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Integrating GenAI in Creating Digital Storytelling as STEAM-Based English Tenses Material on Social Media

Alfiandy Kamal[1], Muhammad Chairil Imran[2]
[1,2]Universitas Islam Makassar

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Corresponding Author:
Alfisyahr
alfiandykamal@uim-makassar.ac.id
Universitas Islam Makassar

Abstract

This study aims to investigate the integration of GenAI in creating DSTs as a STEAM-based medium for learning English tenses and to determine students' acceptance of the created DSTs by using a simplified R&D by Alessi. This method consists of three phases: planning, design, and development. During the phases, multiple GenAI tools were employed for activities such as scripting, image and audio generation, editing, and subtitling. The results show that each GenAI has its own role and produces different responses, which require a curation process to ensure pedagogical content and appropriateness. The DST was also validated by two experts in content and media using Aiken's V, which confirmed strong validity (M = 0.98, M = 0.97). It was then disseminated through TikTok and Instagram. Furthermore, the thirty EFL learners participating in this study showed a significant improvement (p < 0.001) as determined by the Wilcoxon test. TAM results also showed a reliable score (0.87) and positive student acceptance (M = 4.12). These findings affirm that GenAI can effectively assist in creating DSTs, improve students' tense understanding, and are positively received by students. The findings also provide a practical GenAI-assisted DST workflow for EFL-STEAM contexts.

1. Introduction

Digital Storytelling (DST) has been proven as an effective and powerful pedagogical tool in today's education (Robin, 2008). It is unsurprising since DST integrates multimedia elements such as images, narration, and sound. Multimedia learning theory argues that learners are more likely to retain information when it is presented in both visual and verbal formats (Ajabshir, 2024). Numerous studies have shown the efficacy of DST as a learning medium and as a project-based activity that cultivates 21st-century competencies, including creativity, collaboration, and higher-order thinking skills (Hwang et al., 2023). Consequently, these studies strengthen DST's position as a relevant strategy and as a necessary skill for succeeding in today's digital educational context.

In the English as a Foreign Language (EFL) context, studies on DST also show similar results. DST is recognised as an engaging approach to language learning because it incorporates elements such as brainstorming, scripting, recording, storyboarding, and editing in its creation. It naturally integrates multiple language skills, such as writing (scripting), speaking (narration), and listening (reviewing), where it aligns holistically with language development goals (Ohler, 2013). Other studies have also confirmed that DST positively influences foreign language learning and writing development (Balaman, 2018; Chubko et al., 2020; Kamal & Dahniar, 2025; Tanrıkulu, 2022). By engaging students in the combined use of writing, reading, listening, and speaking, DST can strengthen linguistic competence and also stimulate higher-order thinking skills.

As asynchronous learning media, DST also serves as an effective tool in the classroom. Since DST is a video format, it offers a flexible, convenient way to learn (Ringeval et al., 2015). This will allow students to pause, rewind, or fast-forward the video content (Saluky & Nurul Bahiyah, 2023). This concept might promote a deeper understanding and a personalized way of learning, including content related to Science, Technology, Engineering, Arts, and Mathematics (STEAM), which is considered effective in 21st-century education. Besides, DST can also help transcend time zones. It makes learning more accessible, specifically to distance learners. Additionally, DST is also proven to be effective in improving students' confidence (Hava, 2021), where it serves as one of the cores of the success of learning as it drives students to engage, persist, and achieve the learning goal (Pintrich & De Groot, 1990; Schunk et al., 2014).

One way to foster DST and distance learning is through social media, which can support its dissemination. In learning contexts, social media can facilitate collaboration in distance learning by providing opportunities for learners to interact and collaborate even when separated by distance, making them as valuable tools as blended learning (Greenhow & Lewin, 2016). Besides, social media can promote and expand access to informal and self-directed learning (Dabbagh & Kitsantas, 2012). This means that social media allows students to study by themselves, which can support independent and lifelong learning. Moreover, social

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media can encourage reflection and knowledge sharing (Tess, 2013), thereby supporting reflective practice by providing students with spaces to publish and share their work, thereby strengthening critical thinking and knowledge construction.

Despite the benefits that DST and social media offer, they also come with challenges. One frequent issue is that creating digital storytelling is time-consuming, as creators must plan, brainstorm, script, record, and edit, which can overwhelm them (Kamal & Dahniar, 2025; Yang & Wu, 2012). Besides, another significant challenge is the lack of digital literacy (Perdana et al., 2025). It is due to a lack of technical skills in using multimedia tools effectively, creating disparities in the production of DST.

To address these issues, Generative Artificial Intelligence (GenAI) might offer a solution, given its demonstrated ability to generate multimedia elements. It is highly credible that GenAI can support the creation of DST based on several indicators. Previous studies show that GenAI is proven effective in reducing the time required for video production (Orak & Turan, 2024). Other studies also show that GenAI can produce a large corpus in seconds, making it suitable for scripting and narration text for DST (Farrokhnia et al., 2023; Li et al., 2024). GenAI, which uses text-to-speech technology, can also generate audio for the DST. Previous studies show that written text can be directly converted to audio (Barakat et al., 2024). Moreover, GenAI can produce images (Zhu et al., 2024). These GenAIs are more than enough to help co-create DST, specifically in the English-language context.

Since previous studies fail to explain how to integrate GenAI tools to specifically create DST, further investigation is needed. Moreover, studies on the use of GenAI integration in creating DST remain scarce. Therefore, to fill the gap, this study will investigate the integration of GenAI in creating DST in the EFL context. Moreover, this study also uses English tenses as DST material, specifically the simple present tense, which aligns with STEAM materials. Thus, this study is going to answer these research questions as follows:

1. How does the integration of GenAIs to develop digital storytelling function as STEAM-based English tenses material?
2. To what extent do students accept digital storytelling as STEAM-based English tenses material to improve their English tenses skills?

This study is expected to provide both theoretical and practical contributions. It is expected that this study will enrich the insight into the integration of GenAI in creating DST in English as a foreign language within a STEAM-based context. In practice, this study is expected to guide lecturers, teachers, and students in adopting GenAI in their teaching and learning activities, thereby simplifying the creation of DSTs. It will indeed help them in creating DST efficiently.

2. Method

This study employed the simplified R&D model from Alessi and Trollip, chosen for its efficient stages in creating and designing multimedia instructional products. It involves three stages: Planning, Designing, and Development, to investigate how GenAIs were utilized to create DST. The planning phase encompassed brainstorming, while the design phase involved scripting, image generation, and audio production. The development phase included editing, exporting, and video expert validation. To evaluate the effectiveness of the developed DST, it also included a one-group pre-test-post-test design.

In creating DSTs, several GenAIs were employed in each stage. The planning stage used ChatGPT, Gemini, and Deepseek for brainstorming. The design stage used LeonardoAI, Gemini, and ChatGPT to generate text for scripts and images. In this phase, the study also utilized Elevenlabs to generate audio from the script through a text-to-speech process. Furthermore, during the development stage, this study used Canva and CapCut to edit and export video files in the DST format.

After the development stage was completed, the created DSTs were disseminated via social media, including TikTok and Instagram. Moreover, the Technology Acceptance Model was employed to examine students' acceptance of the created DSTs (Davis & Granić, 2024).

Participants

Participants in this study were members of the English Club Meeting at Makassar Islamic University. There were 30 students participating in this study, selected using purposive and convenience sampling techniques (i.e., available students with a poor understanding of tenses). This sampling technique enabled the author to target relevant participants; however, it may lead to selection bias and limit the generalizability of the findings. Before selecting the participants, the authors conducted a brief interview with mentors about their poor understanding of tenses.

Instruments

Three instruments were used for data collection: the expert validation sheet, the TAM questionnaire, and the multiple-choice test. The first instrument was used to figure out the validity of the created DSTs. This instrument was filled out by two content experts and two media experts. The content expert consisted of one associate professor in English literature, and the other was a senior lecturer in English education. Meanwhile, the media experts consisted of a lecture on informatics technology and a design graphics instructor. Both media experts have TOEFL ITP scores above 500. The validation sheet for both content and media consisted of 16 items.

Meanwhile, for the second instrument, a 10-item questionnaire was adapted from the Technology Acceptance Model to assess students' acceptance of

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the created DSTs, whether positive or negative. The items were grouped into two categories, namely Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). The questionnaire used a 5-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). One item was reverse-coded to reduce response bias.

To assess the students' achievement, this study also employed a multiple-choice test developed by the authors comprising 20 items. The scores were classified into criterion-referenced categories (Kronholz, 2012; Sabbott, 2013): Low: 0–11 correct answers (≤59%); Medium: 12–15 correct answers (60–75%); High: 16–20 correct answers (≥76%).

Data collection and analysis

Data were collected in four phases. First, a pre-test was administered to the participants. The data were then analyzed to determine students' initial understanding of the simple present tense. In this phase, descriptive statistics were used to determine the pre-test's mean and standard deviation.

Second was the process of integrating GenAI in creating DSTs. In this phase, DST was planned to be 3-6 minutes in length to support optimizing students' engagement and learning effectiveness (Guo et al., 2014). The DST discussed one main topic, which was "Water boils at 100 degrees Celsius." This topic was selected because the material is suitable for A1 students and is also used in several grammar books as a typical example of the simple present tense to express scientific facts and general truths (Azar & Hagen, 2011; Murphy, 2019; Swan, 2016).

In addition, the topic relates to STEAM because it involves a fundamental science concept. Since the topic covered four sub-materials, the DSTs were also divided into four videos. The objective of the first video was to inform about the function of the simple present tense; the second, about the positive sentence pattern; the third, about the negative sentence pattern; and the fourth, about the interrogative sentence pattern. After creation was complete, this phase used the validation expert sheet. The data were analyzed by using Aiken's V index (1985) to determine the DST's overall validity. A coefficient ≥ 0.80 was considered strong evidence of content validity.

And the third phase was the intervention. The created DSTs were introduced to the selected participants through TikTok and Instagram in four meetings that covered all four objectives of the DSTs. In each meeting, the students gathered in a Zoom meeting to learn the DST, and then they were asked to self-study from social media

Following the completion of the intervention, the final phase consisted of the post-test and the administration of the TAM questionnaire. The data from the pre-test and post-test were then examined using non-parametric statistics to determine significance. Meanwhile, for the TAM questionnaire, the mean score of all 16 items was calculated, with a neutral response (3.0) as the threshold for positive and negative acceptance. The reliability of TAM results was also analyzed

using Cronbach's alpha analysis, with > 0.60 as the acceptable threshold. All statistical analyses were conducted using SPSS and Microsoft Excel.

3. Result

The findings of this study are presented according to the stages of Alessi's model, namely planning, designing, and development phases, as presented below:

Planning Phase

Before planning the creation of the DST, a pre-test was conducted to assess students' understanding of the simple present tense. The results revealed that several students had low test scores, as shown in Table 2. The students with the low score were then purposively selected as participants in the study. To address the low score issue, a learning medium, in this case, DST, was planned.

In this planning phase, the focus was on four main points: brainstorming the topic and characters, deciding on the story/material, and determining the length of the videos. The topic chosen in this study was "*Water boils at 100 degrees Celsius.*" The character chosen was a veiled woman who serves as the narrator. Moreover, the story/material was divided into several parts. The first part was the introduction, which explained the topic at the beginning of the DST. The second one was the primary material. Before delving into the main material, the topic was bridged to the core ideas of the simple present tense, followed by an explanation of its objectives. The third was a summary of the material, followed by the fourth, which was a simple test.

For the duration of DST, the video was set to be 3-6 minutes long. After that, the study considered relevant GenAI to assist in creating the DSTs. The GenAIs were ChatGPT, Deepseek, Gemini, LeonardoAI, ElevenLabs, Canva, and CapCut.

Designing Phase

This design phase encompassed several activities as follows:

Scriptwriting

The scriptwriting activity used several GenAIs, including ChatGPT, DeepSeek, and Gemini. To utilize these tools effectively, an initial prompt is used as follows:

> "Write a short narration for a 3–6-minute Digital Storytelling for A1 students that explains the process of how water boils. The goal of the DST is to help students learn the simple present tense from a STEAM-based Material. At the beginning of the script, start by explaining the process of how water boils, and then bridge it to the sentence that relates to the simple present tense. Next, explain the function of the simple present tense. Also include some more examples and exercises."

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After the prompt was applied, the GenAIs responded differently, as shown in Figure 1.

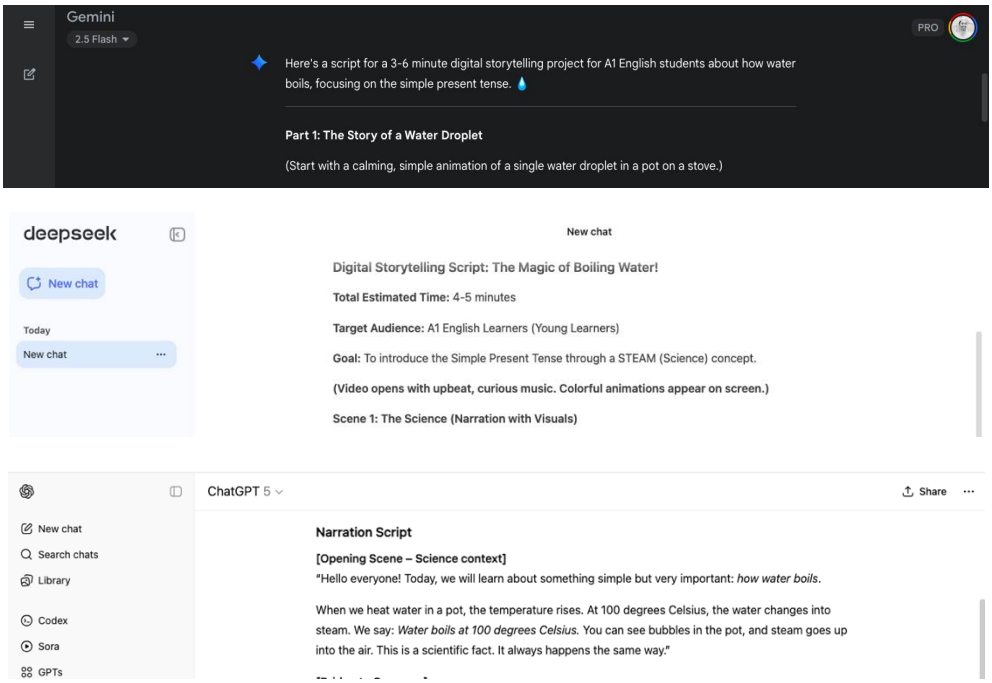

Figure 1. Gemini, Deepseek, ChatGPT Generated Script

During the script production phase, each GenAI generated different responses that were not immediately suitable for the DST. To ensure appropriateness, a curation process was conducted. For examples, in figure 1, Gemini generated *"Part 1: The story of a water droplet.* In this case, it was decided in the curation process that this response was not appropriate since it did not straightforwardly correlate to *"how does water boils".* Meanwhile DeepSeek generated "*They are very sleepy and move slowly*".

Similar to the response of Gemini, it was also unappropriate because it did not represent the true scientific truth about water". Moreover, for CharGPT, it was deemed appropriate to use it as a script for the DST, though it still required iterations and harmonization. Furthermore, after several iterations, the script-generating process stuck to ChatGPT as the primary GenAI tool to ensure consistency in tone and structure. The full script is described in Appendix A.

Image & Audio Generating Process

As the script was completed, the next phase involved creating images and audio. The creation was set to match the character in the planning phase. To create them, several GenAIs were employed, namely LeonardoAI, ElevenLabs, and Gemini. To utilize LeonardoAI and Gemini, an initial prompt was also employed, and the prompt was as follows:

> "Create a cartoon-style teenage Muslim girl character (age 15–18) wearing a white veil (hijab) and a long, loose, baggy skirt. Generate 8 full-body variations of the same character, each with a different pose and facial expression: (1) thinking, (2) confused, (3) surprised, (4) curious, (5) smiling, (6) inviting, (7) talking, (8) listening. Use a bright color palette dominated by dark green, black, and white. The background should be a plain light gray, clean and simple, making it easy to remove or edit later. Maintain a consistent cartoon style across all variations."

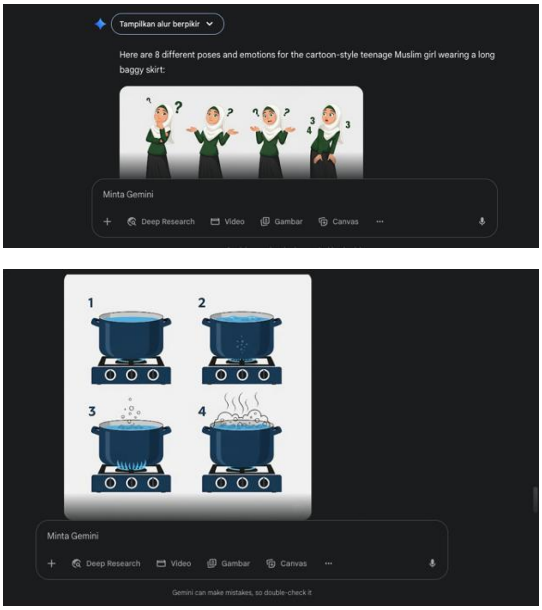

Figure 4. Several images generated in Gemini.

For the image generation phase, Gemini was chosen because, as shown in Figure 4, the results were considered sufficient for use as images for the DST. Finally, for convenience, the process was streamlined to use Gemini to create images of the DST characters. ChatGPT was also used to support the image generation, since the DSTs script required numerous images, such as the process of water boiling, pans, etc. Therefore, image generation was also conducted during conversations by using Gemini and ChatGPT to ensure image consistency.

After generating images, the next step is the audio production. To produce the audio, a prompt was not necessary. Instead of using a prompt, it utilized the text in the script. To ensure the audio matched the script, it was curated to ensure appropriate pronunciation, speed, and tone. In audio generation, the entire script was first pasted into the ElevenLabs text-to-voice column, and the audio was generated afterward. However, there were several moments where the audio was wrong and did not pronounce the word correctly. The script was generated step by step, meaning the audio was generated per statement or sentence to avoid

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mispronunciation. In this phase, the curator did not change to other GenAIs since ElevenLabs were natural enough to produce text-to-speech.

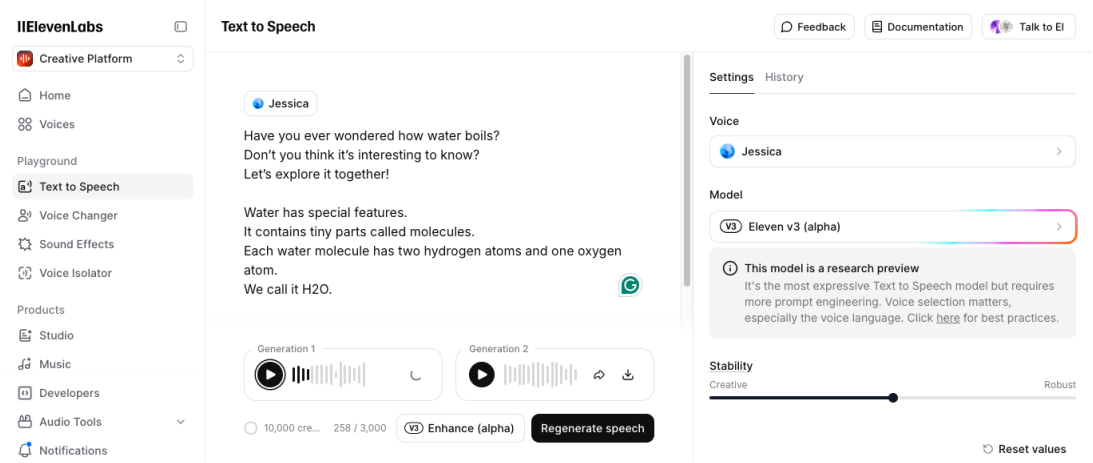

Figure 5. The layout of Elevenlabs

Development Phase

Editing & Exporting DST

After producing images and audio, the next stage was editing. In this stage, two tools were used: Canva for integrating and synchronizing all elements, such as scripts, images, and audio, and CapCut for generating subtitles. In the editing process, Canva proved very beneficial, as it provides text and elements and generates images. Some images and elements were created in Canva, including the water droplet, H2O chemical symbols, and sound-wave elements. Due to this advantage, the editing process was convenient because it used only one tool, without going back and forth between other GenAI tools. Finally, after completing the editing process, the subtitle was created in CapCut and was ready to be finalized and exported in video format.

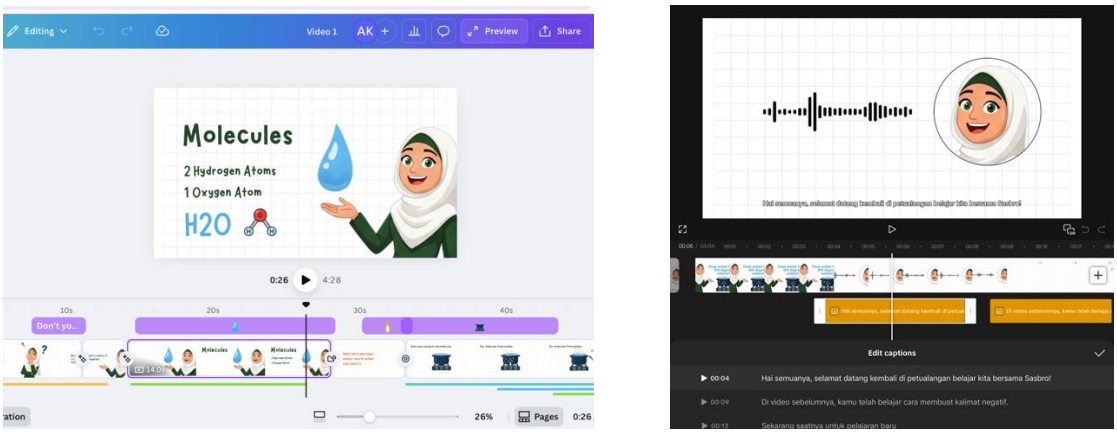

Figure 7. Storyboard Editing in Canva and subtitles in CapCut

Experts Validation

To ensure the validity of the videos, the DSTs were evaluated by two content experts and two media experts, each using 16 items. This study reveals that the generated GenAI DSTs produce valid decisions. The Aikens V analysis indicated that the mean score across all 16 items met the minimal standard of 0.80–1.00, which is interpreted as valid, as shown in Table 1. The mean scores of content experts and media experts are 0.98 and 0.97, respectively, both of which are indicated as valid.

Table 1. Aiken's V Coefficients for Content and Media Experts

Items	Content Experts	Media Experts
Mean	0,98	0,97

Since the DSTs were valid, they were then distributed by uploading them on Instagram and TikTok. After the DSTs were distributed, the link to the DSTs was sent to students. The students then studied them independently and finally did a post-test. The scores for the pre-test and post-test comparisons are shown in Table 2, along with the Shapiro-Wilk normality test in SPSS.

Table 2. Results of Students' Pre & Post Tests

Variables	Participants	Mean	Normality Test Sig. (p)
Pre-Test	30	9.20	0.001
Post-Test	30	14.8	0.009

The results of the normality test indicated that the pre-test score was 0.001 and the post-test score was 0.009, suggesting a non-parametric test since the p-values were < 0.05. It then decided to use the Wilcoxon test, the results of which can be seen in Table 3 below:

Table 3. Wilcoxon Test

Test	N	Sig. (p)
Pre/Post	30	0.000

The test above shows a statistically significant difference between the Pre-Test and Post-Test (**$p < 0.001$**), indicating that the students' Post-Test scores (M = 14.8) were substantially higher than their Pre-Test scores (M = 9.20). It suggests that there is a significant change in students' understanding of the simple present tense from digital storytelling.

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Students Acceptance

To determine students' acceptance of the created DST, this study employed the TAM questionnaire, and the results are presented in Table 4.

Table 4. Descriptive Statistics of TAM Responses

Category	Items	Mean
PEOU (Perceived Ease of Use)	1	4.17
	2	4.13
	3	4.07
	4*	4.10
	5	4.00
Average		**4.09**
PU (Perceived Usefulness)	6	4.10
	7	4.17
	8	4.23
	9	4.00
	10	4.20
Average		**4.14**
Total Average Mean		**4.12**
Reliability Cronbach's alpha		**0,87**

Table 4 above shows that the students' acceptance was generally positive. The average mean score of all items was 4.12, which is higher than the neutral threshold (3.0). In PEOU, the mean score was 4.09. It indicates that students find DST easy to use in learning. Furthermore, in PU, the mean score was 4.12. It indicates that students find that DST helps improve their understanding of the simple present tense. It shows that students find DST enjoyable, recognize its benefits for learning, and are most likely to use it to learn in the future. Besides, Table 4 also shows that the TAM questionnaire results were reliable, with a score of 0.87, which is greater than 0.60. So, it can be concluded that students accept STEAM-based digital storytelling to a positive extent in improving their English tenses skills.

4. Discussion

The study set out to figure out the process of integrating GenAI in creating DST that is pedagogically appropriate and to figure out the students' acceptance of the created DST. The results of this study indicate that integrating GenAI into the creation of STEAM-based digital storytelling (DST) was both pedagogically effective and well received by students, as Aiken's V analysis confirmed that both the content and the media were valid.

Moreover, students expressed positive acceptance of the created DST, indicating high perceived ease of use and usefulness. Additionally, learners found the GenAI-created DST easy to use, enjoyable, and beneficial for learning, a crucial outcome for the sustainable integration of technology in education. Furthermore, the students' understanding of the simple present tense has improved significantly. Taken together, these findings suggest that DST remains a powerful instructional tool in the 21st century (Robin, 2008). Similarly, these findings also support the learning theory that students learn better when presented with both visual and verbal modes (Ajabshir, 2024). Lastly, since DST is a C6-level activity, it supports and cultivates creativity and higher-order thinking, benefits that parallel the positive reception (Hwang et al., 2023).

In the field of language education, these findings reinforce prior studies that highlight DST's role in integrating multiple skills, including writing, speaking, and listening (Ohler, 2013), which enhance language competence (Balaman, 2018; Chubko et al., 2020; Kamal & Dahniar, 2025). Additionally, incorporating STEAM education at the beginning of DST would create a great hook for the DST, potentially inviting or triggering learners to share it on social media. The learning process will not be like learning English generally.

The hook is important in learning in the social media context because it can pique students' curiosity (Long et al., 2023; Maceviciute et al., 2023; Singh & Manjaly, 2022). By embedding tense material and practice in a science-based narrative ("water boils at 100°C"), the study demonstrated how a STEAM context can be integrated into language learning. This interdisciplinary dimension emphasises that DST's adaptability to diverse content areas, including language learning (Amirinejad & Rahimi, 2023; Santos et al., 2023; Yu & Wang, 2025).

Moreover, the TAM results confirm that learners found the GenAI-created DSTs easy to use, helpful, and enjoyable. The PEOU score (M = 4.09) suggests that DST disseminated through social media is easy to use. It then strengthens the argument that learning from DST on social media can promote and expand access to informal and self-directed learning in distance education (Dabbagh & Kitsantas, 2012; Greenhow & Lewin, 2016; Tess, 2013). The PU score (M = 4.14) also indicates that DST supports earlier findings that it can help students in the learning process (Balaman, 2018; Chubko et al., 2020).

Besides these findings, this study also provides insight into addressing one of the significant problems in creating DST. Earlier work noted that DST production is time-consuming and technically demanding (Kamal & Dahniar, 2025; Yang & Wu, 2012). By employing and integrating GenAI, the process of creating DST is efficient. This study streamlined the entire workflow from scriptwriting to image and audio generation, substantially reducing the effort required. With a targeted, clear prompt, scripts and images can be created in seconds, even though they still require selection, elimination, and curation.

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This will indeed assist teachers who lack design competencies. For instance, ChatGPT has proven to be an effective tool for rapidly generating coherent text, which assists in script creation (Farrokhnia et al., 2023). Moreover, ElevenLabs provides a naturalistic narration, which supports the viability of AI-driven text-to-speech (Barakat et al., 2024). Meanwhile, LeonardoAI, Gemini, ChatGPT, and Canva can produce images, indicating that GenAI can generate visuals suitable for educational purposes (Zhu et al., 2024). This confirms that employing GenAI will reduce video production time, and it illustrates how GenAI can support DST creation for teachers and learners with limited technical expertise (Orak & Turan, 2024).

Despite the effectiveness of the GenAI response, the study also highlights the need for human curation alongside AI generation. The GenAIs used in this study were operated through the authors' personalized account, which may introduce usage-driven bias. The Initial outputs from some GenAIs contained inaccuracies or irrelevant details, and the results may vary when generated from different user accounts. To ensure the outputs are appropriate for the DST, intervention from the DST maker is required. This finding adds insight to the literature that GenAI is best understood as a collaborative partner. Teachers ensure the pedagogical quality while AI accelerates the production. This suggests that, to maintain pedagogical quality when using technology such as GenAI, the teacher should be well-equipped with pedagogical knowledge, or Technological Pedagogical Content Knowledge (Celik, 2023; Mishra et al., 2023; Mishra & Koehler, 2006).

Importantly, integrating multiple GenAI tools into a single workflow, as shown in this study, makes a novel contribution. Earlier studies often focused on one AI function; this research offers a workflow that demonstrates how text, audio, and visuals can be integrated and harmonised into pedagogically valid DSTs. This, therefore, opens the possibility that the workflow might be replicated or adapted in other EFL contexts.

5. Conclusion

This study demonstrates that integrating GenAI can play a significant role in creating DST for English learning, particularly for STEAM-based materials. Each GenAI has a role and uniqueness that contribute to each phase of the DST production process, even though curation is still required to maintain pedagogical quality and learners' experience. This process signifies that GenAI can support the creation of DST without replacing human expertise and also accelerate technical production, which might help teachers reduce the technical process and focus on instructional value. This therefore concludes that a combination of GenAI and teachers' pedagogical knowledge can enhance the process of teaching media creation in general, while maintaining pedagogical quality.

Nevertheless, the study also comes with several limitations. First is the small sample, which restricts the generalizability of the results. The second is context-specific, which focuses only on one grammatical structure and a single STEAM topic, which narrows the scope. Additionally, the process of DST creation has not been standardized as a framework. The creators were lecturers who already possessed technological pedagogical content knowledge (TPACK), making this process might not be suitable for those who lack technological and pedagogical knowledge, for instance, pre-service teachers. Therefore, future research should expand this study by creating a GenAI DST model or framework that can be used by anyone who aligns with TPACK. Moreover, a larger sample and broader linguistic content are also recommended to enhance the continuity of this study's findings.

Overall, this study suggests that creating DST with GenAI offers a promising pathway to enhance English language education, particularly in developing teaching materials that are relevant to 21st-century education. By embracing GenAI ethically and critically, educators can harness its potential to design innovative tools or media that blend technological efficiency with pedagogical expertise.

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