil analogised a familiar root from her heritage language (Italian) to an English word that contained a similar root. Learning outcomes from the Primary Language Curriculum include using “existing language skills and knowledge to decipher text in other languages” (NCCA, 2015, p. 26), an outcome which was effectively achieved by the participant in question.

CONCLUSION

While this is a small-scale research study, results showed MAI to optimise learning and achievement for participants, demonstrating that multiple linguistic and literacy skills can be effectively targeted within reading lessons, without assuming additional instructional time. While word-specific instruction is common practice in classrooms, MAI endeavours to “develop pupils’ abilities to be independent word learners” (Blachowicz and Fisher 2002. p. 270). While referred to, but not elaborated on in this paper, questionnaires completed by class teachers in the school in question, evidenced the challenges faced by them in teaching reading instruction in classes with such high numbers of EAL learners. The key challenges identified by these teachers when it comes to planning and intervention include: students’ comprehension, poor word attack skills, limited knowledge of grammar, limited vocabulary and the diversity of the learners. Faced with this scenario, MAI is potentially a comprehensive and integrated approach that could address many of their concerns.

While the merits of this research have been highlighted, it is important to address its limitations. Given the small-scale, predominantly qualitative nature of this research, the potential to generalise findings beyond the present context is limited (Cohen, Manion and Morrison, 2011; Robson, 2011). Additionally, the short time frame to conduct the research did not allow for the long-term effectiveness of MAI to be assessed. While findings are specific to the local context, it was intended that this small-scale study would develop deeper understanding of the pupil sample and gain new perspectives to enhance teaching and learning with this population of children. Future replication of MAI with a larger sample, using a quantitative approach would enhance the generalisability of findings to other settings. Further research could address the issue of whether intervention effects on pupils’ language and literacy performance hold over time.

Acknowledgements

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Appendix A: Overview of Participant Profiles

Participant Pseudonym	Languages Spoken	Length of English Exposure	Educational Background	Baseline Language Assessments	Literacy Skills in the L1
Mary (I.G.)	Polish, Italian, English Multilingual	6 ½ years LMY	Has attended preschool and primary school in Ireland for 6 ½ years. Also attends Polish school at weekend.	BPVS: SS: <70, AE: 4 years 10 months ACE: SS: 3	Literacy skills in Polish & Italian.
Arnon (I.G.)	Romanian, Hungarian, English Multilingual	3 ½ years LMY	Arrived to Ireland and joined school in 1 st class. Did not attend school in Romania prior to coming to Ireland.	BPVS: SS: 70, AE: 5 years 1 month ACE: SS: 3	No literacy skills in L1
Amy (I.G.)	Urdu, English Bilingual	6 months ELL	Arrived to Ireland 6 months previous. Completed prior schooling in Pakistan.	BPVS: SS: <70, AE: 5 years ACE: SS: 3	Literacy skills in Urdu
Luke (I.G.)	Romanian, English Bilingual	4 years LMY	Arrived to Ireland 4 years previous. Completes prior schooling in Romania.	BPVS: SS: 81, AE: 7 years 9 months ACE: SS: 7	No literacy skills in L1
Hailey (I.G.)	Arabic, English Bilingual	1 ½ years ELL	Arrived to Ireland 1 ½ years previous. Completed prior schooling in Morocco.	BPVS: SS: 72, AE: 6 years 1 month ACE: SS: 7	Literacy skills in Arabic.
Jack (I.G.)	Bosnian, English Bilingual	6 ½ years LMY	Has attended preschool and primary school in Ireland for 6 ½ years.	BPVS: SS: 77, AE: 6 years 6 months ACE: SS: 6	No literacy skills in L1
Jane (I.G.)	Chinese, English Bilingual	1 ½ years ELL	Arrived to Ireland 1 ½ years previous. Completed prior schooling in China.	BPVS: SS: <70, AE: 4 years 11 months ACE: SS: 3	Literacy skills in Chinese.
Wayne (I.G.)	Swahili, English, Arabic Multilingual	5 ½ years LMY	Has attended primary school in Ireland for 6 ½ years. Attends Arabic school at weekends. Arabic is being learned as an additional language.	BPVS: SS: 70, AE: 6 years ACE: SS: 5	No literacy skills in L1
James (C.G.)	Nigerian, English Bilingual	6 ½ years LMY	Has attended preschool and primary school in Ireland for 6 ½ years.	BPVS: SS: <70, AE: 5 years 1 month ACE: SS: 3	No literacy skills in L1
Anne (C.G.)	Polish, French, English Multilingual	1 year ELL	Arrived to Ireland 1 ½ years previous. Completed prior schooling in Poland.	BPVS: SS: 71, AE: 6 years ACE: SS: 7	Literacy skills in Polish & French.
Patrick (C.G.)	Lingala, English Bilingual	6 ½ years LMY	Has attended preschool and primary school in Ireland for 6 ½ years.	BPVS: SS: 83, AE: 8 years 2 months ACE: SS: 3	No literacy skills in L1
Ailis (C.G.)	Romanian, English Bilingual	6 ½ years LMY	Has attended preschool and primary school in Ireland for 6 ½ years.	BPVS: SS: <70, AE: 5 years 11 months ACE: SS: 7	No literacy skills in L1

Intervention Group ■ Comparison Group ■

I.G.: Intervention Group

C.G.: Comparison Group

ELL: English Language Learner (n=5)

LMY: Language Minority Youth (n=7)

BPVS: British Picture Vocabulary Scale- 3rd Edition

ACE: Assessment of Comprehension and Expression 6-11: Syntactic Formulations

SS: Standardised Score

AE: Age Equivalent

Appendix B: The Structure of MAI Lessons

Structure of MAI Lesson	
Procedure	Example of an activity
1. Daily recap on previously covered affixes and roots.	Using vocabulary wall and/or flashcards, pupils identify the affix/ root, explain its meaning, provide an example and put it into a sentence.
2. Sharing learning intentions and success criteria for the lesson	WALT and WILF posters: We Are Learning To and What I'm Looking For
3. New affixes and roots are introduced	Use of posters, flipchart or vocabulary notebook
4. Morphological analysis is modelled and practised using new root/affixes	Identify the affixes and root in words. Infer the meaning of the word based on knowledge of word parts.
5. Reading integration- use of morphological analysis in combination with other reading strategies	Using purposefully selected texts at the pupils' instructional reading level
6. Collaborative activities focusing new and previously covered affixes/roots	Word sorts, word building activities, decoding practice

Appendix C: The Content of MAI Lessons

Week	Content introduced	Lesson overview
Week 1	Prefixes: mis-, pre-, re-, un- Root word: tele	Lesson 1: mis-, pre- Lesson 2: re-, un- Lesson 3: tele-
Week 2	Suffixes -able, -en, -er, -est	Lesson 1: -en, -er Lesson 2: -able, --est Lesson 3: Revision
Week 3	Prefixes: dis-, in-, non-, de- Root word: Phone	Lesson 1: dis-, in- Lesson 2: non-, de- Lesson 3: phone-
Week 4	Suffixes: -ful, -less, -ly, -y	Lesson 1: -ful, -less Lesson 2: -ly, -y Lesson 3: Revision
Week 5	Prefixes: uni-, bi-, sub-, im- Root word: cycle	Lesson 1: uni-, bi- Lesson 2: sub-, im- Lesson 3: cycle
Week 6	Suffixes: -er, -or, -ness, -able	Lesson 1: -er, -or Lesson 2: -ness, -able Lesson 3: Revision

Appendix D: YARC Reading Comprehension Ages Pre- & Post-test

Participant Pseudonym	Pretest 13/01/2020 - 17/01/2020			Posttest 09/03/2020 - 12/01/2020			Change in R.C.A.
	C.A.	R.C.A.	Difference between C.A. and R.C.A.	C.A.	R.C.A.	Difference between C.A. and R.C.A.	
Mary (I.G.)	9 years 7 months	8 years 0 months (8.00)	1 year 7 months	9 years 9 months	8 years 2 months (8.16)	1 year 7 months	+ 2 months
Arron (I.G.)	11 years 3 months	6 years 7 months (6.58)	4 years 8 months	11 years 5 months	6 years 10 months (6.83)	4 years 7 months	+ 3 months
Amy (I.G.)	9 years 10 months	8 years 5 months (8.41)	1 year 5 months	10 years 0 months	8 years 7 months (8.58)	1 year 5 months	+ 2 months
Luke (I.G.)	10 years 5 months	8 years 0 months (8.16)	2 years 5 months	10 years 7 months	8 years 2 months (8.25)	2 years 5 months	+ 2 months
Hailey (I.G.)	9 years 11 months	7 years 3 months (7.25)	2 years 8 months	10 years 1 month	7 years 8 months (7.66)	2 years 5 months	+ 5 months
Jack (I.G.)	9 years 10 months	8 years 5 months (8.41)	1 year 5 months	10 years 0 months	8 years 7 months (8.58)	1 year 5 months	+ 2 months
Jane (I.G.)	9 years 11 months	7 years 6 months (7.50)	2 years 5 months	10 years 1 month	7 years 10 months (7.83)	2 years 3 months	+ 4 months
Wayne (I.G.)	10 years 2 months	6 years 10 months (6.83)	3 years 4 months	10 years 4 months	7 years 4 months (7.33)	3 years	+ 6 months
James (C.G.)	10 years 2 months	6 years 10 months (6.83)	3 years 4 months	10 years 4 months	6 years 10 months (6.83)	3 years 6 months	+/- 0 months
Anne (C.G.)	9 years 8 month	6 years 4 months (6.33)	3 years 4 months	9 years 10 months	6 years 7 months (6.58)	3 years 3 months	+ 3 months
Patrick (C.G.)	10 years 5 months	7 years 3 months (7.25)	3 years 2 months	10 years 7 months	7 years 4 months (7.33)	3 years 3 month	+ 1 month
Ailis (C.G.)	10 years 8 months	8 years 5 months (8.41)	2 years 3 months	10 years 10 months	8 years 7 months (8.58)	2 years 3 months	+ 2 months

Intervention Group ■
 I.G.: Intervention Group
 C.A.: Chronological Age

Comparison Group ■
 C.G.: Comparison Group
 RCA: Reading Comprehension Age