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Artículo de revisión

Using Wordwall as a tool to teach English vocabulary to young children

Usando Wordwall como una herramienta para enseñar vocabulario en inglés a niños

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Abstract: Oral health education for children with hearing disabilities faces significant communication challenges that require specialized pedagogical approaches. This study analyzed the effectiveness of educational applications in this field through a systematic review of studies published between 2015 and 2025, conducted in PubMed, Scopus, and Web of Science, comparing digital and traditional methods. The results showed a predominance of visual strategies (56%), particularly the use of sign language and the Visual Performance Reinforcement (VPR) technique, with high effectiveness ratings (4.4/5 and 4.3/5, respectively). The combination of VPR with sign language was significantly more effective ($p<0.001$) in concept acquisition. Visual methodologies were more effective in knowledge transmission, whereas monitoring strategies improved behavioral outcomes. Multimodal approaches outperformed unidimensional approaches, and the involvement of the socio-educational environment played a key role in facilitating successful learning transfer. It is concluded that educational applications should prioritize visual adaptation, behavioral reinforcement, and accessible interface design, thereby helping reduce oral health inequalities among children with hearing disabilities.

Keywords: Dental health education, educational technology, health promotion, hearing impairment.

Resumen: *La educación en salud oral en niños con discapacidad auditiva enfrenta importantes retos comunicativos que requieren enfoques pedagógicos especializados. Esta investigación analizó la eficacia de las aplicaciones educativas en este ámbito mediante una revisión sistemática (2015-2025) en PubMed, Scopus y Web of Science, comparando métodos digitales y tradicionales. Los resultados mostraron un predominio de estrategias visuales (56 %), destacando el uso del lenguaje de señas y la técnica de refuerzo del rendimiento visual (VPR), con altas valoraciones de efectividad (4.4/5 y 4.3/5, respectivamente). La combinación de VPR con lenguaje de señas resultó significativamente más eficaz ($p<0.001$) en la adquisición de conceptos. Las metodologías visuales fueron más efectivas en la transmisión de conocimientos, mientras que las estrategias de monitorización mejoraron los comportamientos. Las aproximaciones multimodales superaron a las unidimensionales, y la participación del entorno socioeducativo fue clave para una transferencia de aprendizaje exitosa. Se concluye que las aplicaciones deben priorizar la adaptación visual, el refuerzo conductual y el diseño de interfaces accesibles, contribuyendo así a reducir desigualdades en salud bucal en niños con discapacidad auditiva.*

Palabras clave: *Discapacidad auditiva, educación en salud dental, promoción de la salud, tecnología educativa.*

1. Introducción

Technology has become an increasingly relevant component of contemporary education, particularly through digital platforms that facilitate interactive learning environments and encourage student participation. In English language teaching, these resources provide opportunities to reinforce vocabulary through activities that integrate practice, feedback, and learner engagement. Among these tools, Wordwall has gained attention as a digital platform that enables teachers to create dynamic vocabulary activities adapted to different proficiency levels and classroom contexts. Recent evidence suggests that teachers perceive Wordwall as a useful platform for designing interactive vocabulary activities that promote student engagement and support the English language learning process (Arsyad, 2024; Arta et al., 2025; Situmorang & Siregar, 2025).

Vocabulary constitutes a fundamental component of second-language learning because it supports the development of receptive and productive language skills and facilitates effective communication. Nevertheless, young learners frequently experience difficulties in retaining, recognizing, and appropriately using newly acquired words. Therefore, meaningful and repeated exposure to vocabulary across different contexts is necessary to consolidate learning and promote long-term retention (Nation, 2001; Webb & Nation, 2017). From a cognitive perspective, learning is enhanced when information is organized through meaningful representations that facilitate storage and retrieval (Paivio, 1990).

Digital resources can complement conventional vocabulary instruction by providing learners with opportunities to interact with language through varied formats. Wordwall enables teachers to design or adapt activities such as matching exercises, quizzes, word searches, puzzles, and other game-based tasks. These features provide repeated opportunities for vocabulary practice while incorporating interactive elements that may enhance learner engagement. The use of digital games in language learning has been associated with alternative ways of experiencing and interacting with linguistic content, transforming learning activities into more participatory and meaningful experiences (Reinhardt & Thorne, 2016). Consequently, Wordwall activities may support vocabulary practice and promote student participation through sustained interaction with target words (Arta et al., 2025; Pradini & Adnyayanti, 2022; Situmorang & Siregar, 2025).

The educational potential of these activities can also be explained by principles associated with cognitive and multimedia learning. Learning materials that combine verbal and visual information can strengthen mental representations and facilitate the retrieval of previously acquired knowledge (Paivio, 1990; Mayer, 2009). Similarly, multimedia-based activities can support learning when information is presented through complementary formats that facilitate understanding without increasing cognitive load. Therefore, instructional activities should avoid unnecessary cognitive demands, particularly among young learners, because excessive or poorly structured tasks may interfere with working-memory processes (Sweller, 1998; Wang & Cai, 2021).

Gamification represents another relevant characteristic of Wordwall, as game-related elements can encourage participation, provide feedback, and enhance learner engagement during instructional activities. Features such as scores, time limits, competition, and immediate results may contribute to more interactive learning experiences when they are appropriately aligned with pedagogical objectives (Deterding et al., 2011). The relationship between motivation and instructional design can also be interpreted through Keller's ARCS model, which emphasizes that effective learning environments should promote attention, relevance, confidence, and satisfaction to maintain learner motivation (Keller, 2010). Previous research has consequently associated Wordwall-based activities with

improvements in vocabulary practice, learner motivation, participation, and classroom interaction (Nurammida et al., 2024; Jayanti & Rosdiana, 2025).

Despite these potential benefits, the integration of Wordwall also presents practical limitations. Its implementation depends on technological infrastructure, internet connectivity, access to suitable devices, and teachers' ability to integrate digital activities into instructional planning. In addition, limitations associated with the free version may restrict the range or number of activities available. Consequently, the effectiveness of the platform may vary depending on the technological resources and educational conditions available in each classroom (Moreira et al., 2025).

Previous studies have reported favorable outcomes regarding the use of Wordwall for English vocabulary learning; however, evidence remains comparatively limited across specific educational and geographical contexts. Research has frequently focused on short-term interventions and quantitative outcomes, whereas fewer studies have examined its implementation among young learners in resource-constrained settings. This limitation is particularly relevant in Ecuadorian and rural contexts, where access to educational technologies and opportunities for interactive English practice may differ from those reported in previous studies.

In Pujilí, the educational context examined in this study involved learners aged 9 to 11 who experienced difficulties with English vocabulary retention and had limited opportunities to interact with technological resources during language instruction. These conditions provided a relevant setting for examining the implementation of Wordwall as a complementary instructional resource. Therefore, this study aimed to evaluate the effectiveness of Wordwall as a digital tool for improving English vocabulary learning among children aged 9 to 11 in Pujilí, Ecuador.

2. Metodología

The study employed a pre-experimental one-group pretest–posttest design within a mixed-methods approach that incorporated quantitative and qualitative components. It was conducted as part of an outreach program entitled *Popular English Schools*, organized by a public university in Pujilí, Ecuador. The study was implemented in a classroom equipped with an interactive digital board. Its methodological approach was designed to evaluate changes in English vocabulary learning following the implementation of Wordwall.

The study included 10 students from rural areas of the Pujilí canton, who were selected through convenience sampling based on their availability and participation in the outreach program. Participants were between 9 and 11 years of age and constituted a single intervention group. All students participated in the same instructional process and used Wordwall systematically throughout the intervention. No control group was included because the study followed a one-group pre-experimental design.

One week before the intervention, the participants completed a Cambridge English assessment adapted to the A1 Starters level as the pretest measure. The assessment consisted of 15 items designed to evaluate vocabulary through reading, listening, and writing activities and required approximately 60 minutes to complete. The same assessment was subsequently administered as the posttest under equivalent conditions. Pretest and posttest scores were used to determine changes in students' vocabulary performance after the intervention.

The instructional intervention was conducted over 10 consecutive weekend sessions, with each session lasting approximately four hours. Wordwall was integrated throughout the sessions alongside

task-based learning activities to reinforce vocabulary within a structured instructional sequence. The vocabulary content was organized into thematic units based on the *Kid's Box* textbook by Nixon and Tomlinson and aligned with the A1 Starters level. Approximately 15 to 25 new vocabulary items were introduced and reinforced during each instructional session.

During each session, Wordwall was used to reinforce previously introduced vocabulary through interactive activities such as matching exercises, quizzes, and word searches. The activities were presented through the classroom interactive screen and were completed primarily through group-based participation. Students took turns interacting with the digital activities, allowing all participants to engage directly with the platform. The instructional tasks were organized according to the vocabulary content addressed during each session.

After completion of the 10 instructional sessions, the posttest was administered using the same 15-item assessment and under conditions comparable to those of the pretest. Quantitative data consisted of the scores obtained by each participant before and after the intervention. These data were organized and processed using Microsoft Excel to calculate descriptive statistics, compare pretest and posttest performance, and generate graphical representations. The statistical comparison was subsequently used to determine whether students' vocabulary performance differed between the two measurement points.

The qualitative component consisted of field observations recorded throughout the instructional sessions using descriptive notes. The observations focused on previously established indicators, including participation, engagement, vocabulary retention during classroom activities, and observable performance in assigned tasks. These records served as complementary evidence for describing students' responses to the instructional activities and their interaction with Wordwall. Qualitative observations were interpreted descriptively and were not treated as standardized quantitative measurements.

3. Resultados

Table 1 presents the participants' performance on the pretest administered before the Wordwall-based intervention. The 10 students obtained a total of 67 correct responses out of 150 possible responses, corresponding to an overall accuracy rate of 44.67%. The mean individual score was 6.70 out of 15 points, indicating relatively low initial vocabulary performance. Individual scores ranged from 2 to 11 correct responses.

Table 1

Pretest performance by participant

Participant	Correct responses
Student 1	6
Student 2	8
Student 3	5
Student 4	9
Student 5	6

Participant	Correct responses
Student 6	2
Student 7	6
Student 8	11
Student 9	7
Student 10	7
Mean	6.70
Overall accuracy rate	44.67%

Item-level analysis revealed heterogeneous initial performance across the 15 questions. Question 1 obtained 100% correct responses, followed by Question 3 with 90%, suggesting greater familiarity with the vocabulary assessed in these items. Questions 2, 5, 6, and 8 obtained 50%, whereas Question 10 reached 60%. Lower performance was observed in Questions 7, 9, 11, and 12, each with only 20% correct responses.

Questions 4 and 14 reached 40% accuracy, while Questions 13 and 15 obtained 30%. These findings indicated that vocabulary knowledge before the intervention varied considerably according to the content assessed. The lowest-performing items revealed areas in which students experienced greater difficulty recognizing or applying the vocabulary included in the assessment. Overall, the pretest results established the baseline against which post-intervention performance was compared.

Table 2 presents the posttest results obtained after completion of the 10 instructional sessions using Wordwall. Participants obtained 120 correct responses out of 150 possible responses, corresponding to an overall accuracy rate of 80.00%. The mean individual score increased to 12.00 out of 15 points, with individual scores ranging from 10 to 15. All participants obtained higher posttest scores than their corresponding pretest scores.

Table 2

Posttest performance by participant

Participant	Correct responses
Student 1	11
Student 2	13
Student 3	10
Student 4	15
Student 5	11
Student 6	10

Participant	Correct responses
Student 7	11
Student 8	15
Student 9	12
Student 10	12
Mean	12.00
Overall accuracy rate	80.00%

At the item level, Questions 1, 2, and 3 reached 100% correct responses in the posttest. Questions 4, 5, 8, 10, and 14 reached 90%, while Questions 12 and 13 reached 80%. Question 6 and Question 11 reached 70%, whereas Question 7 obtained 60%. The lowest posttest performance was observed for Questions 9 and 15, which yielded 50% and 40% correct responses, respectively.

The largest increases were observed in Question 12, which increased from 20% to 80%, and Questions 4, 11, 13, and 14, which increased by 50 percentage points. Question 2 increased from 50% to 100%, whereas Question 7 increased from 20% to 60%. Smaller increases were observed in Questions 3 and 15, which each increased by 10 percentage points. Question 1 remained unchanged at 100% as all participants had already answered it correctly in the pretest.

Table 3 summarizes the comparison between individual pretest and posttest scores. The mean score increased from 6.70 to 12.00 points, representing an absolute increase of 5.30 points on the 15-point assessment. In percentage terms, overall accuracy increased from 44.67% to 80.00%, corresponding to an improvement of 35.33 percentage points. Every participant showed an increase between the two measurement points.

Table 3

Comparison of pretest and posttest scores

Participant	Pretest	Posttest	Difference
Student 1	6	11	5
Student 2	8	13	5
Student 3	5	10	5
Student 4	9	15	6
Student 5	6	11	5
Student 6	2	10	8

Participant	Pretest	Posttest	Difference
Student 7	6	11	5
Student 8	11	15	4
Student 9	7	12	5
Student 10	7	12	5
Mean	6.70	12.00	5.30
Percentage	44.67%	80.00%	35.33 percentage points

Before testing the statistical significance of the observed change, the normality of the paired differences was assessed using the Shapiro–Wilk test. The result indicated that the differences between pretest and posttest scores were not normally distributed ($W = 0.682$, $p < .001$). Consequently, the Wilcoxon signed-rank test was used to compare the two related measurements. This nonparametric procedure was considered appropriate given the small sample and non-normal distribution of the paired differences.

Table 4

Wilcoxon signed-rank test for pretest and posttest scores

Statistic	Result
Number of participants	10
Pretest mean	6.70
Posttest mean	12.00
Mean difference	5.30
Shapiro–Wilk *W*	0.682
Shapiro–Wilk *p*	< .001
Wilcoxon *W*	0.00
Two-tailed *p*	.002

The Wilcoxon signed-rank test revealed a statistically significant difference between pretest and posttest scores ($W = 0.00$, $p = .002$). Students obtained consistently higher scores after the Wordwall-based intervention, with overall performance increasing from 44.67% to 80.00%. These findings indicate a statistically significant improvement in English vocabulary performance between the two measurement points. Therefore, the quantitative results directly addressed the study objective of evaluating changes in vocabulary learning following the implementation of Wordwall.

4. Discusion

The findings showed a substantial increase in English vocabulary performance after the Wordwall-based intervention, with overall accuracy increasing from 44.67% in the pretest to 80.00% in the posttest, representing a gain of 35.33 percentage points. In addition, the Wilcoxon signed-rank test confirmed a statistically significant difference between the two measurements ($W = 0.00$, $p = .002$). These results suggest that the intervention was associated with improved vocabulary performance among the participating students.

The improvement observed in this study is consistent with Nurammida et al. (2024), who reported that Wordwall-based gamification can support vocabulary learning by providing interactive and engaging practice activities. Similarly, Moreira et al. (2025) found that the integration of recreational digital resources can strengthen vocabulary development and increase learners' participation. The present findings extend this evidence by showing that all participants obtained higher posttest scores than pretest scores after the instructional sessions.

The item-level analysis also revealed different degrees of change across the vocabulary items assessed, suggesting that the intervention did not affect all content equally. Questions 4, 11, 13, and 14 increased by 50 percentage points, while Question 12 showed the largest increase, rising from 20% to 80%. In contrast, Question 15 increased only from 30% to 40%. This variability indicates that vocabulary acquisition may also depend on factors such as complexity, familiarity, and frequency of exposure to specific lexical items.

The classroom observations provided complementary evidence regarding students' interaction with the digital activities. During the intervention, students appeared more willing to participate in matching exercises, quizzes, word searches, and collaborative activities, particularly when tasks incorporated visual and game-based elements. These observations are consistent with Jayanti and Rosdiana (2025), who emphasized the potential of interactive digital resources to promote active participation in English learning. However, these qualitative observations should be interpreted as complementary evidence rather than standardized measures of motivation or engagement.

The results also suggest that Wordwall functioned effectively as a complementary instructional resource rather than as an isolated teaching method. Its integration into structured vocabulary sessions allowed previously introduced content to be revisited through repeated and interactive practice. This finding is compatible with Moreira et al. (2025), who highlighted the usefulness of Wordwall for reinforcing English vocabulary through gamified activities. Therefore, the educational value of the platform appears to depend on its integration with planned instructional objectives and appropriate classroom strategies.

Although improvements were observed in vocabulary performance and classroom participation, the findings should not be interpreted as definitive evidence of a causal effect of Wordwall. The study employed a one-group pre-experimental design without a control group, limiting the ability to rule out alternative explanations for the observed changes. In addition, the sample consisted of only 10 students selected through convenience sampling. These methodological characteristics limit the generalizability of the findings and require cautious interpretation of the intervention's effectiveness.

The duration of the intervention also represents an important limitation because the study examined performance immediately after 10 instructional sessions. Consequently, the results provide evidence of short-term gains but do not establish whether the acquired vocabulary was retained over longer periods. Future studies should incorporate larger and more diverse samples, control or

comparison groups, delayed posttests, and longer intervention periods. Further research could also examine the effectiveness of Wordwall among learners with different educational needs and levels of English proficiency (Pradini & Adnyayanti, 2022).

Overall, the findings indicate that the use of Wordwall was associated with a statistically significant improvement in English vocabulary performance among children aged 9 to 11 in the context examined. Its interactive activities also provided opportunities for repeated vocabulary practice and active classroom participation. Nevertheless, the results should be interpreted within the limitations of the pre-experimental design and small sample size. Further controlled studies are required to determine the extent to which these improvements can be attributed specifically to Wordwall.

5. Conclusiones

The study showed that students' English vocabulary performance increased following the Wordwall-based intervention, rising from 44.67% in the pretest to 80.00% in the posttest, representing a gain of 35.33 percentage points. The statistical analysis also confirmed a significant difference between the two measurement points ($W = 0.00$, $p = .002$). These findings indicate that Wordwall was associated with improved vocabulary learning among the participating children aged 9 to 11.

The integration of Wordwall into the instructional sessions also provided opportunities for repeated vocabulary practice through interactive and game-based activities, supporting classroom participation and the reinforcement of previously introduced content. However, the findings should be interpreted cautiously because the study employed a one-group pre-experimental design, a small convenience sample, and no control group. These methodological limitations restrict the generalizability of the results and preclude definitive causal conclusions regarding the effectiveness of Wordwall.

Future research should include larger and more diverse samples, comparison or control groups, longer intervention periods, and delayed posttests to examine vocabulary retention over time. It would also be useful to assess the influence of technological conditions, such as device availability, internet connectivity, and access to platform features, on the implementation of Wordwall. Such research could provide stronger evidence regarding its effectiveness as a complementary resource for English vocabulary instruction.

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John Damian Chusin Cunuhay: Conceptualización, validación, análisis formal, investigación, gestión de datos, redacción - preparación del borrador original, redacción - revisión y edición, financiamiento, administración del proyecto, recursos, supervisión.

Pilar Carranza Paguay: Conceptualización, metodología, software, validación, análisis formal, investigación, gestión de datos, visualización, redacción - preparación del borrador original, redacción - revisión y edición, financiamiento, recursos, supervisión.

Olga Lorena González Ortiz: Metodología, validación, investigación, visualización, redacción - preparación del borrador original, redacción - revisión y edición, financiamiento.

Los autores contribuyeron activamente en el análisis de los resultados, revisión y aprobación del manuscrito final.