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LOCAL GAME-BASED INSTRUCTION AND LITERACY DEVELOPMENT AMONG TANZANIAN ENGLISH LEARNERS: A PRE-POST CORRELATIONAL STUDY

ІГРОВЕ НАВЧАННЯ ТА ФОРМУВАННЯ ГРАМОТНОСТІ
СЕРЕД УЧНІВ ТАНЗАНІЇ, ЯКІ ВИВЧАЮТЬ АНГЛІЙСЬКУ МОВУ:
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ABSTRACT

Purpose. This study examined the relationships between reading and writing skills and the predictive role of reading subskills in writing performance before and after a local games-based literacy intervention. The study focused on primary school pupils with low baseline literacy levels and adopted a post-method pedagogical perspective.

Methodology. A quasi-experimental pre-test–post-test design involving two experimental schools and one control school was employed in the study. Pupils utilised a local games-based English instructions for five-months. Pre- and post-test data were analysed with Pearson correlations and multiple regression to examine reading–writing relationships and predictors of writing performance.

Results. Prior to the intervention, reading and writing skills were highly interdependent across multiple subskills. After the intervention, a distinguished transformation emerged. The correlations between reading and writing measures weakened, while relationships within the writing domain strengthened. Moreover, the reading comprehension emerged as the sole significant predictor of all writing outcomes, with the variance explained by reading subskills decreasing substantially for letter writing (from 63.1% to 19.9%) and word writing (from 47.5% to 12.7%). In contrast, text writing remained strongly associated with reading comprehension.

Conclusions. Local games-based instruction enhanced autonomy in foundational writing skills while maintaining the role of comprehension in complex tasks. The study supports culturally responsive, game-based pedagogies, aligned with post-method principles, as a way to transform reading–writing relationships in resource-limited contexts.

Keywords: early literacy, game-based instruction, literacy intervention, reading–writing relationship, writing and writing skills.

Мета. Це дослідження вивчало взаємозв'язок між навичками читання та письма та прогностичну роль навичок читання в успішності письма до та після ігрового навчання з розвитку грамотності. Дослідження було зосереджено на учнях початкової школи з низьким базовим рівнем грамотності та застосувало пост-методологічну педагогічну перспективу.

Методологія. У дослідженні було використано квазіекспериментальний дизайн «до-після» тестування, що охоплював дві експериментальні школи та одну контрольну школу. Учні використовували ігрові завдання з англійської мови протягом п'яти місяців. Дані до- та після тестування були проаналізовані за допомогою кореляції Пірсона та множинної регресії для вивчення взаємозв'язків між читанням та письмом, а також умов успішності письма.

Результати. До експерименту навички читання та письма були дуже взаємозалежними між собою. Після експерименту відбулася помітна трансформація. Кореляція між показниками читання та письма послабилася, тоді як зв'язки в галузі письма зміцнилися. Більше того, розуміння прочитаного тексту виявилось єдиною значущою умовою усіх результатів письма, причому дисперсія, пояснена суттєвим зниженням навичок читання, виявилася для письма буквами (з 63,1% до 19,9%) та письма словами (з 47,5% до 12,7%). Натомість, написання тексту залишалося тісно пов'язаним з розумінням прочитаного тексту.

Висновки. Навчання на основі локальних ігор покращило автономність базових навичок письма, зберігаючи при цьому роль розуміння прочитаного тексту у складних завданнях. Дослідження підтримує культурно адаптовану педагогіку, засновану на іграх, що відповідає принципам пост-методології як способу трансформації взаємозв'язків між читанням та письмом у контекстах обмежених ресурсів.

Ключові слова: взаємозв'язок між читанням та письмом, навчання на основі ігор, експеримент з формування грамотності, рання грамотність, письмо та навички письма.

INTRODUCTION

Reading and writing are fundamentally interconnected literacy skills. They draw upon a common pool of cognitive and linguistic resources. Reading and writing form a bidirectional relationship in which each skill supports the development of the other (Kim et al., 2018; Kim & Zagata, 2024). Historically, reading and writing skills were often treated as separate domains in literacy instruction. The current research suggests that reading and writing are built upon largely shared systems, including working memory, attention, and foundational oral language skills such as vocabulary and grammatical knowledge (Kim & Zagata, 2024). The Interactive Dynamic Literacy Model further explains that reading and writing co-develop and influence one another over time.

Empirical evidence shows that the reading–writing relationship operates at both lexical and discourse levels (Graham & Hebert, 2010; Shanahan, 2016). It is strongest at the lexical level, such as word reading and spelling, but also extends to discourse, where reading comprehension and written composition predict each other longitudinally (Fitzgerald & Shanahan, 2000; Graham et al., 2017). Writing enhances comprehension by requiring learners to synthesise and articulate ideas, while reading exposure helps internalise sentence structures and organisational patterns (Krashen, 2004; Nagy & Anderson, 1984). These findings support integrated instruction rather than separating reading and writing development (Graham & Hebert, 2010).

The reading–writing relationship is dynamic, influenced by instructional approaches, learners' language proficiency, and the literacy environment (Graham et al., 2017; Kim & Zagata, 2024). Integrated instruction enhances this reciprocity, enabling learners to transfer knowledge between reading and writing more effectively than isolated teaching (Kim & Graham, 2022; Graham et al., 2017). In addition, pupils with stronger oral language, richer vocabulary, and better grammatical knowledge perform reading and writing tasks more effectively (Kim & Graham, 2022). Likewise, print-rich and meaningful literacy environments provide repeated opportunities to engage with and produce texts, further reinforcing the interaction between the skills (Graham et al., 2017; Kim & Zagata, 2024). Together, these factors shape the strength of the reading–writing connection, which must be considered to support the integrated development of both skills.

In many English as a Foreign Language (EFL) context, particularly rural sub-Saharan Africa, these conditions are constrained. Learners often have limited exposure to English outside the classroom, restricting opportunities to practise reading and writing (Brock-Utne, 2015; Kim & Graham, 2022). Shortages of textbooks further limit access to reading materials, reducing opportunities to internalise vocabulary and discourse patterns (Graham & Hebert, 2010). Large class sizes and heavy workloads also restrict individualised feedback, weakening the link between reading and writing development (Graham et al., 2017). As a result, the interaction between these skills may remain underdeveloped.

Despite growing recognition of the reciprocal relationship between reading and writing, this relationship remains underdeveloped in many rural EFL contexts, including Tanzanian primary schools, due to limited exposure to English, scarcity of instructional materials, and reliance on traditional teaching approaches. Moreover, while game-based learning has shown promise in literacy development, existing research has largely focused on digital games in well-resourced settings, leaving the potential of culturally grounded local games insufficiently explored. As a result, there is limited empirical understanding of how context-sensitive, game-based pedagogies can strengthen the reading–writing relationship in resource-constrained environments.

These realities call for a fundamental shift in instructional approach. According to the post methodism perspectives, the current language teaching era which recognises that no single method can satisfy all diverse learning context, shifts the focus of teaching from “knowledge-oriented” theories to “classroom -oriented” pedagogical practices (Lusianov, 2020). Post methodism advocates for the development of context-sensitive pedagogies that emerge from and respond to the specific challenges and resources of the local environment (Kumaravadivelu, 2002). These contextual constraints highlight the need for innovative, culturally appropriate instructional approaches that simultaneously foster reading and writing skills in resource-limited EFL settings (Kim & Zagata, 2024). One promising avenue is the use of local games in literacy instruction.

Culturally grounded methods enhance learning by connecting to learners’ prior knowledge and reducing language anxiety (Ladson-Billings, 2021). Game-based learning provides a low-stakes environment for practising language through repetition, feedback, and motivation (Reinhardt, 2019). Moreover, when based on local traditions, such games become more relevant and engaging.

Local games offer a meaningful way to strengthen the reading–writing relationship in resource-limited EFL contexts. When combined with literacy tasks, they engage learners in both reading and writing, reinforcing their interaction (Graham & Hebert, 2010; Kim & Graham, 2022). Through structured play, learners develop foundational skills such as letter recognition, vocabulary, and sentence formation while remaining motivated (Krashen, 2004; Vygotsky & Cole, 1978). This aligns with the post-method principle of practicality, which views teachers as creators of context-sensitive pedagogy (Kumaravadivelu, 2006).

However, empirical evidence on game-based literacy instruction remains limited, especially in low-resource contexts. Most studies focus on digital games in well-resourced settings (Plass et al., 2015), with little attention to local games. Few studies also examine how such approaches influence the relationship between reading and writing subskills (Kim & Graham, 2022; Graham et al., 2017). This gap is particularly evident in rural EFL settings with limited English exposure and resources (Kim & Zagata, 2024). Addressing this gap is essential for developing contextually relevant pedagogy (Kumaravadivelu, 2012).

The present study addresses these gaps by examining how local game-based English instruction affects the development of, and relationship between, reading and writing subskills among Tanzanian rural primary school pupils. Reading subskills assessed included letter-sound knowledge, basic word reading, oral text reading accuracy, and reading comprehension; whereas writing subskills included letter writing accuracy, word writing accuracy, and text writing accuracy.

By investigating these interconnected skills, the study aims to elucidate how culturally grounded, game-based pedagogies can reshape the reading–writing relationship in resource-limited EFL contexts like Tanzania. In doing so, the study responds to the post method call for pedagogical innovation that emerges from and is tailored to the specific conditions of the local context, rather than relying on methods developed elsewhere (Kumaravadivelu, 2006). Two research questions guided this study:

1. What is the relationship between reading and writing subskills before and after the intervention?
2. To what extent do post reading subskills predict post-test writing performance, and in what way does local games-based instruction influence this relationship?

This study contributes to literacy research in underrepresented contexts. It provides empirical evidence from rural Tanzanian classrooms, examines literacy at the subskill level, and uses a quasi-experimental design with correlational analysis to explore both performance and relationships among skills. The findings offer insights for developing effective, context-sensitive literacy instruction in similar settings.

THEORETICAL FRAMEWORK

This study employed the theories of interactive-Compensatory Model (ICM) (Berninger et al., 2002), Socio-Cultural Theory (SCT) (Vygotsky, 1978), and Post-Method Pedagogy (PMP) (Kumaravadivelu, 2002; Kumaravadivelu, 2006). ICM explains that reading and writing share cognitive, linguistic resources and interact dynamically, with strengths be one one skill compensating the weaknesses of the other skill. On the other hand, SCT emphasises that learning occurs through social interaction and culturally meaningful activities. It positions local games as mediational tools that support collaborative and contextually relevant literacy development.

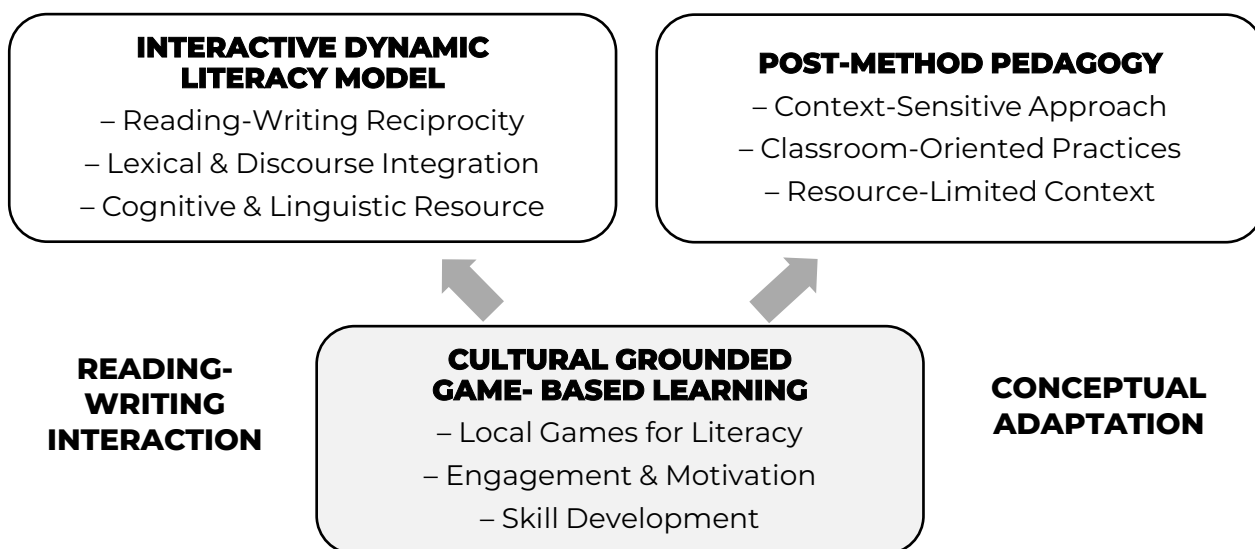
Furthermore, PMP which complements these perspectives by advocating for context-sensitive, practice-oriented instruction, and enabling teachers to integrate local games as culturally appropriate strategies in under-resourced classrooms. Together, these theories explain how game-based, socially grounded, and context-responsive instruction can enhance pupils’ reading and writing development.

CONCEPTUAL FRAMEWORK

Building on these theories, conceptual framework links local games-based English instruction (independent variable) with literacy outcomes through mediating factors such as learner engagement, motivation, and peer interaction. The dependent variables include reading sub-skills (letter recognition, word decoding, reading comprehension) and writing skills (letter, word, and text writing accuracy). The framework (see Figure 1) illustrates how culturally grounded, interactive learning enhances engagement, thereby improving literacy outcomes and reshaping reading–writing relationships.

Figure 1

Conceptual framework linking theoretical models to cultural game-based literacy instruction



METHODOLOGY

The Design and Approach

This study was part of a broader design-based research (DBR) project conducted to explore local games played by pupils, identify local games potential for enhancing learning of literacy skills, and evaluation of the impact of local games intervention in literacy learning. However, this particular study focused only on part of the project, intervention phase. A quasi-experimental pre-test/post-test design with embedded correlational analyses (Mallette & Duke, 2020) involving two experimental groups and one control group were involved in the study.

This research design addressed two aims with their corresponding research questions: (1) to examine how reading and writing subskills relate before and after the intervention? and (2) to determine to what extent does the post-test reading subskills predict post-test writing performance, and how does the local games-based instruction influence this relationship? Combining experimental manipulation with correlational analysis allowed researchers to understand not only the occurred changes but also the mechanisms underlying these changes (Stanovich & Cunningham, 2004). The quasi-experimental component establishes the intervention's effects, while the correlational component reveals whether the pattern of relationships among literacy subskills was fundamentally altered.

Participants

Many primary school pupils in Tanzania face difficulties in developing their English reading and writing abilities (Barrett et al., 2024). These issues are more severe in rural regions where educational resources are scarce. Owing to logistical and financial limitations, the current research was carried out in Chamwino District, in Dodoma Region. Carrying this study only to this area allowed for careful observation of the intervention and promoted ongoing involvement with the schools involved in the study. Chamwino District was intentionally chosen due to evidence highlighting ongoing literacy difficulties faced by pupils in rural schools (Ndijuye & Beatus, 2022).

Additionally, an initial literacy assessment carried out before the intervention fostered the selection of this area for the study. The assessment revealed a significant difficulty in English reading and writing among Standard Three pupils in the district.

The research focused on rural areas to represent the actual experiences of learning in remote educational settings. Three primary public primary schools, situated in different wards, were intentionally chosen due to their comparatively low results in the preliminary literacy assessment. The original sampling frame included 2,201 registered Standard Three pupils from the chosen schools.

The sample size for this study was computed using Cochran's formula (Cochran, 1977), $\frac{Z_{1-\alpha/2}^2 P(1-P)}{d^2}$, with parameters established at $Z = 1.96$ (which corresponds to a 95% confidence level), $p = 0.5$, and $d = 0.05$, resulting in a minimum sample size of 385 pupils. Nonetheless, because of practical limitations and the involvement of intact classes, the ultimate sample included 328 pupils from six participating schools, with one Standard Three class chosen from each institution. The preliminary assessment involved all 328 pupils.

After this stage, a sub-sample was selected for the intervention phase. Selection was carried out intentionally at the class level to maintain authentic classroom environments and reduce interruptions to normal school timetable. Three intact classes ($N = 176$ pupils) were selected for the study based on literacy performance made in the initial

assessment. The classes were categorised as school A (n = 59 pupils) and school B (n = 43 pupils) forming experimental groups, whereas school C (n = 74 pupils) acted as the control group. The intervention was conducted at the class level to minimize the possibility of contamination among groups. In addition, all subsequent analyses for this study were derived from this intervention sample (N = 176).

Intervention

The intervention programme took 20 weeks, providing pupils with two hours of teaching each week. Pupils in the experimental groups participated in organized English literacy tasks integrated into locally familiar cultural games. This study opted for this time frame to guarantee adequate exposure for significant literacy growth, as the prolonged, moderately timed interventions are more successful for fundamental skill learning than short or disjointed methods (Castles et al., 2018).

Two experimental schools (named as A and B) were involved in using local games embedded with English activities. However, one school named C, was the control school which maintained normal English instruction stipulated in the national curriculum. The intervention targeted two local games – *rede* and *ruka kamba* – chosen based on their familiarity among pupils, frequency of usage, and enjoyment levels. Both games were systematically modified to include organised English literacy tasks while maintaining their initial gameplay dynamics.

Rede is one of the cultural games typically played by two players who stand at opposite points, while the other players play within the space between them. External players play by throwing a ball towards players situated inside, while the inside players try to escape or catch the ball. When the inside players catch the ball, they throw it far away and begin filling a bottle with sand to symbolise victory, repeating the process upon the agreed number. In this study, the game structure was embedded with English language tasks. This replaced the traditional end activity of filling a bottle with sand and ensured that gameplay was systematically linked to literacy learning objectives.

Similarly, *ruka kamba* (rope skipping), involves two players who stand at opposite points swinging a rope. Other players play by jumping within the moving rope. Players who do not keep the rhythm and get hit by the rope are usually omitted from the playing round. In this research, the elimination of players who get touched by the rope was redefined as a chance to learn English literacy. Pupils hit by the rope had to perform particular English language tasks. Those who performed the English tasks successfully got chance to returning into playing, while those who failed were eliminated. This adaptation allowed continuous participation while reinforcing targeted literacy skills.

During intervention, when players of *rede* catch and throw the ball far away, and players of *ruka kamba* who truck by the rope when playing the game, were required to complete the structured English literacy activities. The performed English literacy activities at the letter level focused on identifying, pronouncing, sequencing, matching letters with images, and writing target letters. The word-level activities comprised constructing simple words from letter planks, reading words aloud, spelling words, using words in sentences, and matching words with pictures.

To help them write sentences they were required to perform activities such as copying sentences and reading on their own or in pairs or group. They were also required to do activities like matching sentences with pictures, answering questions, finding the idea and arranging pictures in order to tell a story. These activities were for enhancing the reading comprehension. All these activities were performed by pupils while playing

games. So, it was fun and interactive. The games and the English activities went together to help the learners get better at reading and writing.

This approach ensured that participation in games was consistently linked to literacy development. The activities intended to be developed were seven core skills: letter sounds, basic word reading, text oral reading accuracy, reading comprehension, and writing accuracy. Integrating literacy tasks into familiar games enhanced engagement while strengthening both foundational and advanced literacy skills.

Data Analysis

This study intended to find out what happens when pupils engage with literacy development using local games. It looked how well pupils can develop their reading and writing skills through a comprehensive quantitative analysis made using STATA. To understand how changes in the intervention happened, the study descriptively computed the means and standard deviations to both reading and writing subskill in pre-test and post-test. This provided an essential overview of developmental shifts following the intervention. Moving beyond simple gains, the study then explored how the reading and writing subskills related to one another before and after instruction. The Pearson product-moment correlation coefficients were calculated at both time points to capture the strength and direction of these relationships.

The study also performed the multiple regression analyses to uncover how reading subskills predicted the writing performance. The separate multiple regression analyses were conducted for pre-test and post-test data, with reading subskills entered simultaneously as predictors of writing outcomes. By examining changes in the variance explained (R^2) and the shifting patterns of standardized regression coefficients (β), the analysis illuminated a critical transformation that the local games-based instruction did not merely improve literacy skills but it fundamentally restructured the predictive relationships between reading and writing, revealing new pathways for how these competencies developed in tandem.

RESULTS

Descriptive Statistics

Descriptive statistics provide an overview of pupils' literacy performance before and after the intervention (Table 1). Pre-test scores were very low across all subskills, ranging from 0.29 (text writing accuracy) to 20.88 (letter sound), indicating limited literacy. After the local games-based instruction, all subskills improved, with post-test means ranging from 19.36 (reading comprehension) to 65.20 (letter sound), showing moderate variability. These results suggest the intervention effectively enhanced both foundational and higher-order literacy skills, especially in text oral reading and writing.

Table 1

Mean and Standard Deviation of Pre-Test and Post-Test Scores Across Literacy Subskills

| Literacy Subskill | Pre-Test Mean (SD) | Post-Test Mean (SD) |
|----------------------------|--------------------|---------------------|
| Letter sound | 20.88 (24.54) | 65.20 (26.65) |
| Read basic word | 14.31 (22.49) | 47.35 (29.28) |
| Text oral reading accuracy | 2.65 (9.54) | 27.45 (26.16) |
| Reading comprehension | 1.47 (4.31) | 19.36 (21.17) |
| Letter writing accuracy | 7.45 (15.71) | 62.55 (31.36) |
| Word writing accuracy | 1.37 (5.64) | 31.18 (29.39) |
| Text writing accuracy | 0.29 (2.21) | 20.78 (21.97) |

The Relationship Between Reading and Writing Subskills *Before* and *After* the Intervention

The first research question examined the relationships between literacy components (reading and writing) before and after the intervention in both control and experimental groups. Pearson correlation coefficients (Tables 2 and 3) show that foundational reading skills were linked to lower-level writing skills in the control group, while text writing developed largely independently. In the experimental groups, correlations between reading and writing subskills were positive and strengthened after the intervention.

Specifically, for the control group (Table 2), pre-test correlations among reading and writing subskills were moderate. Letter sounds were moderately associated with basic word reading ($r = 0.492$), text oral reading accuracy ($r = 0.362$), reading comprehension ($r = 0.282$), and writing skills ($r = 0.287-0.348$). Basic word reading was strongly linked to text oral reading accuracy ($r = 0.594$), reading comprehension ($r = 0.465$), and letter writing accuracy ($r = 0.492$).

Letter writing was strongly correlated with word writing ($r = 0.537$), while text writing accuracy showed weak or non-significant associations. At post-test, lower-level skills remained moderately correlated, but higher-level skills like text writing developed more independently, indicating that complex writing does not automatically improve without targeted instruction.

Table 2

Pre-test and Post-test Correlations among Reading and Writing Skills in the Control Group

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------------------|-------------------|-------------------|-------------------|--------------------|-------------------|------------------|---|
| 1. Letter Sounds | 1 | | | | | | |
| 2. Read Basic Words | 0.492 (0.303) | 1 | | | | | |
| 3. Text Oral Reading Accuracy | 0.362 (0.358) | 0.594 (0.407) | 1 | | | | |
| 4. Reading Comprehension | 0.282 (0.345) | 0.465 (0.344) | 0.242 (0.449) | 1 | | | |
| 5. Letter Writing Accuracy | 0.287 (0.144) | 0.492 (0.254) | 0.301 (0.352) | 0.264 (0.258) | 1 | | |
| 6. Word Writing Accuracy | 0.348 (0.236) | 0.370 (0.331) | 0.332 (0.274) | 0.034 (0.318) | 0.537 (0.244) | 1 | |
| 7. Text Writing Accuracy | 0.003 (-0.057) | 0.050 (-0.004) | -0.114 (0.147) | -0.022 (-0.103) | 0.354 (-0.074) | 0.382 (0.124) | 1 |

Note. Values outside parentheses represent pre-test correlations; values in parentheses represent post-test correlations.

Pearson correlation coefficients were computed to examine relationships among seven literacy subskills in the experimental groups before and after the intervention. At pre-test (Table 2), all measures were significantly correlated except for associations involving text writing accuracy. The strongest correlations were between letter writing accuracy and basic word reading ($r = 0.723$) and between basic word reading and letter sounds ($r = 0.684$). Text oral reading accuracy was also strongly correlated with letter writing accuracy ($r = 0.680$) and basic word reading ($r = 0.643$). In contrast, text writing accuracy showed weak correlations with most other measures, particularly with text oral reading accuracy ($r = 0.104$) and letter writing accuracy ($r = 0.108$), indicating that text-level writing skills were relatively distinct from foundational literacy skills at the outset.

At post-test (Table 3; Figure 2), the correlation pattern shifted. The relationship between basic word reading and letter sounds strengthened ($r = 0.744$), while several previously strong correlations weakened. For instance, the correlation between letter writing accuracy and basic word reading decreased to $r = 0.357$, and the correlation between text oral reading accuracy and word writing accuracy dropped from $r = 0.632$ to $r = 0.149$. Conversely, correlations within the writing domain strengthened, particularly between word writing and text writing accuracy, which increased from $r = 0.445$ to $r = 0.646$.

The comparison of pre- and post-test correlations shows a general dissociation between reading and writing measures, alongside stronger correlations within the writing domain. The reduced cross-domain correlations, particularly between reading and writing accuracy, likely reflect the development of more specialized or automated sub-skills, while the strengthened association between word- and text-level writing indicates greater integration of these skills as pupils progressed.

Table 3

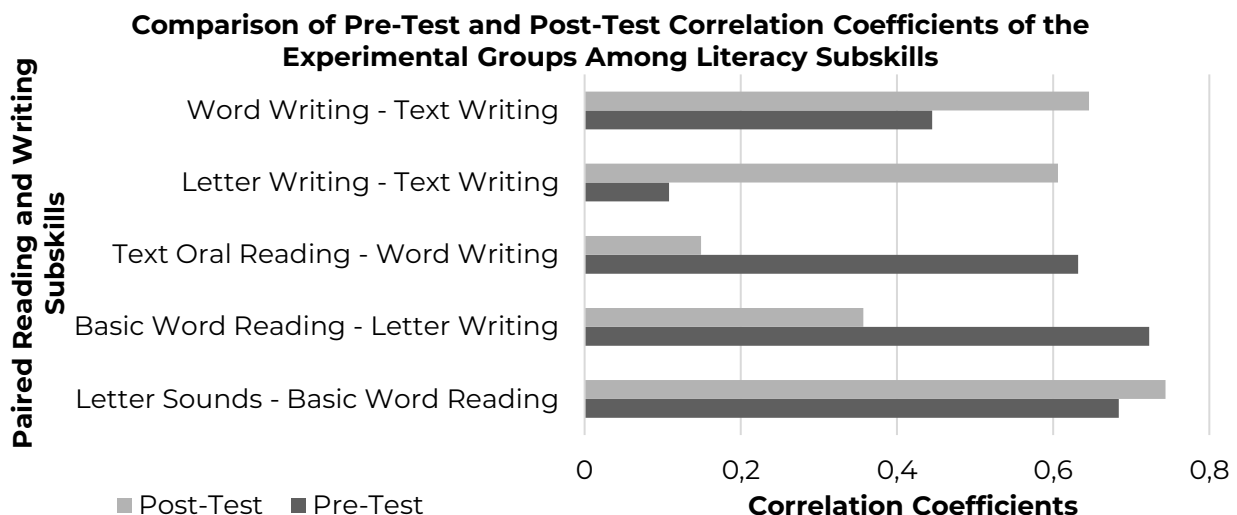
Pre-test and Post-test Correlations among Reading and Writing Skills in the Experimental Groups

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|---|
| 1. Letter Sounds | 1 | | | | | | |
| 2. Basic Word Reading | 0.684 (0.744) | 1 | | | | | |
| 3. Text Oral Reading Accuracy | 0.519 (0.604) | 0.643 (0.679) | 1 | | | | |
| 4. Reading Comprehension | 0.455 (0.480) | 0.424 (0.556) | 0.602 (0.528) | 1 | | | |
| 5. Letter Writing Accuracy | 0.476 (0.280) | 0.723 (0.357) | 0.680 (0.385) | 0.538 (0.384) | 1 | | |
| 6. Word Writing Accuracy | 0.471 (0.261) | 0.429 (0.281) | 0.632 (0.149) | 0.609 (0.304) | 0.621 (0.593) | 1 | |
| 7. Text Writing Accuracy | 0.325 (0.204) | 0.353 (0.289) | 0.104 (0.305) | 0.266 (0.432) | 0.108 (0.606) | 0.445 (0.646) | 1 |

Note. Values outside parentheses represent pre-test correlations, while values in parentheses represent post-test correlations.

Figure 2

Comparing the pre- and post-test correlation coefficients of intervention groups



Multiple linear regression analysis (Table 4) examined the influence of reading tasks – letter sounds, word reading accuracy, text oral reading accuracy, and reading comprehension – on pupils’ writing scores before and after the local games’ intervention. At pre-test, writing performance was significantly predicted by several reading subskills, particularly reading comprehension and text oral reading accuracy. Letter writing accuracy was predicted by read basic words ($B = 0.390$, 95% CI [0.257, 0.522], $p < 0.001$), text oral reading accuracy ($B = 0.448$, 95% CI [0.148, 0.747], $p = 0.004$), and reading comprehension ($B = 0.731$, 95% CI [0.158, 1.304], $p = 0.013$), while letter sounds were not significant ($B = -0.088$, 95% CI [-0.199, 0.023], $p = 0.118$).

Pre-word writing was predicted by text oral reading accuracy ($B = 0.237$, 95% CI [0.111, 0.363], $p < 0.001$) and reading comprehension ($B = 0.423$, 95% CI [0.183, 0.663], $p = 0.001$), whereas letter sounds and basic word reading were not. Pre-text writing was influenced by reading basics ($B = 0.039$, 95% CI [0.012, 0.066], $p = 0.006$), text oral reading accuracy ($B = -0.088$, 95% CI [-0.149, -0.026], $p = 0.006$), and reading comprehension ($B = 0.137$, 95% CI [0.020, 0.255], $p = 0.022$), while letter sounds remained non-significant ($B = 0.012$, 95% CI [-0.011, 0.034], $p = 0.316$). These results indicate that pre-test writing relied on multiple reading subskills, with comprehension and oral reading accuracy being particularly influential.

At post-test, reading comprehension became the sole consistent predictor across all writing outcomes. Letter writing was predicted only by reading comprehension ($B = 0.338$, 95% CI [0.005, 0.670], $p = 0.047$), with no significant contributions from letter sounds, basic word reading, or text oral reading accuracy. Similarly, word writing was predicted only by reading comprehension ($B = 0.330$, 95% CI [0.005, 0.655], $p = 0.047$), and text writing remained predicted solely by reading comprehension ($B = 0.392$, 95% CI [0.160, 0.625], $p = 0.001$).

Comparing pre- and post-test results reveals a clear shift: writing initially relied on multiple reading subskills, but following the intervention, reading comprehension emerged as the primary driver of writing improvement. This pattern highlights the central role of comprehension in supporting literacy development and suggests that local games-based instruction strengthened pupils’ comprehension skills, enabling more autonomous writing

Table 4

Post-Test Reading Predictors of Writing Performance Following Local Games intervention

| Writing Outcome | Predictor | Coefficient (β) | Std. Error (SE) | t | p-value | 95% CI (Lower – Upper) |
|---------------------------|----------------------------|-------------------------|-----------------|-------|---------|------------------------|
| Pre-letter writing | Letter sounds | -0.088 | 0.056 | -1.58 | 0.118 | -0.199 – 0.023 |
| | Read basic words | 0.39 | 0.067 | 5.84 | 0 | 0.257 – 0.522 |
| | Text oral reading accuracy | 0.448 | 0.151 | 2.96 | 0.004 | 0.148 – 0.747 |
| | Reading comprehension | 0.731 | 0.289 | 2.53 | 0.013 | 0.158 – 1.304 |
| Pre-word writing | Letter sounds | 0.04 | 0.023 | 1.69 | 0.094 | -0.007 – 0.086 |
| | Read basic words | -0.021 | 0.028 | -0.75 | 0.453 | -0.077 – 0.034 |

| Writing Outcome | Predictor | Coefficient (β) | Std. Error (SE) | t | p-value | 95% CI (Lower – Upper) |
|----------------------------|----------------------------|-----------------|-----------------|-------|---------|------------------------|
| | Text oral reading accuracy | 0.237 | 0.063 | 3.75 | 0 | 0.111 – 0.363 |
| | Reading comprehension | 0.423 | 0.121 | 3.5 | 0.001 | 0.183 – 0.663 |
| Pre-text writing | Letter sounds | 0.012 | 0.011 | 1.01 | 0.316 | -0.011 – 0.034 |
| | Read basic words | 0.039 | 0.014 | 2.84 | 0.006 | 0.012 – 0.066 |
| | Text oral reading accuracy | -0.088 | 0.031 | -2.83 | 0.006 | -0.149 – -0.026 |
| | Reading comprehension | 0.137 | 0.059 | 2.32 | 0.022 | 0.020 – 0.255 |
| Post-letter writing | Letter sounds | -0.055 | 0.164 | -0.34 | 0.736 | -0.380 – 0.270 |
| | Read basic words | 0.132 | 0.166 | 0.8 | 0.428 | -0.197 – 0.461 |
| | Text oral reading accuracy | 0.251 | 0.156 | 1.61 | 0.111 | -0.058 – 0.559 |
| | Reading comprehension | 0.338 | 0.168 | 2.01 | 0.047 | 0.005 – 0.670 |
| Post-word writing | Letter sounds | 0.131 | 0.16 | 0.82 | 0.415 | -0.187 – 0.449 |
| | Read basic words | 0.173 | 0.162 | 1.07 | 0.289 | -0.149 – 0.494 |
| | Text oral reading accuracy | -0.185 | 0.152 | -1.21 | 0.227 | -0.487 – 0.117 |
| | Reading comprehension | 0.33 | 0.164 | 2.01 | 0.047 | 0.005 – 0.655 |
| Post-text writing | Letter sounds | -0.086 | 0.115 | -0.75 | 0.457 | -0.313 – 0.142 |
| | Read basic words | 0.057 | 0.116 | 0.49 | 0.626 | -0.173 – 0.287 |
| | Text oral reading accuracy | 0.098 | 0.109 | 0.9 | 0.371 | -0.118 – 0.314 |
| | Reading comprehension | 0.392 | 0.117 | 3.34 | 0.001 | 0.160 – 0.625 |

The Change of Predictive Role of Reading Subskills on Writing Performance After Intervention

This study examined how the predictive power of reading subskills on writing outcomes shifted after a local games-based intervention (see Table 4 and Figure 3). For letter writing, reading subskills accounted for 63.1% of the variance at pre-test ($R^2 = 0.631$) but only 19.9% at post-test ($R^2 = 0.199$; $\Delta R^2 = -0.432$). For word writing, variance explained decreased from 47.5% to 12.7% ($\Delta R^2 = -0.348$). Text writing showed minimal change, with variance explained declining slightly from 21.4% to 19.9% ($\Delta R^2 = -0.015$). These findings indicate that the intervention substantially reduced reliance on reading skills for basic writing tasks while text writing continued to draw on higher-level reading proficiency,

suggesting that the approach fosters autonomy in foundational writing and supports sustained integration at more complex levels.

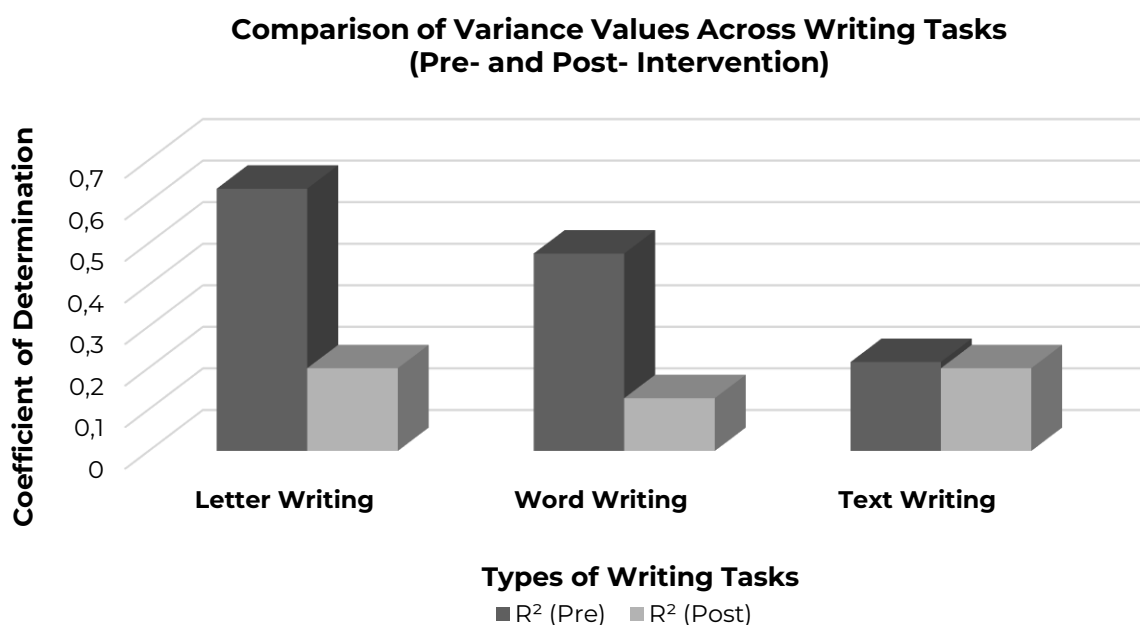
Table 4

Comparison of Pre and Post Tests' Change in Variances

| Model | R ² (Pre) | R ² (Post) | Change in Variance (ΔR ²) |
|----------------|----------------------|-----------------------|---------------------------------------|
| Letter Writing | 0.631 | 0.199 | -0.432 |
| Word Writing | 0.475 | 0.127 | -0.348 |
| Text Writing | 0.214 | 0.199 | -0.015 |

Figure 3

Comparisons of variance values to indicate the change of predictive role of reading subskills on writing performance



DISCUSSION

This study examined the relationship between reading and writing components before and after a local games-based intervention, and the extent to which post-intervention reading subskills predicted writing performance. The findings revealed that prior to the intervention, experimental groups showed strong and significant correlations across most reading and writing measures, except for text writing accuracy, which was weakly associated with other skills. The study was specifically found the existence of the strong correlations between letter writing accuracy and basic word reading ($r = 0.723$), and between basic word reading and letter sounds ($r = 0.684$).

These patterns suggest that early literacy skills share a common underlying knowledge base that include phonological and orthographic awareness (Fitzgerald & Shanahan, 2000). These findings are consistent with Interactive-Compensatory Model (ICM). The close relationship between letter-level writing and word-level reading indicates these foundational skills develop in tandem, reflecting linguistic interdependence (Cummins, 1979). However, text writing accuracy demonstrated weak correlations with other measures, suggesting that higher-level writing skills were not yet fully integrated with

lower-level transcription processes, as also explained by ICM, where higher-order processes develop more gradually.

Following the intervention, a clear shift in relationships was observed. Reading and writing became more differentiated, while relationships within the writing domain strengthened. For example, the correlation between word writing and text writing increased substantially ($r = 0.445$ to $r = 0.646$), suggesting improved integration of writing processes through automatization (Berninger et al., 2002).

In contrast, cross-domain correlations weakened, indicating an increase of specialisation (Perfetti, 2007), which aligns with ICM in explaining how skills become more autonomous over time. From a pedagogical perspective, a shift reflects a Socio-Cultural Theory (SCT), as local games provided meaningful, socially mediated learning contexts that supported internalisation of writing skills (Vygotsky, 1978). Furthermore, the findings also reflect on Post-Method Pedagogy (PMP), which emphasises on context-sensitive strategies that enhance engagement (Kumaravadivelu, 2002).

Furthermore, the regression analyses highlighted this transformation. At pre-test, multiple reading subskills significantly predicted writing performance, but after the intervention, reading comprehension emerged as the only consistent predictor, with reduced variance explained. This suggests that an increase of autonomy in writing, particularly at the transcription level, is consistent with automatization theories (Logan, 1988) and the compensatory mechanisms described in ICM. At the same time, the effectiveness of repeated, meaningful practice reflects SCT, where learning is reinforced through interaction, and PMP, where teachers adapt instruction to local contexts (Kumaravadivelu, 2006).

In the case of text writing, it showed minimal change with reading comprehension remaining a strong predictor, consistent with discourse-level models (Shanahan, 2006) and the higher-order integration explained by ICM. Overall, the findings demonstrate that local games-based instruction promotes both differentiation and integration in literacy development. This outcome is best understood through the combined lens of ICM, SCT, and PMP, which together explain how cognitively shared processes, socially mediated learning (Kwambaza, 2024), and context-responsive pedagogy interact (Omollo et al., 2024) to enhance pupils' literacy development.

CONCLUSIONS

This study demonstrates that a local games-based literacy intervention transformed the relationship between reading and writing skills among pupils with low baseline literacy levels. The findings indicate a shift from reliance on multiple reading subskills to a pattern in which reading comprehension became the main predictor of writing performance, alongside reduced cross-domain interdependence. The decline in variance explained by reading subskills in foundational writing tasks suggests increased autonomy in writing development. From a post-method perspective, this reflects the value of context-sensitive pedagogy, where instruction grounded in learners' cultural resources and developmental needs can reshape relationships between literacy skills (Kumaravadivelu, 2006).

These findings highlight the potential of culturally responsive, game-based approaches to support integrated yet differentiated literacy development in resource-limited contexts. The study supports the post-method view that effective pedagogy emerges from aligning instructional practices with learners' contextual realities rather than applying universal methods (Kumaravadivelu, 2002), and it contributes evidence for the effectiveness of locally grounded, play-based approaches to literacy instruction.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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No artificial intelligence tools were used in the preparation of this manuscript.

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