Multimodal Learning / Digital Storytelling in ESP Manado State Polytecnics Students

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ABSTRACT
This study explores how digital storytelling (DST) can support Electrical Engineering students in developing their technical oral communication skills, particularly when speaking anxiety widens the gap between what they know and how confidently they can present it. The research used a quantitative quasi experimental pretest–posttest control group design with 60 students, who were evenly assigned to an experimental group and a control group. In the experimental class, students followed a 15stage project cycle that started with a Web Quest based preparation task and moved on to writing technical narratives, recording technical voice-overs, and editing these recordings in sync with visual materials, before sharing their work with peers on digital platforms and delivering a final "making of" presentation. By the end of the intervention, students who experienced DST showed higher gains (M = 78.10, SD = 6.45) than those in the control group (M = 68.47, SD = 6.72), which corresponds to a large effect size (Cohen's d = 2.20). Taken together, these results suggest that asking students to reshape technical content into multimodal digital stories can meaningfully enhance their linguistic accuracy, fluency, and command of technical vocabulary in vocational ESP settings.

Keywords
Multimodal Learning; Digital Storytelling; ESP; Technical English; Vocational Learners

1. INTRODUCTION
In the contemporary global workforce, English proficiency has transitioned from a supplementary skill to a fundamental professional necessity for engineers [10]. For electrical engineering graduates, the capacity to interpret technical schematics must be matched by the ability to articulate complex insights verbally in professional international settings [6]. However, a persistent gap remains between technical expertise and communicative performance, often hindered by traditional, passive learning models and "speaking anxiety" among vocational learners [4]. The emergence of multimodal learning specifically through digital storytelling (DST) offers a transformative pedagogical bridge to address these challenges [9]. DST requires learners to synthesize linguistic, visual, and auditory resources to construct discipline-specific narratives [2]. By integrating technology-mediated tasks, DST encourages students to practice speaking[13] in a lower-anxiety environment through rehearsed production [7]. While the benefits of DST in general language contexts are well-documented, its specific application within the rigorous constraints of English for Specific Purposes (ESP) for vocational students remains an area of active scholarly inquiry [3]. This study aims to fill this void by investigating how a 15-stage DST project influences the speaking proficiency of engineering students at Politeknik Negeri Manado.

1.1 Digital Storytelling (DST)
Digital Storytelling is a sophisticated multimodal framework[13] that necessitates the strategic synthesis of linguistic, visual, and auditory modalities to construct discipline-specific narratives [2]. Within the context of technical education, DST functions as a transformative bridge between theoretical expertise and communicative oral performance. The implementation of DST in this study follows a rigorous 15-stage workflow, transitioning from initial WebQuest inquiries and topic selection to the creative scripting of technical narratives. This process is followed by a technical assembly phase, where learners execute voice-over recordings and synchronize audio-visual elements such as diagrams and background audio to produce a coherent digital artifact [9]. By enabling students to become creators of content rather than mere consumers, DST fosters a deep sense of ownership and agency over their linguistic development [7].

1.2 Multimedia Learning
The theoretical foundation of DST is rooted in the Cognitive Theory of Multimedia Learning, which posits that individuals learn more deeply from words and pictures than from words alone [1]. This theory suggests that the human brain processes information through two separate channels—visual and auditory and that learning is optimized when both channels are engaged simultaneously without exceeding cognitive capacity. In the context of ESP, the "multimodal advantage" of DST allows students to use visual scaffolding (such as circuit diagrams and technical animations) to support their oral explanations, thereby mitigating the cognitive load inherent in second-language production [10]. This dual-channel processing not only enhances the retention of technical vocabulary but also improves the overall coherence and fluency of the learners' speech [3].

2. RESEARCH METHOD
This study adopted a quantitative approach using a quasi-experimental, non-equivalent control group pretest–posttest design. This allowed for a systematic comparison in intact classroom settings where random assignment was not feasible.See

Table 1. Tabel tahapan DST (Initial, Creative, Technical, Social, Final)

Group	Pre-test	Treatment	Post-test
Experimental	Q1	DST-based instruction (X)	Q2
Control	Q3	Conventional instruction (-X)	Q4

2.1 Research Procedure

The Dissemination & Peer Review Phase required students to upload and share their completed stories via a digital platform, watch their classmates' work, and provide constructive feedback through structured forum discussions. Finally, the Reflection & Final Evaluation Phase concluded the process with a "making of" presentation, self-assessment forms, and a final survey aimed at measuring both perceived proficiency gains and student engagement with the multimodal learning experience. A summary of the core stages for completing the Digital Storytelling for ESP project is presented in

Table 2: DST (Initial, Creative, Technical, Social, Final)

Stage	Description of Activity
Initial	Pre-survey and learning DST principles via WebQuest
Creative	Topic selection, scripting of technical narratives, and video production
Technical	Voice-over recording and synchronized editing with visuals and background audio
Social	Sharing projects, peer-watching, and forum-based discussions
Final	"Making of" presentation, self-assessment, and final survey

2.2 Participants

The participants were 60 second-semester Electrical Engineering students (Ages 18–21). Both the experimental (n=30) and control groups (n=30) had similar baseline proficiency (A2–B1 level). Informed consent was obtained, and pseudonyms were used to maintain anonymity.

2.3 Data Collection & Procedure

1. Speaking Test: A 2-3 minutes task (technical explanation) scored via a CEFR-based rubric (1–5 scale).
2. Reliability: Two trained raters assessed the recordings, achieving an inter-rater reliability of Cohen's kappa > 0.85.
3. Procedure: Over six weeks, the experimental group engaged in DST projects (scripting and video creation), while the control group utilized role-plays and textbook activities.

Here are the indicators of the Digital Storytelling Project (DSP) in English, aligned with your ESP technical speaking context.

These indicators can be directly converted into analytic rubric items (e.g., 1-5 scale) to assess students' DST performance in terms of narrative quality, ESP speaking proficiency, and multimodal design.

Tabel 3. Indikator DSP

Dimension	Indicator
Context	States the technical problem/issue clearly (what, where, why it matters).
	Describes the technical setting and situation accurately.
Event	Presents a clear main technical event or process (procedure, troubleshooting, etc.).
	Highlights a key "turning point" related to the topic.
Insight	Explains why the event is important and what is learned from it.
	Links the insight explicitly to the ESP/technical context and objectives
Build-up & pace	Organizes the story into a clear beginning–middle–end structure.
	Maintains an appropriate narration pace with smooth transitions.
Closing	Summarizes the main message or answers the initial question.
	Offers technical recommendations, implications, or a reflective question
Position of storyteller	Uses a consistent point of view (technician/student/observer).
	Adds a personal touch showing ownership of the story.
Presentation & tone	Maintains an appropriate emotional tone (informative/reflective/persuasive).
	Aligns voice, music, and visuals with the intended tone.
Language (ESP speaking)	Demonstrates fluent speech with minimal fillers.
	Shows grammatical accuracy and correct use of technical vocabulary
	Uses clear discourse markers to ensure coherence.
Multimodal/technical	Matches visuals (diagrams, images, text) with the spoken narrative.
	Synchronizes audio and visuals; ensures clear sound and readable on-screen text.

2.4 Data Analysis

Data were analyzed using SPSS 26.0, employing descriptive statistics, paired-samples t-tests (within-group improvement), and independent-samples t-tests (between-group gain comparison), alongside Cohen's d for effect size.

3. FINDING AND DISCUSSION

3.1 Statistical Results

Data analysis using SPSS 26.0 revealed that both the experimental and control groups showed significant improvement in technical speaking scores from pretest to posttest ($p < .001$). However, the gains in the experimental group were significantly superior, $t(58) = 8.52$, $p < .001$, with the DST-integrated group attaining a higher posttest mean ($M = 78.10$, $SD = 6.45$) compared to the control group ($M = 68.47$, $SD = 6.72$). The calculated Cohen's d of 2.20 indicates a large effect size, suggesting that the DST intervention exerted a transformative impact on students' speaking proficiency in the ESP context.

3.2 Discussion: The Multimodal Advantage

The results underscore a significant "multimodal advantage" for students exposed to DST-based instruction. By utilizing tools such as Canva or Cap Cut, learners engaged in "rehearsed production," which encompassed scripting, recording, and revising their digital narratives in ways that naturally lowered the affective filter typically associated with speaking tasks in a foreign language. Unlike traditional role-plays and textbook-based oral drills, the DST process offered visual scaffolding that made technical vocabulary more memorable and supported the organization of complex content into coherent narrative structures.

The procedure implemented in this study ensured that learners were not merely producing a technical video, but were immersed in a recursive linguistic process integrating planning, rehearsal, and performance. As reflected in the Creative and Technical stages, the transition from scriptwriting to voice-over recording and synchronized editing provided multiple opportunities for students to revisit, refine, and re-record their spoken output in a low-anxiety environment, thereby enhancing fluency, accuracy, and coherence. Furthermore, the Social phase operationalized through sharing, peer-watching, and structured forum discussions extended the communicative demands beyond monologic presentation to interactive negotiation of meaning, as students were required to articulate feedback and defend their creative choices.

This multimodal ecology supports the argument that DST can effectively bridge the gap between technical knowledge and communicative performance in vocational ESP settings. By embedding language practice within meaningful design and collaboration tasks, DST aligns with contemporary views of language as a social and semiotic resource, while simultaneously preparing learners for the communicative demands of 21st-century engineering workplaces.

Table 4. Descriptive Statistics of Speaking Scores

Graphics	Top	In-between	Bottom
Tables	End	Last	First
Figures	Good	Similar	Very well

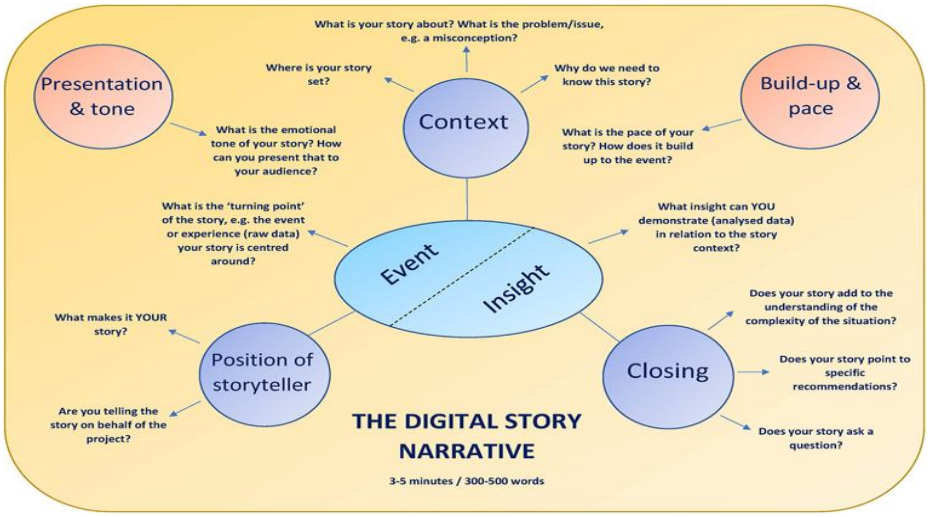

Fig. 1. The digital story narrative framework used in the DST project. source: N.G. Davey and G. Benjaminsen

4. CONCLUSION

Digital Storytelling significantly outperforms traditional methods in enhancing the technical speaking proficiency of engineering students in an ESP context. The multimodal workflow from conceptualization and scripting to production, peer sharing, and reflective presentation enables learners to integrate technical content with targeted language practice, thereby effectively bridging the gap between theoretical knowledge and communicative fluency. These findings highlight DST as a promising pedagogical model for vocational institutions seeking to cultivate both linguistic competence and digital literacy among future engineers for industry application

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