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Digital Storytelling as a Pedagogical Tool: Assessing the Impact on Vocabulary Acquisition in Pakistani Multilingual ELT Classrooms

Alveena Farooq[1], Shahabullah[2], Aftab Hussain[3]

[1] Research Scholar, Department of English, Abbottabad University of Science and Technology, Abbottabad, Pakistan. Email: alveenafarooq42@gmail.com
[2] Lecturer, Department of English, Abbottabad University of Science and Technology, Abbottabad, Pakistan. Email: shahabullah@aust.edu.pk
[3] Ph.D. Scholar, Department of English Language and Applied Linguistics, Allama Iqbal Open University, Islamabad, Pakistan. Email: sunswabi@gmail.com

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ABSTRACT

The present study aims to investigate the effectiveness of digital storytelling in enhancing vocabulary acquisition among multilingual undergraduate ESL learners in Pakistan. Digital Storytelling has gained recognition in English language teaching, yet its potential in resource-limited contexts like Pakistan remains underexplored. Existing research largely emphasizes communicative competence and motivation, overlooking empirical evidence on vocabulary retention. This study bridges this gap by investigating the effectiveness of DST-driven ELT practices in enhancing vocabulary retention. Quantitative data was collected using an experimental research design, 60 students are divided into two groups: control group receiving traditional instruction and experimental group engaging with DST-based learning. Over eight weeks, pre- and post-tests measure learning outcomes, analyzed through statistical methods such as mean, median, and t-tests. Grounded in the Multiliteracies framework, Constructivist learning theory, Social learning theory, and Cognitive load theory, the study supports a multimodal, experiential approach to ELT. It anticipates that DST will facilitate the implicit acquisition of vocabulary items through contextualized learning, leading to improved retention and engagement. Findings contribute to language teaching methodologies, curriculum development, and teacher education programs, advocating DST as a learner-centered pedagogical tool. By integrating DST into ELT, this study provides a more inclusive and interactive learning experience, particularly for ESL students struggling with grammar and vocabulary acquisition.

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Corresponding Author's Email: shahabullah@aust.edu.pk

1. Introduction

Vocabulary plays a foundational role in language learning and is integral to the development of communicative competence (Nation, 2001). However, traditional English Language Teaching (ELT) methods—such as translation and rote memorization—often fail to support meaningful comprehension or long-term retention (Schmitt, 2008). Often, these practices are very low-context, so learners can't activate and use vocabulary in real-life contexts of use. Digital Storytelling (DST) is an innovative pedagogical method and instructional strategy that overcomes these limitations because it builds on formal and informal storytelling, combining multimedia—text, images, audio, and video—into narrative forms (Robin, 2008). By placing vocabulary in rich, personalized narratives, DST increase learners' emotional engagement and cognitive processing so learners do not suffer from lack of purposeful and meaningful engagement. Contextualized learning through DST helps students grasp not only word meanings but also appropriate usage, collocations, and nuanced connotations (Webb, 2008). Research demonstrates that DST facilitates vocabulary development by encouraging repeated, multimodal exposure regarding target words. Hung,

Hwang and Huang (2012) found that digital storytelling provided students with immersive learning experiences that significantly improved recall and retention of vocabulary. Likewise, Xu, Park and Baek (2011), noted that ESL learners engaged with DST proved to perform better on vocabulary tests, compared to their peers who were exposed to vocabulary through more traditional means, and demonstrated higher levels of motivation and engagement. Furthermore, DST fosters independent and active learning. While creating their own digital stories, students analyze, use and customize vocabulary items, thereby advancing their language learning (Sylvester & Greenidge, 2009). This approach is consistent with constructivist learning theory, that emphasizes the interactions of learners with the content to support knowledge construction with peers (Jonassen, 1991). Beyond vocabulary gains, DST fosters positive attitudes toward language learning, especially among learners who respond well to visual and interactive stimuli (Yang & Wu, 2012). Importantly, DST can be adapted for use in resource-limited settings, utilizing accessible tools such as smartphones and free multimedia applications (Barrett, 2006), making it a practical option for many Pakistani classrooms. In spite of the increasing amount of evidence from around the world regarding the success of digital storytelling (DST), it has yet to receive much attention as a pedagogical modality for vocabulary instruction. Subsequently, this study will contribute to addressing this gap by focusing on the pedagogical potential of DST in vocabulary learning, providing contextualized information that can be beneficial for classroom teachers and language policy planners in the specific context of Pakistan.

1.1. Problem Statement

In ELT, scaffolding and supporting vocabulary learning often rely on traditional practices involving rote learning, word lists presented in isolation and teacher-led instruction. Rather than facilitate meaningful learning or situated use of vocabulary, these practices often lead to disengaged learners and limited communicative competence (Nation, 2001; Schmitt, 2008). Vocabulary is an essential part of language; however, it is often taught in such a way that limits or obstructs fluency and expressive language use. The disjunction between the vocabulary learners work with in the classroom and real-world use of language is exacerbated in multilingual classrooms where linguistic diversity asks for a more adaptive and interactive approach to language teaching. DST is an innovative, student-centered solution to these educational barriers. Combining visual, audio, text, and music content within narrative structures, DST gives learners valuable and rich vocabulary input that is contextualized and increases engagement, retention, and motivation (Robin, 2008; Sadik, 2008). There is plenty of research backing DST as a teaching method for vocabulary acquisition, development of communicative competence, and learner autonomy in a variety of education contexts (Akdoğan, 2023; Hung, Hwang, & Huang, 2012; Xu, Park, & Baek, 2011). Despite this growing body of international evidence, the pedagogical application of DST for vocabulary acquisition remains significantly underexplored in Pakistani ELT context. There is a significant need for context-based research that explores the potential of DST in developing vocabulary, enhancing student engagement, and supporting inclusive, technology-supported language teaching practices. This study aims to contribute to this evidence base by examining the affordances of digital storytelling for developing vocabulary in multilingual classrooms in Pakistan. It will provide an empirical foundation for language pedagogy and language policy.

1.2. Research Objectives

This research aims to address the following objectives:

1. To investigate the effectiveness of digital storytelling in enhancing vocabulary acquisition among multilingual undergraduate ESL learners in Pakistan.
2. To identify challenges and opportunities in integrating digital storytelling into vocabulary instruction within the Pakistani ESL context.

1.3. Research Questions

1. How effective is digital storytelling in improving vocabulary acquisition among multilingual undergraduate ESL learners in Pakistan?
2. What are the challenges and opportunities of implementing digital storytelling for vocabulary instruction in multilingual ESL classrooms in Pakistan?

1.4. Significance

The shift to Digital Storytelling in education has made learning more active, inclusive, and participatory. Because it is multimodal, it meets the needs of learners from different backgrounds and addresses different modalities, thus allowing students to meaningfully engage in personalized ways. In the context of ELT, DST not only seems to enhance essential teaching skills including vocabulary development, it also enables storytelling and creative tasks that have a cultural narrative (Gainer & Lapp, 2010; Trostle Brand, Favazza, & Dalton, 2012). Overall, when used positively, DST can enhance student engagement in their learning by linking the content of the classroom to the interests and experience of students. Since ELT in Pakistan is generally teacher-centered, this study seeks whether DST can facilitate vocabulary instruction while fostering a learner-centered and technology enhanced teaching practice.

1.5. Rationale of the study

The rationale for this study lies in the urgent need to shift from traditional, rote-based vocabulary instruction toward more dynamic, learner-centered approaches in multilingual ELT contexts like Pakistan. As previously mentioned, effective teaching and learning options traditionally lack ways to engage and retain students in the process. However, enriching and authentic experiences for vocabulary learning can be integrated through DST. It offers learner-generated, contextualized artefacts with multi-modal elements that require students to interact with content. DST offers to personalize vocabulary learning, foster a variety of learning styles and levels of cognitive engagement, and transform practices to meet learning and educational needs in the 21st century. DST also provides opportunities to adapt vocabulary acquisition for English learners within Pakistani classrooms and offer timely, innovative and worldly alternatives to ineffective and out-dated pedagogy.

1.6. Organization of the Study

This research paper is organized into five main sections. The Introduction summarizes the research, including the problem statement, objectives, research questions, significance, and rationale of the research. The Literature Review chapter presents a critical review of the research of primary importance to the field of Digital Storytelling in language education, discussing the theoretical frameworks that underpin the research and identifying a gap in the scholarship. The Research Methodology chapter describes the quantitative experimental design, selection of participants, sampling methods, data collection instruments, and the approach to statistical analysis. The Results and Discussion chapters outline the results from the vocabulary tests and the sentence completion activities, interpreting the findings and relating them back to the research questions and the literature. The final section of the study, titled Conclusion, summarizes the main findings of the study, the significance of the results in theory and practice, the limitations of the study, and recommendations for further research.

2. Literature Review

DST is a noteworthy educational digital tool that integrates multiple multimedia elements (texts and images, sounds and video) into cohesive narratives that can enrich students learning (Robin, 2008). In his seminal book*, Digital Storytelling: A Powerful Technology Tool for the 21st Century Classroom*, Robin asserted that DST not only provided a new way of learning, towards increased meaning, engagement, interaction, and production, but especially for language learning. There is much empirical evidence supporting the use of DST for enhancing vocabulary development for English language learners. For example, classroom action research in Indonesia found students' learning of vocabulary improved statistically after using DST to create a project. The study found the mastery of vocabulary for the students improved from 43.78 to 73.89 when implemented over two cycles of instruction. This indicates the potential of DST to enhance the learning experience, but to actually help students progress and demonstrate language growth. Although there are encouraging outcomes, most literature focuses on general improvements in motivation, engagement, or writing skills through DST (Robin, 2008; Yang & Wu, 2012) with relatively few examples that investigate vocabulary learning as a main area of attention. In Alismail (2015) and Dogan and Robin (2008) research studies, aspects of the impact of DST could be studied with respect to multimodal literacy skills development and learner engagement, but did not necessarily address vocabulary learning outcomes. In addition, the studies that were carried out mostly used a strict pre-test/post-test experimental design with little attention to the cultural and contextual aspects of vocabulary learning (Hafner & Miller, 2018).

Similarly, in the Turkish EFL setting, Hava (2021) researched the use of DSTs to enhance both motivation and satisfaction. The study found that DST activities increased learners' motivation, and vocabulary, writing, and speaking skills were improved significantly. In addition, students exhibited increased confidence and personal use of English, adding to the viability of DSTs to promote authentic use of language. Maya, Sumarni and Suseno (2022) explored the effect of DST on vocabulary construction among primary-level ESL learners. And the results significantly revealed the improvement in vocabulary acquisition, memory retention, and motivation level among the learners. Chonnia and Izzah (2022) focused on digital storytelling to enhance vocabulary learning and demonstrated its effectiveness among ESL learners. Their findings were descriptive and cannot be applied to a multilingual ELT context such as Pakistan. The use of digital storytelling in an online EFL course was identified to improve vocabulary retention and minimize cognitive load, but researchers stressed that further research should be conducted for understanding DST's role in long term retention of learned structures, furthermore, the findings were limited only to a small sample of learners (Tatli, Saylan, & Kokoç, 2022).

Chen et al. (2024) presented RetAssist, which pairs generative images with story retelling activities. In their within-subject study (N = 24), they demonstrated that visualized DST facilitated fluency, vocabulary acquisition, and retention and decreased cognitive load. Belda-Medina and Goddard (2024) built on this research by exploring the use of the DST approach in classrooms that were inclusive and/or diverse. Research conducted with children aged 8 to 10 years showed improvement in vocabulary acquisition and alongside gains in digital literacy and critical thinking skills among pre-service teachers. These outcomes showcase how DSTs can have value to varying age groups and educational contexts. The use of strict pre-test/post-test experimental designs also limits the degree to which findings can be generalized, and often the studies lack ecological validity, which provides limitations of generalization largely for multilingual and multicultural classrooms (Cook, Campbell, & Day, 1979). The present study explains the influence of Digital Storytelling (DST) on vocabulary learning among undergraduate English Language Learners (ELLs) in Pakistan using a mixed-method design, a quasi-experimental style. The methodological tool is based on Social Constructivism (Vygotsky & Cole, 1978) and Dual Coding theory (Paivio, 1990) and allows investigating not only a measurable improvement in vocabulary but also a perception of engagement and learning by learners. A quasi-experimental model, importantly a non-equivalent control group pre-test/post-test model, is suitable to use in real classroom conditions, in which random assignment is not applicable (Creswell, 2002). In view of these gaps, the current study aims to add to the understanding of the literature by carrying out an empirically-based, context-sensitive study of digital storytelling in vocabulary learning among undergraduate English language learners in Pakistan. By focusing on locally relevant themes and using familiar technologies, the study will examine the instructional potential of digital storytelling in the resource-constrained, multilingual conditions of Pakistani classrooms and provide significant and transferable findings in contexts like it(Dhivya et al., 2023; Ragmoun & Alfalih, 2024).

3. Theoretical Foundations of Digital Storytelling in Language Learning

Digital Storytelling (DST) is rooted in several learning theories that provide support for its much-routed success in vocabulary development for ESL/EFL learners. Paivio's Dual Coding Theory (1990) proposes that when information is presented both verbally and visually, information will be remembered at a greater rate than when only one mode of information delivery is employed, which DST inherently provides through text, images, audio, and videos. Mayer and Moreno (2003) are also supporting DST using his Cognitive Theory of Multimedia Learning (2003), presenting that learning outcomes are deeper when learners actively process the multimedia inputs in a way that is meaningful. In terms of social constructivism, Vygotsky's Sociocultural Theory discusses the importance of contextualized social interaction and the role of scaffolding with regard to learning a language through social interaction, both of which are inherent in collaborative tasks when utilizing DST. Bruner's theory of Constructivism (1961) supports DST because learners are able to access knowledge from real-world contexts through the creative use of language and not just the print form of it. Lastly, Kearsley and Shneiderman's Engagement Theory (1998) referenced DST to underline the impact authentic collaborative tasks, which are relevant to learner's lives, play in improving their motivation and engagement in the vocabulary learning process. The importance of the pedagogical value of

DST can be explained by the Multiliteracies Framework, which states the need to combine various means to create meaning. DST is compatible with such paradigm categories, since it helps learners to integrate text, pictures, audio, and narration, and develop multimodal literacy. This method introduces learners into the real-world communication scene and helps improve vocabulary acquisition since this way of using language is imaginative and embedded into the world. Taken collectively, these theories emphasize DST as a multimodal, socially interactive and learner-directed pedagogy to support vocabulary development in multilingual language classrooms.

4. Research Methodology

The study utilized a quantitative research design with the intent of quantitatively measuring the effects of DST on vocabulary learning. Specifically, quantitative methods allowed, via the pre- and post-intervention tests, to collect numbers and ten analyze numerical data to derive clear understanding of learning gains without subjective measures. The study used an experimental pretest-posttest control and experimental group design to measure any effectiveness of DST on vocabulary learning. This design allowed a straightforward comparison of vocabulary learning between the experimental and control group and helped identify differences in vocabulary learning related to the implementation of the DST intervention.

4.1. Population Profile

The study was carried out in the Abbottabad University of Science and Technology (AUST), Pakistan, and involved first-semester Bachelor of English Language and Linguistics students. The total sample comprised of 60 students. The following table contains a summary of the main demographic and contextual details.

Table 1: **Target Population Profile**

Variable	Description
Institution	Abbottabad University of Science and Technology (AUST), Pakistan
Program	Bachelor in English Language and Linguistics
Academic Level	First and Second Semester
Total Participants	60 Students
Group Allocation	30 Experimental (DST-based instruction), 30 Control (Traditional instruction)
Age Range	18 to 22 years
Gender	Both Male and Female
Native Language	Non-English (Multilingual backgrounds)
Sociocultural Background	Diverse linguistic and cultural exposure with varied prior English proficiency
Sampling Technique	Cluster Sampling

4.2. Sample and Sampling Technique

A total of 60 participants were selected using a method of cluster sampling. Participants were divided as follows: Experimental Group (n = 30), which received eight weeks of instruction with the use of DST as the main teaching strategy, and Control Group (n = 30), which received instruction using traditional teaching strategies. The sample size is consistent with established best practices in educational experimental research. With respect to sample size, Creswell (2002) states that an appropriate sample size for random experimental studies should consist of approximately 15-30 participants per group to ensure statistical validity. In the same way, 30 participants per group enables researchers to look for medium to large effect sizes while evaluating educational intervention. The structured and controlled nature of this research would support the reliability and validity of the findings, thus forming a strong basis upon which to assess the instructional effectiveness of DST in the context of English language learning.

4.3. Data Collection

To ensure the accuracy, validity, and reliability of the study's findings, a structured and systematic data collection process was implemented. The procedure was guided by the research objectives and aligned with established practices in experimental research involving educational interventions.

4.4. Instrument Development

The main data collecting instruments were two vocabulary tests (the pre and post vocabulary test). These tests were developed to assess vocabulary acquisition and retention among English Language Learners (ELLs) specifically. The tests were developed based on the linguistic aims of the study and the tests were intended to assess both a contextual and correct use of the vocabulary items. As a means of ensuring content validity, the first drafts of the tests were reviewed by a panel of subject-matter experts in the disciplines of applied linguistics and language education; the drafts were revised based on the feedback of the experts to enhance the clarity of the tests, linguistic appropriateness, and that the tests were reflective of the proficiency levels of the learners. and A small group of students, who were not taking part in the study, carried out a pilot of the tests to verify the reliability and function of the test items. This allowed me to make sure the tools were still capturing the data I intended.

4.5. Implementation Process

The data collection occurred in two phases, corresponding to the pre- and post-intervention stages:

- Phase 1 (Pre-Test): The pre-test was administered to both the experimental and control groups before the commencement of the intervention to establish baseline vocabulary proficiency levels.
- Intervention Period: Over the course of eight weeks, the experimental group received vocabulary instruction integrated with Digital Storytelling (DST) techniques, while the control group followed conventional teaching methods.
- Phase 2 (Post-Test): After the intervention, the post-test was administered to both groups to measure any changes in vocabulary acquisition and retention attributable to the instructional method.

5. Data Analysis

5.1. Descriptive Statistics

Descriptive statistics were used to summarize learner performance through mean scores, which served as indicators of central tendency across the pre- and post-test data. These means were calculated for both experimental and control groups to identify overall trends in vocabulary improvement.

To facilitate better comparison and interpretation, raw scores were converted into percentages, allowing for standardized assessment across groups. This conversion helped control for potential variation in scoring scales and made performance comparisons clearer and more meaningful.

5.2. Inferential Statistics

To determine whether the observed differences in performance were statistically significant, both paired-samples t-tests and independent-samples t-tests were conducted:

- Paired-samples t-tests were applied to compare the pre- and post-test scores within each group (experimental and control) to identify any significant learning gains over time.
- Independent-samples t-tests were used to compare the post-test results between the experimental and control groups, assessing whether the DST intervention led to significantly different outcomes compared to traditional instruction.

The choice of t-tests was appropriate given the study design, as these tests are robust tools for evaluating whether the differences in mean scores are statistically meaningful or simply due to random variation. A p-value threshold of 0.05 was used to determine statistical significance.

Figure 1

6. Results

Section 1: Vocabulary

To evaluate the effectiveness of DST on vocabulary learning, a systematic vocabulary assessment was given to participants prior to the intervention (pre-test) and following the intervention (post-test). For the vocabulary assessment, participants were presented with a word and had to choose the correct meaning from several choices, which indicated their comprehension and retention of vocabulary. The experimental group (DST) practiced narrative-based vocabulary through interactive and contextualized strategies for building vocabulary knowledge using digital narratives. The control group (NO DST) practiced vocabulary through text book worksheets, teacher-centred instruction, and memorization. Both the experimental and control groups received the same group of vocabulary words connected to the study. All participants were tested before and after the intervention to have a constant measurement to consider success in regard to vocabulary improvement. The pre-test measured the participants baseline vocabulary knowledge, and the post-test was used to measure the improvement of vocabulary knowledge as a result of the intervention. Each participant's responses from the vocabulary pre- and post-tests were retrieved from each group and analysed against each other to measure the success of narratives and DST. The following table reports the percentage of each correct and incorrect from both groups before and after the intervention.

Table 2: Percentage of Correct and Incorrect Responses for both Pre and Post Tests by Controlled Group

Vocabulary list	Controlled Group			
	Pre-Test		Post-Test	
	Correct Responses	Incorrect Responses	Correct Responses	Incorrect Responses
Ruffle	70%	30%	73%	27%
Glancing	60%	40%	60%	40%
Pathetic	73%	27%	80%	10%
Tangle	80%	20%	86%	14%
Betrayal	63%	37%	70%	30%
Sob	66%	34%	66%	34%
Malfunction	70%	30%	75%	25%
Harshly loud	86%	14%	86%	14%
Combat	70%	30%	70%	30%
Affection	70%	30%	76%	24%
Drench	60%	40%	66%	34%
Ubiquitous	25%	75%	30%	80%
Average percentage	66%	34%	69%	31%

The table demonstrates the pre-test and post-test vocabulary acquisition scores of the controlled group. It displays the accuracy rate for each target word before and after the vocabulary intervention. Overall, vocabulary retention increased by a small margin, with learners answering about 3% more correctly without the DST intervention.

Table 3: Percentage of Correct and Incorrect Responses for both Pre and Post Test by Experimental Group

Vocabulary list	Experimental Group			
	Pre-Test		Post-Test	
	Correct Responses	Incorrect Responses	Correct Responses	Incorrect Responses
Ruffle	83%	17%	96%	4%
Glancing	63%	37%	83%	17%
Pathetic	90%	10%	100%	0%
Tangle	83%	17%	96%	4%
Betrayal	70%	30%	86%	14%
Sob	73%	27%	90%	10%
Malfunction	73%	27%	85%	15%
Harshly loud	93%	7%	100%	0%
Combat	83%	17%	95%	5%
Affection	86%	14%	90%	10%
Drench	73%	27%	85%	15%
Ubiquitous	46%	53%	66%	34%
Average percentage	76%	24%	89%	11%

Progress made by the experimental group in acquiring vocabulary is showcased in Table 2. The study shows considerable growth in vocabulary mastery, as the overall accuracy rate jumped from 76% before instruction to 89% following the Digital Storytelling activities. The words selected for the experiment experienced marked improvement, and many of them achieved a perfect score following the intervention. This evidence indicates that DST was successful in helping the students in the experiment improve their vocabulary.

6.1. Data Summary

Control Group: Pre-Test Mean: 66%, Post-Test Mean: 69%
Experimental Group: Pre-Test Mean: 76%, Post-Test Mean: 89%
Tests Performed and Hypothesis Validation:
Control Group Pre-Test vs. Post-Test (H_0)
T-Statistic: 1.440
P-Value: 0.161

The p-value ($p>0.05$) shows no statistical significance between pre-test scores (66%) and post-test scores (69%). The research findings confirm the null hypothesis (H_0) because the minor increase in scores appears to be caused by accidental fluctuations instead of DST effects. The experimental factors that the control group did not experience resulted in no noteworthy improvement in scores, thus excluding external elements as key contributors to performance.

Experimental Group Pre-Test vs. Post-Test (H_1)
T-Statistic: -2.117
P-Value: 0.043

A p-value of less than 0.05 reveals that the experimental group achieved statistically significant score enhancement. The observed results strengthen the alternative hypothesis (H_1) because the DST intervention proved crucial in improving the vocabulary acquisition of participants. The students demonstrated a 13% better performance outcome after the intervention of DST, which proves that DST serves as an effective instrument for language learning.

Pre-Tests (Control vs. Experimental) (H_0)
T-Statistic: 0.000
P-Value: 1.000

p-value ($p>0.05$) shows that control group participants (66%) had similar levels of language proficiency as experimental participants (76%) at the beginning of the study, and there is no significant difference. The established validity confirms that DST intervention effects in experimental groups can be linked to the program's activities since it rules out differences

discovered before testing started. The research gains increased internal validity by retaining the null hypothesis in this case.

Post-Tests (Control vs. Experimental) (H_1)
T-Statistic: 1.977
P-Value: 0.053

Statistical findings indicate a potentially significant difference between the control group's post-test scores at 69% and the experimental group's scores at 89%, with a p-value ($p \approx 0.05$). Although surpassing the standard p-value threshold of 0.05, the result shows that the experimental group achieved better results compared to the control group. The study findings indicate DST produced positive effects on language achievement, yet more investigations with bigger participant numbers could enhance the study's verification.

Section 2: Complete the sentences

To test the acquisition of vocabulary and its correct use in context, both the experimental and control group participants were required to complete the sentences using the list of words. The main purpose was to test the contextual understanding of learners learned vocabulary items. In this study, the experimental group received DST-based instruction and worked with interactive stories where vocabulary words appeared in a variety of real-life contexts. In this way, participants in this group internalized word meaning and grammatical form through contextual representation and exposure, rather than through mechanical memorization, the control group learned the vocabulary words through direct instruction and textbook learning, accompanying exercises. This method allowed for a thorough evaluation of how well each participant could recognize and use different word forms accurately in their writing. The table below shows the percentage of correct and incorrect responses for both groups of participants and the relative effectiveness of Digital Storytelling compared to traditional methods of learning.

Table 4*:* Sentence Completion with Appropriate Word Forms

Fill in the Blanks	**Controlled Group**			
	Pre-Test		**Post-Test**	
	Correct Responses	**Incorrect Responses**	**Correct Responses**	**Incorrect Responses**
The loud noise made her _ at the door in surprise.	40%	60%	43%	57%
His shirt was _ by the strong wind as he walked outside.	40%	60%	46%	54%
The movie was so _ that the audience started laughing during an emotional scene.	50%	50%	56%	44%
The children tried to untangle the _ wires but gave up.	66%	34%	70%	30%
After his _, she never trusted him again.	76%	24%	76%	24%
The little boy started to _ after dropping his ice cream.	56%	44%	60%	40%
The machine had a _, causing a delay in the production	70%	30%	75%	15%
The sound of the siren was _, waking everyone in the neighborhood.	66%	34%	70%	30%
They had to _ the strong winds while hiking to the top of the hill.	56%	44%	60%	40%
His clothes were _ after the sudden downpour.	47%	53%	50%	50%
Average percentage	56%	44%	60%	40%

The data in the table shows how the members of the controlled group performed on the contextual vocabulary test before and after receiving instruction. You can see in the Table how many times each question was answered correctly or incorrectly. At the beginning, only 56% of the tasks were known correctly, but this number grew only to 60% after the intervention. The slight changes support the idea that teaching with old methods did not much improve students' ability to use vocabulary in various settings.

Table 5*:* Experimental Group Pre- and Post-test Results for Completing the Sentences

Fill in the Blanks	Experimental Group			
	Pre-Test		Post-Test	
	Correct Responses	Incorrect Responses	Correct Responses	Incorrect Responses
The loud noise made her _ at the door in surprise.	43%	57%	70%	30%
His shirt was _ by the strong wind as he walked outside.	33%	67%	54%	46%
The movie was so _ that the audience started laughing during an emotional scene.	67%	33%	83%	17%
The children tried to untangle the _ wires but gave up.	43%	57%	86%	20%
After his _, she never trusted him again.	73%	27%	90%	10%
The little boy started to _ after dropping his ice cream.	50%	50%	76%	24%
The machine had a _, causing a delay in the production	73%	27%	90%	10%
The sound of the siren was _, waking everyone in the neighborhood.	73%	27%	86%	14%
They had to _ the strong winds while hiking to the top of the hill.	60%	40%	76%	34%
His clothes were _ after the sudden downpour.	53%	47%	67%	33%
Average percentage	56%	44%	75%	25%

Results of the vocabulary test for the experimental group, who learned through Digital Storytelling (DST), are presented in the following Table. Student ability to use vocabulary has shown a distinct increase. On average, students went from barely being able to apply vocabulary in the pre-test to performing much better in the post-test. The main development is in the accuracy of using words and big growth was seen for untangle, sob and malfunction. It seems from the findings that DST did not just teach students to recognize new words. It also allowed them to practice using their new learning properly.

6.2. Data Summary

Control Group: Pre-Test Mean: 56%, Post-Test Mean: 60%
Experimental Group: Pre-Test Mean: 56%, Post-Test Mean: 75%
Tests Performed and Hypothesis Validation:
Control Group Pre-Test vs. Post-Test (H_0)
T-Statistic: 0.743
P-Value: 0.462

The control group's slight improvement from 56% to 60% was not statistically significant ($t = 0.743$, $p = 0.462$). This indicates that without the inclusion of interactive interventions, the conventional learning methods did not lead to a significant enhancement in the accuracy of word selection. The increase, however, can be explained by factors such as incidental learning, the effect of repeated exposure to similar exercises, or test-taking familiarity, and not necessarily as an instructional effect. Since the control group did not receive any interactive or multimedia-driven learning experience, the results show that traditional methods may not be as effective in the improvement of vocabulary on their own.

Experimental Group Pre-Test vs. Post-Test (H_1)
T-Statistic: -3.621
P-Value: 0.005

On the other hand, the experimental group revealed a significant increase in the scores, which started from 56% to 75% with a highly significant p-value of 0.005 ($t = -3.621$). This is a substantial improvement, which clearly shows that DST intervention enhanced the participants' capacity to use vocabulary correctly in specific contexts. The 19% increase shows that the multimodal approach of DST with the use of visual, auditory, and textual stimuli

helped the participants to engage in deeper cognitive processing and retention of the vocabulary. It is the storytelling approach that most likely reinforced contextual understanding: Participants were able to use words in meaningful situations and not just in an isolated manner. The interactive and narrative-driven methodology may have also helped in maintaining the learners' interest, which is usually lacking in traditional methods.

Pre-Tests (Control vs. Experimental) (H_0)
T-Statistic: -0.723
P-Value: 0.472

At the beginning of the study, both groups were equal in their baseline scores (56%), and the statistical comparison ($t = -0.723$, $p = 0.472$) showed that there was no significant difference between the two groups. If the experimental group had higher pre-test scores, then the validity of DST could be called into question. However, this result supports the internal validity of the study, and hence, it can be concluded that DST was the only independent variable that caused the change in the dependent variable.

Post-Tests (Control vs. Experimental) (H_1)
T-Statistic: 2.345
P-Value: 0.032

A highly significant difference was noted in the post-test scores between the control group (60%) and the experimental group (75%) ($t = 2.345$, $p = 0.032$). The lower p-value (< 0.05) indicates a significant change in the experimental group after the DST intervention and exposure to multimodal experimental learning. This result indicates that digital storytelling helped the students learn the target words in a more effective way than the traditional rote-based approaches. The collected data shows that the experimental group had a higher level of cognitive engagement and development than the control group, which indicates that DST is a better method of teaching vocabulary and grammar than the traditional method. The narrative-based approach of the intervention makes it easier for learners to engage with new words in the context of real-life stories. Unlike rote learning, which often results in shallow understanding and memory, DST helps to engage learners more deeply, linking words with emotions and events or with the interactions of characters. This in turn improves both the recall and the application of the learned words, as shown by the increase in the accuracy of sentence completions.

7. Discussion

This section reviews the results of our study regarding the effectiveness of Digital Storytelling (DST) on vocabulary acquisition in learners. The current section will present a comprehensive description of the effectiveness of DST, using the pre and post-test data of the control group (where they received traditional instruction) and of the experimental group (where their instruction was based on DST). The analysis will focus on the following linguistic features discussed in the study: vocabulary learning, contextualized use of words, sentence building, and self-corrections. The data demonstrated that the learners who used DST outperformed the learners with conventional instruction. This suggests that DST supports implicit and meaningful vocabulary learning. In the area of vocabulary acquisition and retention only, the experimental group increased vocabulary usage significantly much better than the control group. This supports Ellis (1997), where he stated vocabulary is best learned in context rather than learning words in isolation. The present study also supports Krashen's (1982) Input Hypothesis, as the learners used a meaningful narrative-based input that improved their learning and retention. utilization of DST was consistent with (Paivio, 1990) Dual Coding Theory. The multi-media design helped improve cognitive processing through multimodal (visual, auditory and narrative) input. This method enhanced cognitive processing resulting in the encoding and recall of the words and stories. The affective dimensions of storytelling also increased the motivation and emotional salience of learners during DST instruction which can have a differential impact on vocabulary retention.

The experimental group showed overall successful performance again in the fill in the blank tasks, a proxy for vocabulary use in context, where the experimental group increased performance from 61% to 82% while the control group only increased to 57% to 65%, respectively. This difference in results shows the role of DST in facilitating a more instinctive,

natural learning experience for language acquisition. Learners began developing metalinguistic awareness and learned to self-correct and utilize vocabulary more attentive to context.Although t he post-test results in vocabulary retention approached statistical significance ($p = 0.053$), they did not meet the standard threshold ($p < 0.05$). As such any claim of the greater superiority of Digital Storytelling (DST) needs to be understood with reservations. This margin of significance shows a promising trend, yet by no means proves something decisive. It is advisable that future studies should be conducted on bigger samples to confirm these results and make results more reliable.

Key findings from this study include:

- DST enhances vocabulary retention through meaningful, contextualized learning experiences.
- Although traditional methods are instructional, DST offers a more engaging and meaningful alternative that fosters deeper cognitive involvement.

7.1. Research Limitations and Recommendations for Future Research

This study has significant implications regarding the effectiveness of Digital Storytelling assists second language learners in acquiring vocabulary; however, it is also vital to address and emphasize the key limitations of the study as well as provide serious recommendations for future related studies. The following are some important points highlighting the limitations and future research recommendations;

7.1.1. Size Constraints

The research included limited participants for study, which reduces the ability to generalize its results. The results would become more authentic and applicable across different educational institutions when using a broader study sample across multiple institutions.

7.1.2. Time Constraints

The research period proved short because this raises uncertainties and concerns regarding the student's ability to maintain their learned skills, particularly the learned vocabulary items in this study, in the long run. Future studies need to investigate whether the obtained results from the DST intervention will persist across several years or not.

7.1.3. Lack of Qualitative Data

This research study depended solely on quantitative assessments to measure score improvements to assess the effectiveness of DST, yet it failed to find learners' subjective views on their educational experiences. To know about learners' views on DST-based learning, qualitative data about their subjective experiences can be taken via personal interviews, focus groups, and observing the learners' behavior and response to DST in their natural classroom setting.

7.1.4. Technological Barriers

Certain students belonging to resource-constrained areas face technology barriers such as lack of proper devices and internet among the students, lack of teacher’s training regarding the use of digital tools and time constraint in the academic program. These were the obstacles to the effective implementation of DST and point out the necessity of more solid infrastructure and capacity-building in the future usage. Future studies need to examine whether DST adaptation methods work for under-resourced school settings or not, so all the students can access their beneficial aspects.

7.1.5. Comparison with Modern Approaches

Future studies should analyze how the integration of Digital Storytelling functionality in the curricula compete against other modern teaching aids such as game-based instruction, artificial intelligence tutors, and virtual reality applications.

Additional research must address these raised concerns to firmly establish DST effectiveness for learning the use of technology and effective second language acquisition teaching methods.

8. Conclusion

This research provides evidence that Digital Storytelling (DST) is an effective pedagogical strategy for improving vocabulary learning for English language learners. Overall, the results show that learners engaged in instruction built on DST performed better than learners engaged in instruction based on traditional learning approaches as measured in vocabulary retention, sentence construction and self-correcting. The study findings also highlight the notion that grammar should not be taught in isolation through the memorization of rules and structures but rather should be experienced within a meaningful, authentic context. DST offers one potential experience for language learning within authentic contexts by integrating language learning with narrative, visual and audio components in a new multimodal landscape. This new landscape increases learner engagement and allows for retention to be reinforced through multiple exposures and emotional connections to the learning content.

The findings from the current study contribute to the ongoing research supporting a shift away from traditional teacher-centered, rote learning towards a more learner-centered approach to learning supplemented with technology. When DST is used to integrate the components of narrative and multimedia in the same learning activity, it provides learners with deeper learning experiences that are cognitively stimulating and emotionally engaging. Despite its promising findings, the study is subject to several limitations. The sample size was relatively small, limiting the generalizability of the results. The short duration of the intervention raises questions about long-term retention of the acquired skills. Additionally, the absence of qualitative data means the learners' subjective experiences and perceptions of DST remain unexplored. Finally, technological constraints among students from under-resourced backgrounds could affect the scalability of DST-based instruction. Future research should aim to address these limitations by expanding the sample size, extending the study duration, incorporating qualitative methods such as interviews and observations, and testing DST's adaptability in low-resource environments. Comparative studies exploring DST alongside other innovative methods such as game-based learning or AI-assisted instruction would further enrich the understanding of its relative effectiveness. In conclusion, the study affirms that DST is a powerful and practical instructional tool for vocabulary and grammar acquisition in second language classrooms. Its integration into English language teaching programs can lead to more engaging, meaningful, and learner-centered educational practices. As such, DST holds significant potential for modernizing language pedagogy and enhancing learning outcomes in multilingual and technologically evolving classrooms.

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