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The Effect of Digital Storytelling via the Stop Motion Studio Application on the Speaking Proficiency of EFL Elementary Learners

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ABSTRACT

With growing interest in the use of educational technology to enhance language learning based on Vygotsky' s sociocultural frameworks, this study examined the effect of digital storytelling through the use of Stop Motion Studio application on the development of Iranian language learners' speaking skills at the elementary level.

Method: This study was conducted with a pretest-posttest design with a control group. Forty female language learners aged 12-15 years, selected based on a placement test, were randomly assigned to two experimental and control groups. The experimental group received their instruction through digital stories produced using Stop Motion Studio, while the control group received the same educational content and storytelling assignments without the use of technology. Speaking proficiency was assessed using two parallel versions of the Cambridge A2 Flyers speaking test, and participants' performance was measured based on fluency, accuracy, vocabulary range, engagement, and coherence. Data were analyzed using descriptive statistics and analysis of covariance.

Results: The results showed that after controlling for pretest scores, the educational intervention had a significant effect on posttest speech scores, $F(1, 37) = 32.02$, $p < .001$, $\eta^2 = .464$, indicating a high effect coefficient. The findings suggest that digital storytelling through stop-motion studio can effectively improve language learners' speaking proficiency through gradual support and collaborative meaning-making.

Conclusions: This study suggests that language teachers should integrate structured digital storytelling tasks into speech instruction to enhance learners' motivation and communicative development.

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1- Introduction

English is regarded as an important medium of communication in today's interconnected world and is the most widely studied language globally. Among the four primary language skills, listening, speaking, reading, and writing, speaking has a unique and crucial place (Marashi & Khavarian, 2018). It allows learners to express ideas, convey emotions, and interact with others in meaningful ways. According to Leong and Ahmadi (2017), developing speaking proficiency is fundamental for effective communication and for preventing conversational failures. However, acquiring spoken fluency remains one of the most difficult challenges for English as a Foreign Language (EFL) learners, particularly at the elementary level, due to the complex nature of producing, organizing, and processing spoken language in real time (Montemayor, 2021).

Although speaking is the most observable and often the most emphasized aspect of language learning, its development can be hindered by a range of pedagogical and contextual factors. In many EFL settings, learners receive limited exposure to authentic language use and are primarily taught through lecture-based methods that emphasize grammar and passive knowledge over production and fluency (Hwang et al., 2016; Yang & Chen, 2007). In such contexts, the focus of instruction is often on standardized tests and textbook content, with a few opportunities for learners to engage in spontaneous or meaningful spoken interactions. This challenge is observed in many EFL countries, where learners may spend years studying English at schools without developing the ability to communicate fluently.

The pressure to cover exam-based curricula in large classroom settings often makes teachers prioritize comprehension-based instruction over communicative teaching approaches (Jiang, 2017; Ngoc & Samad, 2020). Consequently, students struggle to develop spoken output, mainly due to fear of making mistakes or being judged by peers (Shen & Chiu, 2019). In such settings, speaking is often perceived demanding and learners may remain passive. To address these challenges, researchers and practitioners highlight the significance of technology-enhanced learning environments. Recent studies have shown that integrating digital tools into the classroom can improve learners' overall language skills, including their speaking proficiency (Dressman & Sadler, 2019; Nazari & Xodabande, 2020; Sauro & Zourou, 2019). In particular, interactive technologies offer opportunities for learners to use language in creative ways.

One approach that aligns well with these goals is Digital Storytelling (DST). Digital storytelling emerged in the early 1990s through the collaborative efforts of Dana Atchley and Joe Lambert. Their work resulted in the founding of the Center for Digital Storytelling (StoryCenter), which popularized the use of personal narratives combined with digital media (Lambert, 2006). Digital storytelling refers to the practice of combining personal narratives

with multimedia elements such as voiceovers, music, animations, and images to create short digital stories (Yang et al., 2022). Unlike traditional storytelling, which relies on oral or written delivery alone, DST integrates digital literacy and technological skills into the process of language production. This approach enriches the storytelling experience and consequently, supports the development of key speaking components such as fluency, accuracy, and coherence (Badawi et al., 2022; Huang, 2022; Murad et al., 2023).

According to Abderrahim and Plana (2021), digital storytelling is grounded in constructivist learning theory, which emphasizes the active role of learners in building knowledge through interaction, collaboration, and the use of real-world tools (Vygotsky & Cole, 1978). In Storytelling tasks, learners are not passive receivers of information but active creators of meaning. digital storytelling, when supported by technology, becomes a project-based learning activity that fosters language use in authentic communicative contexts. This not only enhances motivation but also develops learners' narrative abilities and oral fluency (Hwang et al., 2016; Fu et al., 2022).

One particularly effective technique for implementing digital storytelling is stop motion animation. Stop-motion animation functions as an integral component of digital storytelling by allowing creators to bring static objects to life through frame-by-frame photography (Hurtado Mazeyra et al., 2021). Among the available tools for stop motion animation, the Stop Motion Studio application has emerged as a particularly accessible and user-friendly platform. It allows learners to create animated stories using mobile devices and offers features such as audio recording and editing tools, making it appropriate for language learning contexts (Cateater, 2024). When used in language classrooms, Stop Motion Studio provides opportunities for learners to produce, revise, and share their spoken language in a creative and supportive environment (Nami, 2020). While some studies have examined digital storytelling's effects on speaking proficiency (Badawi et al., 2022; Huang, 2022; Murad et al., 2023; Nami, 2020), very few have focused specifically on mobile applications that support stop motion animation. Despite the benefits of using the Stop Motion Studio application in EFL settings, the effects of this tool remain underexplored. For instance, Peña Sánchez (2022) used Stop Motion Studio in an art class to promote communication and creativity, and the results revealed a significant positive effect.

Accordingly, in light of this research gap, the present study investigates the effect of digital storytelling through the Stop Motion Studio application on the speaking proficiency of Iranian elementary EFL learners. Focusing on key components of speaking, fluency, accuracy, range, interaction, and coherence, this study seeks to determine whether the integration of this application into digital storytelling tasks can enhance learners' oral performance. The findings

aim to contribute to the field of language education by offering practical insights into the design and implementation of technology-enhanced speaking instruction for young EFL learners.

2- Literature Review

2.1. Speaking Proficiency

Speaking is a central skill in language learning, allowing learners to convey ideas, express emotions, and engage in real-time communication. Bailey (2003) defines speaking as the productive aural/oral skill of producing systematic verbal utterances to convey meaning. This skill is widely recognized as the foundation of communicative competence in both first and foreign language acquisition. In the EFL context, speaking is often the most challenging skill to develop due to limited exposure to authentic interaction and insufficient opportunities for spontaneous language use (Shumin, 2002). Proficiency in speaking requires the integration of linguistic knowledge (vocabulary, grammar, and pronunciation) with cognitive processes such as planning, monitoring, and self-correction. It also demands fluency, accuracy, coherence, and appropriate interaction strategies (Timpe-Laughlin & Dombi, 2020).

Effective speaking instruction goes beyond repetition and controlled exercises. It necessitates authentic, meaningful communication tasks that prepare learners to interact in real-world settings (Hwang et al., 2016). Strategies such as project-based learning, role play, and peer collaboration have been widely promoted to increase learners' oral proficiency. Furthermore, language learning strategies, including cognitive, affective, and social techniques, have shown significant impacts on speaking development (Kehing & Yunus, 2021).

The digital age has introduced new possibilities for fostering speaking skills, particularly through online platforms and multimedia applications. Innovative solutions such as the implementation of social media-based language tasks help bridge the communication gap, allowing learners to practice fluency, coherence, and pronunciation (Idries et al., 2024). Project-based and interactive tasks not only increase learners' confidence but also support the internalization of language structures in meaningful contexts. Among the most effective innovations in this domain is the use of digital storytelling (DST), which merges language production with creative expression.

2.2. Digital Storytelling (DST)

In the early 1990s, Dana Atchley and Joe Lambert pioneered the concept of DST, which led to the establishment of the Center for Digital Storytelling (now StoryCenter). This initiative played a key role in promoting the integration of personal narratives with digital media (Lambert, 2006). DST involves the use of digital tools to create narrative-based projects that combine voice, text, images, and sound to tell stories (Hessler & Lambert, 2017). Technological advancements such as smartphones, user-friendly editing tools (e.g., iMovie), and mobile apps

have since democratized access to digital storytelling, making it feasible even in low-resource EFL classrooms (Beck & Neil, 2021).

DST has emerged as an impactful pedagogical tool in language learning, especially for developing speaking skills. This multisemiotic mode of expression allows learners to build and communicate meaning across different modalities, encouraging not just language use but creativity, autonomy, and collaboration (Hessler & Lambert, 2017). Kallinikou and Nicolaidou (2019) defined digital storytelling as a valuable resource for enhancing speaking skills. They stated that digital storytelling helps learners internalize language while producing and presenting personal stories. Through planning, scripting, rehearsing, recording, and sharing stories, students develop fluency, lexical range, and pronunciation. Studies have shown that this method boosts learner motivation and provides authentic communicative opportunities in the classroom (Rahman et al., 2022; Hava, 2021).

Several empirical studies support the efficacy of digital storytelling in developing speaking skills. For instance, Yang et al. (2022) used Prezi as a digital storytelling tool and found that learners who practiced speaking through DST significantly outperformed those using traditional methods. The results indicated improvements in fluency, coherence, and vocabulary use. Similarly, Kallinikou and Nicolaidou (2019) showed that DST not only enhances speaking performance but also supports learner confidence and self-expression in foreign language settings.

DST also contributes to the development of transversal skills such as critical thinking, digital literacy, and collaboration (Yu & Wang, 2025). In a study conducted by Du (2024), students using DST apps were able to visualize story scenes, practice structured narration, and improve oral presentation skills. This integration of visual and verbal modalities makes DST an ideal match for speaking instruction, particularly for young and elementary learners who benefit from multimodal input and output. Furthermore, DST's immersive nature fosters learner engagement and emotional investment. According to Hava (2021), DST boosts enthusiasm and confidence among language learners, resulting in improved communicative competence. Digital storytelling's potential for personalized learning also allows students to take ownership of their narratives, fostering autonomy and motivation.

The reviewed studies show that digital storytelling improves speaking skills in various educational contexts, but their approaches differ significantly in influencing factors such as learner characteristics, type of digital tool, and type of speech assessment. Research that has focused on young or elementary language learners has mainly emphasized the role of digital storytelling in increasing motivation, confidence, and the use of multimodal input (Du, 2024; Hava, 2021); While studies conducted on older or higher-level learners have reported

improvements in speaking skills such as fluency, coherence, and vocabulary range (Kallinikou & Nicolaidou, 2019; Yang et al., 2022). There are also significant differences in the digital tools used; some studies have used sophisticated, multimedia tools such as Prezi, while others have used simpler mobile-based tools, and these choices have influenced the level of narrative structure and linguistic focus of the activities. Furthermore, the scope of speech skill assessment is not the same across studies; some have focused on sub-skills such as pronunciation, vocabulary range, and structured narration, while others have addressed broader dimensions such as coherence, motivation, and communicative competence. These differences indicate that research on digital storytelling is necessary for under-researched groups, especially elementary language learners, and this reinforces the necessity of the present study, which examines speaking skills and willingness to communicate within the context of digital storytelling-based education.

2.3. Animation and Stop Motion Studio

According to Hurtado Mazeyra et al. (2021), stop-motion animation plays a vital role in digital storytelling by transforming still objects into animated sequences through the frame-by-frame capture of images. Within DST, a range of multimedia tools can be combined to produce hybrid narratives, which can be further enriched through the creative and interactive application of stop-motion animation techniques.

Research highlights the effectiveness of stop-motion storytelling in both content and language learning. Hoban and Nielsen (2013) showed that pre-service teachers who used stop-motion to explain scientific concepts enhanced both their subject knowledge and communication skills. In language learning, this visual medium allows learners to plan, narrate, and revise their stories, improving not only fluency and vocabulary use but also digital competence (Nielsen & Hoban, 2015). In response to the challenges posed by the COVID-19 pandemic, stop-motion DST was adopted to maintain learner engagement and continuity in language instruction (Marais, 2021). Learners working on animated stories remained involved and motivated, even in remote or hybrid learning environments. Digital storytelling through stop-motion animation fosters creativity, supports content understanding, and facilitates authentic communication, all of which are central to speaking proficiency.

One of the most accessible tools for stop-motion storytelling is the Stop Motion Studio application. According to Cateater (2024), this user-friendly program allows learners to animate stories using photos, drawings, and voiceovers. Students can record narration, add sound effects or background music, and edit their stories directly on mobile devices. The ease of use and creative flexibility make Stop Motion Studio an excellent platform for language educators seeking to implement digital storytelling in EFL classrooms. The integration of Stop Motion

Studio into language instruction has shown promise in several studies. For example, Peña Sánchez (2022) used the app in an art class to encourage students to craft social dialogues and thematic animations. Although not in a language learning context, this study demonstrated the application's potential for promoting expressive storytelling. Fu et al. (2022) used a similar storytelling tool, Toontastic, to foster speaking fluency and coherence. Their findings revealed that learners who engaged in animated DST significantly outperformed peers in speaking proficiency.

In language-focused studies, Nair and Yunus (2022) applied digital storytelling tools in a study and found that learners who used digital storytelling devices showed noticeable improvements in speaking accuracy and fluency. Similarly, Nami and Asadnia (2024) explored digital storytelling for vocabulary development in EFL contexts and found that learner-generated digital stories facilitated both lexical acquisition and oral proficiency. These findings confirm that animated storytelling tools such as Stop Motion Studio can enrich speaking instruction by combining narrative, visual, and linguistic elements in a meaningful way.

A review of previous research shows that despite extensive evidence of the potential of stop-motion animation to enhance language learning, these studies are heterogeneous in terms of educational context, level of learners, type of animation tool used, and speech components assessed. For example, research conducted in non-linguistic or interdisciplinary contexts, such as the studies of Hoban and Nielsen (2013) and Peña Sánchez (2022), has mainly focused on content comprehension, narrative, and general communication skills, and has examined the participation of teachers or university students; While language-focused research such as Nielsen and Hoban (2015), Nair and Yunus (2022), and Nami and Asadnia (2024) has focused on improving specific components of speech such as fluency, accuracy, vocabulary, or coherence. In terms of language level, some studies have studied adult learners or those with higher language ability, while beginner groups or children have received less attention. Another difference is evident in the animation tools: Some studies have used software such as Tonetastic or general animation tools, while there is little evidence specifically about Stop Motion Studio as a simple, accessible tool suitable for language classes. Furthermore, the scope of assessment of speaking skills in these works varies greatly, ranging from limited analyses of vocabulary or fluency to comprehensive assessments including coherence, accuracy, and communicative adequacy. These discrepancies indicate that there is still a significant gap in research related to the use of stop-motion studio for beginner-level Iranian language learners and multidimensional assessment of speaking proficiency, a gap that the present study attempts to address by providing detailed and systematic empirical evidence.

2-4- Theoretical Framework

Vygotsky's sociocultural theory (Vygotsky, 1978) forms the theoretical foundation of the present study and emphasizes the role of social interaction, mediation, and cultural tools in cognitive and linguistic development. One of the key concepts of this theory is the zone of proximal development (ZPD), which represents the gap between a learner's current level of ability and their potential level of performance with appropriate support. In this framework, scaffolding is defined as a set of temporary supports that allow a learner to perform an activity that he or she is unable to do alone, with the guidance of a teacher, peers, or intermediary tools (Wood et al., 1976). In second language learning, grounding through language modeling, feedback, task organization, and provision of multimodal resources enables language development in a social context (Lantolf & Thorne, 2006).

The use of the stop-motion studio in this study is an example of the practical realization of the ZPD in a multimodal, project-based environment. This digital tool functions as a cultural tool that enables the creation of mediated activities through features such as image composition, storytelling, audio recording and review, and the organization of sequences of events (Lantolf, 2011). The process of designing the story, selecting images, writing the text, recording and modifying the audio, and creating repeated versions engages learners in a cycle of planning, performing, receiving feedback, and revising; a cycle that is fully consistent with the process of mediated learning in Vygotsky's view. These digital activities are grounded in nature, as the visual structure of the story assists learners in organizing spoken content and narrative coherence, while audio review helps improve accuracy, fluency, and pronunciation (Swain, 2000). Also, interacting with peers in developing the narrative and presenting the project provides more opportunities for dialogue, negotiation of meaning, and linguistic production. Therefore, stop motion studio is not only a technological tool, but also a cultural mediator and mechanism for activating the ZPD, which directly leads to strengthening components of speech skills such as fluency, accuracy, vocabulary, coherence, and interaction.

3- Methodology

This study employed a quantitative research design, adopting a pre-test/post-test control group design as outlined by Ary et al. (2018), to investigate the effect of digital storytelling through the Stop Motion Studio application on the speaking proficiency of EFL elementary learners. The design allowed the researchers to measure and compare the speaking proficiency of learners before and after the implementation of the treatment in both experimental and control groups.

3-1 Participants

The participants of this study consisted of 40 female elementary EFL learners enrolled at Ghalame Parvaz Language Institute in Iran. These participants were selected from an initial

pool of 75 elementary-level students, based on their performance on a standardized placement test, the Guide to Pearson Test of English Young Learners (PTE Young Learners). Following the placement test, 40 eligible students were randomly assigned to either the experimental group or the control group, each comprising 20 participants. The participants' ages ranged from 12 to 15 years old, and all were studying English at the elementary level at the time of the study. All selected students had access to mobile phones and possessed the basic digital literacy skills necessary to operate mobile applications for educational purposes. We ensured that the experimental group students had access to mobile phones capable of running the Stop Motion Studio application. Additionally, to ensure their technical competence, one preparatory session was conducted before the treatment phase, during which students were explicitly trained on how to navigate and use the main features of the Stop Motion Studio app for creating digital stories.

3-2 Instrumentation

3.2.1. Placement Test (Pearson Test of English Young Learners)

To ensure that learners were at the same level, the Pearson Test of English for Children and Adolescents was administered as a placement test. The Pearson Test of English for Children and Adolescents is a validated international assessment designed to measure the English language proficiency of learners aged approximately 6 to 15 years and is presented in a communicative, topic-based format. This test is offered in four levels including Firstwords, Springboard, Quickmarch, and Breakthrough, and assesses integrated listening, reading, writing, and speaking skills through story-based tasks. In this study, the Quickmarch level, which is aligned with CEFR A1-A2 indicators according to the official test guide, was used as the basis for designing the adapted version. The adapted test content included story-based tasks and integrated listening, reading, writing, and speaking skills, and all items were selected and rearranged in accordance with the CEFR functional descriptors in the A2 domain.

To score the tests, a numerical scale from zero to 100 was defined, in which each item was scored based on indicators of accuracy, text comprehension, and communication ability. In order to determine the appropriate range for inclusion in the study, a pilot study was conducted with 20 language learners. The results showed that the range of 40 to 60 in the adapted version had an acceptable correlation ($r = .82$) with the expert teachers' language level estimates based on the CEFR A2 descriptors. In addition, two language assessment experts with experience in CEFR tests reviewed the adapted version and confirmed that this proficiency range is aligned with A2 indicators in terms of vocabulary complexity, comprehension, and ability to convey a message. Based on this empirical evidence and content validity, a range of 40 to 60 was chosen

as the final inclusion criterion to ensure that participants in both the control and experimental groups were at a realistic and referable A2 level in terms of language proficiency.

3.2.2. Pre-test and Post-test (A2 Flyers Cambridge Speaking Proficiency Test)

To measure learners' speaking proficiency before and after the intervention, two parallel versions of the A2 Flyers Cambridge English Speaking Proficiency Test were administered as a pre-test and post-test. This standardized test is aligned with the Common European Framework of Reference for Languages (CEFR) and evaluates multiple dimensions of speaking ability, including: Fluency, Accuracy, Lexical Range, Interactive Communication, and Coherence. Learners' speaking performances were scored based on the Cambridge Speaking Rubric, which provides detailed descriptors for each of the assessed components. The same rubric was used consistently across both testing phases to ensure objective comparison and reliable assessment of progress in speaking proficiency. Two trained raters score the speaking test independently.

Reliability of the speaking proficiency scores was examined through both inter-rater agreement and internal consistency. Two trained raters independently scored all performances using the Cambridge A2 Flyers Speaking Rubric, and inter-rater reliability analysis using ICC (two-way random, absolute agreement) revealed high agreement at both pre-test (ICC = 0.91) and post-test (ICC = 0.93). Additionally, Cronbach's alpha values indicated strong internal consistency among the five scoring criteria (fluency, accuracy, range, interaction, and coherence), with $\alpha = .88$ for pre-test and $\alpha = .90$ for post-test.

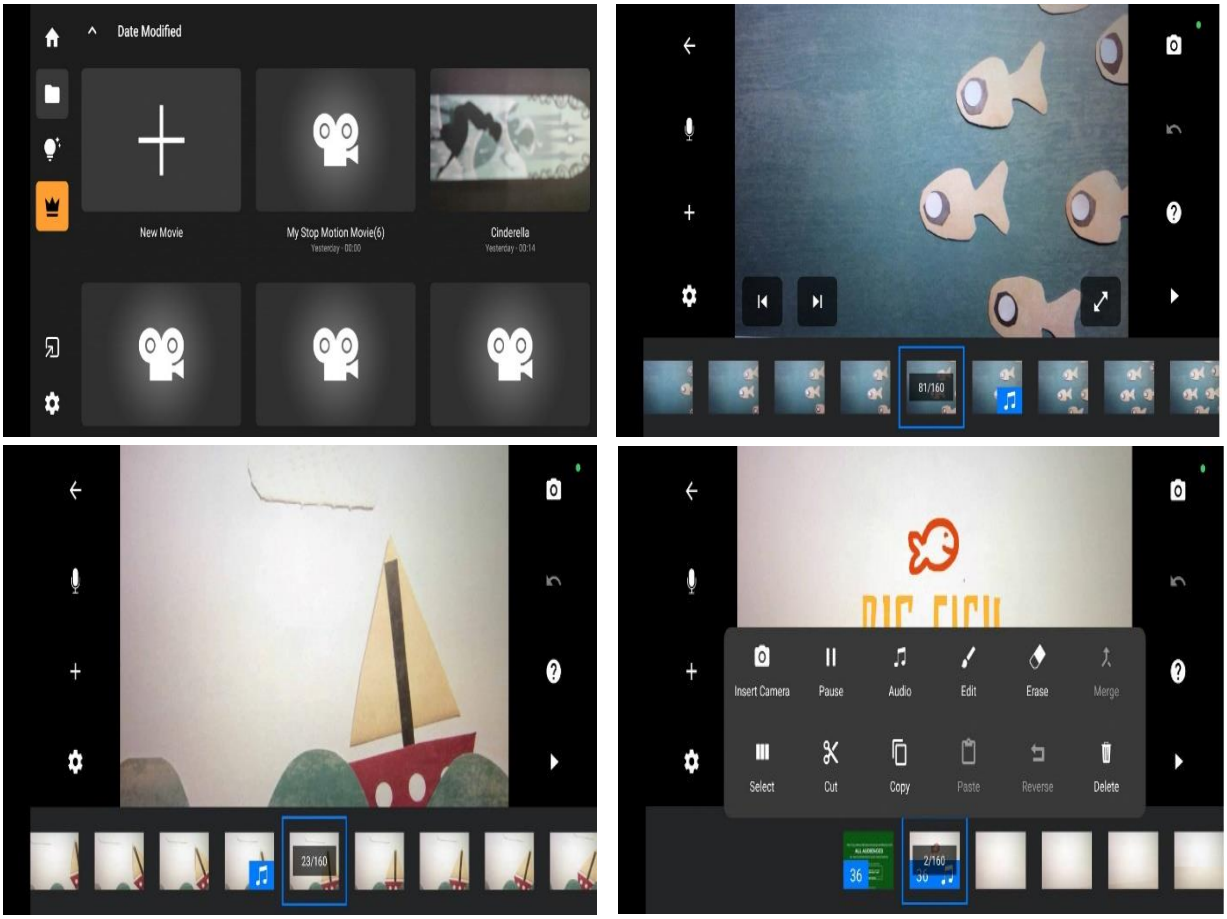
3.2.3. Stop Motion Studio

According to Cateater (2024), Stop Motion Studio is a powerful yet user-friendly program that enables users to bring their creative ideas to life by animating images and integrating voice, sound effects, and music. It functions as a multimedia movie-maker, offering learners a platform to take pictures, animate them, record their voice, and produce narrative-based videos that can be shared in class. The application is compatible with Android, iOS, and Windows, making it accessible across different devices. In this study, the mobile application version was used for its portability and ease of access during classroom sessions. Additionally, due to licensing restrictions, only the non-premium version of the application was used. While this version limits access to certain advanced features and results in lower image quality, it still enabled learners to complete all the necessary tasks for creating and narrating their digital stories, such as taking pictures, adding sound, and recording voiceovers. Figure 1 illustrates key features of the Stop Motion Studio application. The first image shows the home screen, where learners could start a new project or continue a previously saved one. The second image presents a built-in animation sample provided by the app (e.g., an animated fish) which was used for

initial practice and helped students understand how to create animations. The third image displays a sample story scene learners could use or replicate for their projects. The fourth image highlights several functional tools, including buttons for adding voice recordings, background sounds, and controlling playback speed.

Figure 1.

Key features of the Stop Motion Studio application



3-3 Research Procedure

Initially, 40 female elementary EFL learners were selected from among 75 students enrolled at Ghalame Parvaz Language Institute. Selection was based on scores obtained from the Guide to Pearson Test of English Young Learners, ensuring the homogeneity of participants. Before the treatment phase, all participants were given the A2 Flyers Cambridge Speaking Proficiency Test as a pre-test to determine their current speaking ability. The test assessed five key areas of speaking proficiency: fluency, accuracy, range, interaction, and coherence, based on the Cambridge rubric. Afterwards, participants were randomly assigned to experimental and control groups (20 learners in each). Both groups received instruction over 10 sessions, each lasting 95 minutes. However, the mode of delivery differed. The experimental group received

instruction through digital storytelling using the Stop Motion Studio application (Mobile App Version), and the control group covered the same content without digital tools, using conventional methods of oral storytelling and classroom discussion. It should be noted that to ensure the technical competence of experimental group students, one preparatory session was conducted before the treatment phase, during which students were explicitly trained on how to navigate and use the main features of the Stop Motion Studio app for creating digital stories.

The instructional content was structured around a narrative-based syllabus, designed specifically for speaking skill development. The syllabus was developed in consultation with two university professors with expertise in language teaching and storytelling. Each session focused on a different story topic, selected to match the learners' age and language proficiency level. The story topics were culturally relevant, age-appropriate, and thematically rich to encourage personal engagement and creativity. Examples of the topics included stories about daily routines, favorite animals, trips with family, or helping friends. These topics were used as the foundation for both traditional storytelling (control group), and digital storytelling (experimental group).

For the experimental group, the digital storytelling implementation followed the eight-stage framework proposed by Morra (2013), which guided students through the process of creating meaningful digital stories:

1. **Idea Development**: Learners selected a topic related to personal experiences, daily life, or fictional content.
2. **Research and Exploration**: Learners explored the topic through brainstorming, teacher-led discussions, and drawing from prior knowledge.
3. **Scriptwriting**: A short narrative script was written in simple English, either independently or with teacher support.
4. **Storyboarding**: Learners created a visual plan of their story, arranging events and identifying the visuals they needed to create or capture.
5. **Media Gathering**: Participants collected or drew images to represent each part of the story. Since the non-premium version of Stop Motion Studio limited gallery imports, learners captured photos using their mobile devices during the session.
6. **Story Assembly**: Learners animated the images in sequence, added voice recordings directly into the app, and adjusted the timing to match the narration.
7. **Sharing**: Once finalized, learners shared their videos with the class and received feedback from peers and the teacher. Projects could also be exported and shared outside the classroom via platforms like Telegram or WhatsApp.

8. **Reflection and Feedback**: Learners revisited their projects, listened to their own voices, identified areas for improvement, and practiced re-recording to enhance their fluency and pronunciation.

In contrast to the experimental group, the control group engaged in conventional storytelling activities without the use of any digital tools or applications. These learners received the same narrative content and instructional syllabus, including the story topics, but they performed their storytelling tasks through face-to-face interaction, relying on spoken language to convey meaning. Learners were encouraged to use their imagination to sequence events, develop characters, and narrate their stories aloud in class. For example, in one session, learners in the control group received a printed storytelling template containing six blank frames. They were required to brainstorm a personal or fictional story, write a short description for each scene, practice their narrative in pairs, and finally present the story to the class without any technological tools. This approach preserved the core elements of narrative-based instruction while excluding the technological enhancement provided by the Stop Motion Studio application. Finally, following the instructional period, both groups took a post-test using an alternate version of the A2 Flyers Cambridge Speaking Proficiency Test. The same assessment criteria used in the pre-test were applied again to evaluate progress in speaking proficiency.

3-4 Data Analysis

After data collection, the elicited data were analyzed using both descriptive and inferential statistical methods through SPSS Software (Version 26). Initially, descriptive statistics (including means, frequencies, percentages, and standard deviations) were calculated to summarize the participants' performance in the placement test. Following this, to evaluate the impact of digital storytelling through the **Stop Motion Studio** application on learners' **speaking proficiency**, an **Analysis of Covariance (ANCOVA)** was conducted. ANCOVA was selected to statistically control for any **initial differences** between the groups' pre-test performance, ensuring that the results reflected the **effect of the treatment** rather than pre-existing proficiency levels.

4. Results and Discussion

4.1. Testing Assumptions for ANCOVA

To investigate whether there was a significant difference in speaking proficiency between the experimental and control groups after the intervention, an **Analysis of Covariance (ANCOVA)** was conducted. The **post-test speaking proficiency scores** were treated as the **dependent variable**, the **group** (experimental vs. control) as the **independent variable**, and the **pre-test speaking proficiency scores** as the **covariate**. Prior to running the ANCOVA, the

key assumptions recommended by Pallant (2020) were examined, including normality, homogeneity of variances, linearity, and independence of observations.

4.1.1. Normality

The **Kolmogorov-Smirnov** and **Shapiro-Wilk** tests were conducted to evaluate the normality of speaking proficiency scores. As shown in Table 1, both tests indicated non-significant results ($p > .05$), confirming that the assumption of normality was met.

Table 1

Tests of Normality

Test	**Statistic**	**df**	**Sig.**
Kolmogorov-Smirnov	.119	40	.161
Shapiro-Wilk	.929	40	.115

4-2. Homogeneity **of Variance**

Levene's test was used to assess the equality of error variances between groups. As shown in Table 2, the result was not significant ($p = .383 > .05$), indicating that the assumption of homogeneity of variance was met.

Table 2

Levene's Test of Equality of Error Variances

F	**df1**	**df2**	**Sig.**
.778	1	38	.383

Also, in order to check whether the assumption of homogeneity of regression slopes was met, the interaction of group × pretest score was tested in a preliminary ANCOVA model. The result showed that this interaction was not significant, $F(1, 36) = 0.84$, $p = .365$; therefore, the regression slopes were similar in the two groups and the assumption of homogeneity of slopes was met.

4.3. Descriptive Statistics

Descriptive statistics were computed for the speaking proficiency scores. Table 3 confirms that there were no missing cases among the 40 participants.

Table 3

Case Processing Summary

Cases	**Valid**	**Missing**	**Total**
N	40	0	40
%	100.0%	0.0%	100.0%

Table 4 provides detailed descriptive statistics, showing the overall distribution, central tendency, and variability of the speaking scores. The mean post-test speaking score was 6.17 (SD = .77), with a minimum of 4.00 and a maximum of 7.25.

Table 4

Descriptive Statistics of the Speaking Scores

Statistic	**Value**
Mean	6.1655
Std. Error	.12250
Std. Deviation	.77475
Variance	.600
Minimum	4.00
Maximum	7.25
Range	3.25
Median	6.20
Skewness	–.458
Kurtosis	–.265

In addition, in order to provide a more accurate picture of the intervention's impact, the means and standard deviations of the five components of speaking skill were also calculated. The results showed that the experimental group made greater progress than the control group in all components: fluency, accuracy, vocabulary range, interaction, and coherence (Table 5). The greatest improvements were in fluency, vocabulary, and coherence, respectively, consistent with the multifaceted and narrative-driven nature of digital storytelling. The control group also made modest but expected improvements from receiving regular classroom instruction.

Table 5

Means and standard deviations of pre-test and post-test in speaking subskills

Components of speaking	**Group**	**Pre-test mean**	**Pre-test STD**	**Post-test Mean**	**Post-test STD**
Fluency	Experimental	4.82	0.64	6.18	0.72
	Control	4.79	0.61	5.21	0.68
Accuracy	Experimental	4.75	0.59	6.05	0.70
	Control	4.70	0.57	5.10	0.65
Vocabulary Range	Experimental	4.90	0.66	6.22	0.73
	Control	4.87	0.63	5.15	0.69
Engagement	Experimental	4.95	0.62	6.30	0.75
	Control	4.92	0.60	5.25	0.67
Coherence	Experimental	4.88	0.58	6.15	0.71
	Control	4.84	0.56	5.18	0.66

4.4. ANCOVA Results

The ANCOVA revealed a statistically significant difference in post-test speaking proficiency scores between the experimental and control groups, after controlling for pre-test scores. Table 5 summarizes the ANCOVA results.

Table 6

Tests of Between-Subjects Effects

Source	SS	df	MS	F	Sig.	Partial η²
Corrected Model	11.157	2	5.578	16.846	.000	.477
Intercept	46.538	1	46.538	140.537	.000	.792
Pre-test (Covariate)	3.794	1	3.794	6.396	.016	.161
Group	10.605	1	10.605	32.024	.000	.464
Error	12.252	37	.331	—	—	—
Total	1546.945	40	—	—	—	—
Corrected Total	23.409	39	—	—	—	—

These results indicate that, after adjusting for pre-test scores, the experimental group significantly outperformed the control group on the post-test: $F(1, 37) = 32.024$, $p < .001$. The partial eta squared for the group effect was .464, which according to Lakens (2013), reflects a large effect size. This suggests that the digital storytelling intervention via Stop Motion Studio had a strong impact on improving speaking proficiency. Additionally, the adjusted R-squared value of .448 indicates that approximately 44.8% of the variance in post-test speaking scores could be explained by the combination of group membership and pre-test performance (Miles & Shevlin, 2001).

Overall, the findings of the present study revealed that the use of digital storytelling through the Stop Motion Studio application had a significant positive effect on the speaking proficiency of elementary EFL learners. The experimental group that engaged in digital storytelling activities demonstrated greater improvement in speaking outcomes compared to the control group, who received conventional storytelling instruction. This result is consistent with an emerging body of research indicating the pedagogical effectiveness of digital storytelling in promoting speaking skills among language learners (Badawi et al., 2022; Huang, 2022; Murad et al., 2023).

One reason for this progress can be found in the multifaceted and interactive nature of digital storytelling. Creating animated narratives provides opportunities for language learners to experience language input and output in a meaningful, engaging, and controllable format. According to Vygotsky's theory of the zone of proximal development, tasks that are slightly beyond the learner's independent ability and are supported through cultural tools and mediators have the greatest impact on cognitive and linguistic development. In this study, Stop Motion Studio software acted as a mediating tool, enabling the planning, recording, reviewing, and modifying of narratives. This recursive cycle, whose nature is consistent with the concept of scaffolding, created opportunities for learners to practice within their ZPD and gradually gain more control over their oral production. This mechanism is consistent with the findings of Du

(2024) and Hoban and Nielsen (2013), who have shown that narrative environments increase the frequency of practice, reflection, and control of language processing.

The significant gains in the speaking proficiency of the experimental group can be attributed to the unique affordances of digital storytelling and the multimodal environment offered by the Stop Motion Studio application. This tool enabled students to create animated stories by incorporating images, narration, and sound, allowing for a rich, immersive language learning experience. As Hwang et al. (2016) have suggested, multimedia storytelling engages both the verbal and visual channels of learners, stimulating their imagination and enhancing learning in accordance with the dual-channel theory of multimedia learning. The opportunity to combine voice recording with visual sequencing in Stop Motion Studio likely facilitated students' ability to articulate ideas more clearly, work on pronunciation, and improve fluency.

The observed outcomes can also be explained in terms of the relationship between multiple modes of meaning-making. The coordination of image, movement, sound, and narration forced learners to select more appropriate linguistic structures to achieve story coherence. This process, according to the results of Fu (2022) and Yu and Wang (2025), can lead to improved speech coherence, vocabulary selection, and fluency. Furthermore, the ability to record and listen to their own narratives repeatedly provided a kind of immediate feedback and self-regulation that is not available in traditional storytelling activities. This linguistic reflexivity is a likely reason for the experimental group's improvement in accuracy and fluency.

The motivational aspect of digital storytelling should also be acknowledged. As Hava (2021) argued, DST increases learner motivation and engagement, both of which are essential conditions for effective language learning. Similarly, Rahman et al. (2022) stated that digital storytelling offers a dynamic and interactive classroom environment that supports speaking development. The present study found that learners in the experimental group responded enthusiastically to the digital storytelling activities, and their improved speaking scores likely reflect both cognitive and affective gains. It is important to know that the integration of digital storytelling into language education not only improves traditional speaking skills but also fosters learner autonomy and creativity. Yu and Wang (2025) and Fu et al. (2022) have reported that students gain confidence in their oral abilities when they are actively involved in creating, editing, and presenting their digital stories. The ability to take ownership of the content and delivery of the story allows learners to become more independent and expressive, which aligns with the findings of the present study.

From a practical standpoint, digital storytelling encourages learners to rehearse, revise, and re-record their stories, leading to deeper engagement and more refined speaking output. As Yu and Wang (2025) observed, digital storytelling contributes to a broader range of skill

development, including speaking, writing, technology use, and presentation skills. The recursive nature of digital storytelling, where students script, record, listen to, and modify their stories, provides valuable opportunities for self-monitoring and correction, ultimately improving their speaking proficiency. Moreover, as Kallinikou and Nicolaidou (2019) noted, the interactive and multimedia features of digital storytelling tools foster oral language development by offering learners a platform to creatively organize and verbalize their thoughts. The findings from the present study confirm this by showing that learners exposed to the Stop Motion Studio tool were more effective in delivering coherent, fluent, and accurate oral narratives.

Furthermore, the benefits of DST are not restricted to one specific language or context. Studies conducted in multiple countries and languages (Badawi et al. 2022; Hoban & Nielsen, 2013; Kallinikou & Nicolaidou, 2019; Nami & Asadnia, 2024) have confirmed the applicability of digital storytelling in diverse educational settings. This cross-contextual evidence reinforces the idea that the Stop Motion Studio platform can be successfully integrated into English language classrooms across different cultural and linguistic backgrounds. Another valuable aspect of the digital storytelling approach is its capacity to enhance both receptive and productive skills. Nair and Yunus (2021) noted that digital storytelling improves not only speaking but also reading, listening, and presentation skills. This is particularly relevant in young learners' contexts, where integrated skills instruction can lead to more holistic language development. Similarly, Nair and Yunus (2021) conducted a systematic review and concluded that digital storytelling provides a platform for meaningful language use, which is crucial for speaking development.

5- Conclusion and Implications

This study investigated the effect of digital storytelling through the Stop Motion Studio application on the speaking proficiency of elementary EFL learners. The findings revealed that incorporating DST in the EFL classroom led to significant improvement in learners' speaking skills. Through the use of Stop Motion Studio, learners were given the opportunity to blend visual creativity with language output, which enhanced their engagement. The storytelling process supported learners in constructing narratives, organizing their thoughts, and rehearsing their speech in a meaningful context. In particular, the multimodal nature of Stop Motion Studio enabled learners to engage in speaking tasks with greater interest and ownership, enhancing both their motivation and articulation.

From a pedagogical standpoint, the findings indicate that digital storytelling can be an effective method for teaching speech in elementary English classes. Teachers can use Stop Motion Studio as a platform to design project-based, integrated, and collaborative assignments

that not only strengthen verbal skills but also digital literacy, creativity, and presentation skills. This result is consistent with project-based and multiliteracies language teaching approaches and suggests that digital tools, if properly designed, can create opportunities for meaningful language production. In the Iranian context, where natural communication opportunities are limited, these tools can provide a substitute for real interactions and help grow oral production. Furthermore, the implications of this study are wide-ranging. Curriculum designers should consider embedding digital storytelling activities into language syllabi, especially at beginner levels, to enhance communicative competence and learner autonomy. Teacher training programs should also prioritize equipping instructors with the technical and pedagogical skills needed to effectively implement digital storytelling strategies in the classroom.

It should be noted that similar to other studies, the present study is not without limitations. The participants were limited to female learners aged 12–15 in a single language institute in Iran, which may limit the generalizability of the results to other demographics or educational contexts. Comparative studies may also examine the effectiveness of different digital storytelling tools across various age groups, language levels, or cultural contexts to identify best practices in implementing technology-enhanced storytelling in EFL instruction.

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