Id: 1082776

Participatory Educational Research (PER)
Vol.9(6), pp. 89-112, November 2022
Available online at http://www.perjournal.com
ISSN: 2148-6123
http://dx.doi.org/10.17275/per.22.130.9.6

Digital Storytelling in an Online EFL Course: Influences on Speaking, Vocabulary, and Cognitive Load

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Article history
Received:
04.03.2022

Received in revised form:
29.05.2022

Accepted:
20.06.2022

Key words:
digital storytelling; English speaking skills; vocabulary achievement; cognitive load

Digital Storytelling (DS) is an alternative instructional tool for language teaching to make the relevant process more engaging through the use of technology and to facilitate effective language learning. This single case study explored the impact of DS in an online EFL lesson on speaking and vocabulary achievement in consideration to cognitive load effect. The study utilized mixed-design analysis strategies as quantitative tests (pre- and post-vocabulary test, speaking evaluation rubric, cognitive load scale) with 33 Turkish EFL learners studying at tertiary level who participated in an online English course and interviews with 21 volunteers. Quantitative findings revealed increased vocabulary achievement after DS use and improved English-speaking skills in terms of spoken grammar, vocabulary use, fluency and coherence, and pronunciation after repeated DS use in three stories, despite high level of cognitive load due to technical incompetency of the participants. In addition, the results obtained from the qualitative data match with the results of the quantitative data in terms of positive evaluations on the impact of DS for vocabulary use, error correction, sentence formation, pronunciation, and self-study. DS can also be effectively used in online EFL education by eliminating the drawbacks of students' digital incompetency at tertiary level. The results of this study are expected to shed light on the practitioners aiming to use DS in online language learning for teaching speaking and improving vocabulary achievement.

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Introduction

In the new Covid-19 pandemic times, teaching and learning English has met with even more challenges which have led language practitioners to look for innovative ways to cater to the needs and different learning styles of English language learners during online learning. Those challenges have been alleviated with attempts like the use of recent technology. Technology integration in language classrooms during online learning plays a vital role in effective communication skills. Jacobs (2010) states that technology integration in language classroom transforms passive learners to active ones and provides educators the opportunity to give feedback, thus, making the language learning process more interactive. Kawinkoonlasate (2019) believes that technology use in language classroom provides student engagement in class with active learning, cooperative-based learning, and creative thinking opportunities, and emphasizes that quality language learning depends on students' having an appropriate course designed with appropriate teaching methods and technologies. The Information and Communication Technologies (ICTs) are used both in social, economic, and educational matters for handling information (Bhattacharjee & Deb, 2016). ICTs are defined as any type of infrastructure and components for generating, transmitting, processing, storing, and distributing information (Erdoğdu & Erdoğdu, 2022). Some examples of ICTs in the literature are desktop and portable computers, recorders, cameras, data projectors, Microsoft Office applications, the Internet and related software, CD-ROMS, DVDs, mobile phones, e-dictionaries, educational games, interactive whiteboards in the educational settings, etc. (Çakıcı, 2017; Hennessy, Ruthven, & Brindley, 2005; Livingstone, 2012). The integration of ICTs in education has facilitated the dissemination of knowledge, paving the way for effective and enhanced education both in face-to-face and online settings. The ICTs have also revolutionized foreign language teaching and learning. The use of ICTs in foreign language teaching process helps students develop their language skills with easily accessible technology-oriented materials, online resources or virtual environments with hands-on practices while having fun via various software both in and outside the classroom environment through the Internet. Many studies have examined ICT use in English as a Foreign Language (EFL) context and indicated positive results, if properly implemented, as more fun and motivating lessons both for teachers and students, creating more interaction and higher learner autonomy with interesting learning activities, and facilitating the use of language skills alternately with media (Al-Munawwarah, 2014; Pardede, 2020; Uluyol & Şahin, 2016; Yang & Chang, 2012). Considering those benefits, various ICTs have been used for EFL teaching and learning.

Digital Storytelling

Digital storytelling (DS) is one of the most creative ways of teaching and learning English to make the process more interesting by blending traditional methods and technology. Lambert (2013) defines DS which originated in the 1990s and was developed by the Center of Digital Storytelling in America as the way of telling stories or personal narratives by utilizing digital technologies. DS is a powerful, technology enhanced learning approach and a constructivist instructional style used to facilitate technology-integrated, project-based, and student-centered learning experiences (Robin, 2016; Wu & Chen, 2020). DS is a wide concept including video games, PowerPoint presentations, and electronic photo albums but in educational contexts, it is a type of short, personal narrative genre with the utilization of such new media technology as high-quality sound and images (Vinogradova, Linville, & Bickel, 2011).

There are two methods of creating digital stories: teacher-created with the aim of presenting

teaching materials (Ramirez Verdugo & Belmonte, 2007; Rance-Roney, 2010; Robin, 2008; Shelton, Archambault, & Hale, 2017) and student-created with the aim of constructing deeper meaning by processing information (Liu, Wang, & Tai, 2016; Robin, 2008; Stewart & Gachago, 2016; Urstad et al., 2018). Yang, Chen, and Hung (2020) informed that student-created DS is primarily used in education across different educational levels and learner groups (early childhood, elementary, secondary, post-secondary, adults). Robin (2008) found in his study that digital stories created by students independently or in small groups provide maximum improvement in classroom.

DS can be a potent learning experience for students while engaging in creating their own digital stories as part of classroom with the use of latest technology to communicate effectively, thus, developing 21st century skills (Jakes & Brennan, 2005). Robin (2008) describes these skills as the combination of *digital literacy* which is the ability to communicate to discuss about matters, gain knowledge, and ask for assistance; *global literacy* which is the ability to read, describe, acknowledge, and investigate messages from a global perspective; *technology literacy* which is the ability to work with computers and other media to advance learning, output, and achievement; *visual literacy* which is the ability to comprehend, design, and exchange information through visual images; and *information literacy* which is the ability to discover, assess, and incorporate information. Thang et al. (2014) assert that DS improves *interactive communication* while converting materials into interactive media format and *interpersonal skills* while working in groups requiring share of knowledge, communication, and collaboration. It also improves *personal and social responsibility* while making decisions about which information to cover and how to convey messages most effectively. DS enhances *technology literacy* while learning how to use software and search on the Web in various ways to create videos and *basic and visual literacy* while comprehending the technology used. In addition, DS helps develop *relevant, high-quality products* while creating meaningful videos and *curiosity, creativity, and risk-taking* while creating videos to teach and raise awareness. They claim that all these skills are relevant to 21st century skills. Cruz and Orange (2016) claim that language learning helps learners achieve these 21st century skills as they (a) use numerous types of reasoning and critical thinking in solving problems, (b) communicate, share their ideas, and assess different points of view through a variety of technologies, (c) work in teams effectively taking responsibility, (d) use technology to find, form, and communicate information, (e) become self-motivated to learn, and (f) work respectfully within different social and cultural teams.

Studies on the Use of Digital Storytelling in Language Learning

Considering the potent role of DS in improving 21st century skills, DS is acknowledged as an effective tool for language learning. DS can be used in EFL classrooms to assist learning process and help develop communicative competence in a learner-centered environment (Razmi, Pourali, & Nozad, 2014). When students write their own scripts, record their own voices, mix with different types of multimedia, and present their stories to the audience, they interact with the language and use the target language in authentic ways, fostering meaningful learning (Kajder, 2006; Rance-Roney, 2008). Various studies in the literature present the use of DS for the development of such language skills as Writing (Balaman, 2018; Sepp & Bandi-Rao, 2015; Sudarmaji & Mulyana, 2020; Tanrıkulu, 2020) Reading (Anggeraini & Afifah, 2017; Rahimi & Yadollahi, 2017; Yoon, 2013), Listening (Cigerci & Gultekin, 2017; Loniza, Aslina, & Mazlina, 2018; Tahriri, Tous, & MovahedFar, 2015), and Speaking (Baghdasaryan, 2012; Wei, Siriyothin, & Lian, 2018; Yang, Chen, & Hung, 2020).

Baghdasaryan (2012) examined the use of DS as homework for developing learners' speaking skills and revealing their attitude towards the program applied in a mixed-method research and concluded that DS provided significant gains in learners' oral production and learners developed positive attitude towards DS use as homework. Wei, Siriyothin, and Lian (2018) investigated Chinese EFL major students' speaking skills in a 12-week DS intervention with 100 students. The experimental group students participated in DS intervention as in-and–out of classroom activities and the control group students received conventional whole-class instruction. They concluded that the experimental group outperformed the control group in speaking skills and students reported in their diaries about DS intervention as interesting, challenging, helpful and enjoyable, contributing to their autonomous learning as well. Yang, Chen, and Hung (2020) examined the effectiveness of DS on EFL learners' speaking and creative thinking with a two-group quasi-experimental pretest and posttest design in an eight-week interdisciplinary project. Their findings revealed that DS activities offered authentic and meaningful learning opportunities for student development and becoming proficient English speakers and creative thinkers.

There are also studies examining the effect of DS on vocabulary (Leong, Abidin, & Saibon, 2019; Samsi, 2016; Tajeri, Syal, & Marzban, 2017). Leong, Abidin and Saibon (2019) examined the impact of DS use on vocabulary learning of 6 (aged 11) Malaysian ESL learners with tablet-based DS application in 8 weeks. The data obtained through interviews, documentations and observations revealed enhanced vocabulary and positive attitude of the learners towards DS application as well as higher motivation for language learning in primary school. Samsi (2016) explored the effect of DS and dictionary compared to song lyrics on improving 8th grades' vocabulary mastery in pre-test, treatment, and post-test design. The research findings revealed higher vocabulary mastery with DS and dictionary. In another study, Tajeri, Syal and Marzban (2017) explored the benefits of using DS in language classes in terms of vocabulary and writing in a thirteen-week study with 20 post-graduate students and research scholars in a pretest and post-test quasi-experimental design. Their findings from multiple methods data collection and analysis with questionnaires, reflection logs, interviews, and observation indicated enhanced vocabulary levels and written skills and positive feelings about DS use.

Other variables examined in the context of DS in language learning were motivation (Kasami, 2017; Ono, 2014; Parsazadeh, Cheng, Wu, & Huang, 2020; Wu & Yang, 2008; Xie, 2016; Yoon, 2013), satisfaction (Hava, 2019), critical thinking skills (Yang & Wu, 2012), and student perceptions (Okumus, 2020; Tanrıkulu, 2020).

Teaching speaking in EFL classes

While teaching speaking in EFL classes, three main factors must be considered; (1) attention to pronunciation, grammar, and vocabulary; (2) opportunities to use speaking skills for real communication goals; and (3) opportunities for better fluency (Nation & Newton, 2009). However, speaking problems can be a major concern for learners, causing major challenges for effective EFL learning and communication practice. Various researchers examined the reasons for speaking difficulties and identified them as personal reasons such as lack of motivation, anxiety, fear of criticism upon making mistakes, lack of self-confidence, and native-language use; societal factors such as living in an environment with few opportunities to speak; and educational factors including teachers' perceptions, teaching strategies and curriculum (Al Hosni, 2014; Alzahrani, 2019; Djahimo, Bora, & Huan, 2018; Kara, Ayaz, & Dündar, 2017; Khotimah, Rusmanayanti, & Febriyanti, 2020; Kosar, 2020).

DS is offered as an effective way of overcoming these challenges. Al-Amri (2020) states that different aspects of EFL learners' communicative competence can be improved through DS. Studies focusing on the improvement of oral skills with DS yield positive results in other domains as well. Hava (2019) explored the effects of DS on 60 pre-service EFL students' motivation and satisfaction in a pre-experimental nine-week study. The results yielded significant improvements in motivation levels and speaking skills despite students' unwillingness to engage in future DS activities. Fu, Hang and Yeh (2021) examined how a specific DS tool influences learner engagement and speaking competence with 100 freshmen in a 18-week speaking and listening course in quasi-experimental design. Their results revealed significant progress as regards fluency and language use. In another study, Kimura (2012) examined the effectiveness of DS in improving oral reading fluency of 35 Japanese nursing students in terms of pacing, expression and volume, phrasing, and smoothness using Photo Story 3 software, and found that DS improved the targeted oral aspects. In addition, DS is reported to diminish shyness and help overcome anxiety as well as improving students' speaking proficiency in EFL classes (Meri-Yilan, 2020). DS can be a very powerful tool for addressing these factors with sounds, music, graphics, photographs formed by the learners while providing meaning with authentic opportunities to practice their learning.

Online learning, which is conducted synchronously or asynchronously from distance through various electronic devices with an internet connection (Gonzalez & Louis, 2018; Plaisance, 2018), is not unfamiliar but has been widespread globally during the global COVID-19 pandemic time. Notwithstanding the advantageous nature of online learning, teachers who are used to face-to-face classes may feel overwhelmed with technical or pedagogical challenges in moving to fully online environments (Subetki, 2021). Some of those challenges were reported as psychological factors, the online teaching methods, proficiency levels, and language skills to be covered in fully new online environments (Demuyakor, 2020; Karuppannan & Mohammed, 2020), loss of motivation (Chen & Hsu, 2020; Han & Hiver, 2018; Krisi, Nagar, & Knoll, 2020), feeling stressed and anxious (Al-Jarf, 2007; Krisi, Nagar, & Knoll, 2020), methodological problems in presenting and sharing information, performing assessment, and limited resources for internet connection (Basilaia & Kvavadze, 2020; Crawford et al.,2020; Shahzad et al.,2020). The challenges as feeling uncomfortable, hesitant and reluctant to speak or to spell the words correctly (Hernández & Flórez, 2020; Sayuti et al., 2020; Yen & Mohamad, 2020) in productive language skills such as writing and speaking may be overcome through task-based activities which support student engagement and interaction in online settings as well. Engagement in tasks can support learner motivation and achievement (Henrie, Halverson, & Graham, 2015; Reeve & Lee, 2014). Egbert (2020) claims that task-based learning can be utilized in online environments for learners who experience fear and chaos in their lives due to the pandemic. High engagement and interaction can be provided with DS (Niemi & Multisilta, 2016; Smeda, Dakich, & Sharda, 2014). One of the greatest challenges in online environments as described in abovementioned studies, interaction can be facilitated with DS projects allowing meaningful interactive communication with other participants (Prins, 2017).

Despite the growing number of research focusing on the use of DS in EFL classrooms, little research has explored the impact of DS during online learning on speaking skills, vocabulary improvement, and cognitive load which expresses the cognitive effort that learners spend while performing a targeted task. Therefore, the objectives of this study are to fill in this gap by investigating the impact of DS on EFL learners' speaking skills by considering the repeated DS application, to determine whether DS improves vocabulary achievement, and to assess the extent of the cognitive load brought about by DS while creating stories.

Cognitive Load

Cognitive Load theory assumes that knowledge is divided into two as biologically primary information (learning to listen and speak, learning to plan or self-regulate etc.) that is acquired unconsciously and essential for human survival and secondary information that requires explicit instruction and conscious effort (learning to read and write, a second language, mathematics, etc.) (Sweller, 2020). Secondary information is first processed in limited-duration working memory and then transferred to long-term memory for permanent use. According to Sweller et al. (2011), cognitive load is based on the limited cognitive capacity, and the structure and presentation of the learning tasks can hinder learners' information processing and storage. Mathy and Feldman (2012) asserts that the amount of mental load that memory can handle varies between five and nine units. The short-term memory is overloaded when the amount of information that the learner will process at the same time is exceeded (Güngör, 2010). The important thing is to present information by considering this capacity and to allow what is learned to be encoded into long-term memory by eliminating the situations that cause overloading (Kılıç & Karadeniz, 2004).

As foreign language learning heavily relies on the complex cognitive process of information processing, cognitive load is examined in various EFL studies. Demir (2022) explored the relationship between cognitive load and anxiety with EFL oral tests with 412 students at tertiary level and found that oral test anxiety increases cognitive load. Lin and Yu (2017) examined the impact of a mobile phone vocabulary learning application on the cognitive load of 32 Taiwanese eighth graders in a four-week program. They concluded that the examined program reduced the cognitive load of learning new vocabulary. In another study, Kilic (2014) examined the cognitive load of 52 teacher candidates while preparing DSs and concluded that DS preparation does not lead to cognitive load.

Research Questions

Drawing on the reviewed literature, this study aims to examine the impact of DS in an online EFL lesson on speaking and vocabulary achievement in consideration to cognitive load effect for Vocational School students. The following research questions are formulated to guide the study:

RQ1-Are there any effects of DS on the vocabulary improvement of EFL learners?

RQ2-Are there any effects of DS on the cognitive load of EFL learners?

RQ3-Are there any effects of repeated DS use on the speaking skills of EFL learners in terms of spoken grammar, vocabulary use, fluency and coherence, and pronunciation?

RQ4- Is there a relationship between English speaking skills and spoken grammar, vocabulary use, fluency and coherence, and pronunciation?

RQ5- How do the participants evaluate their experiences with Digital Storytelling?

Material and Methods

Research Design and Participants

This mixed-design case study which lasted for six weeks investigated the role of DS on the vocabulary use and speaking skills of students considering cognitive load factor. A

case study is an in-depth research design to understand and explore a complex issue in its natural setting (Crowe et al., 2011). A mixed-method study involves both quantitative and qualitative data collection or analysis methods in a single study (Creswell et al., 2003). This method allows the researcher to combine statistical trends (quantitative data) with stories and personal experiences (qualitative data) to better understand the research problem (Creswell, 2017). Therefore, this study used mixed-design method to get a detailed understanding of the problem. The study was conducted in the online environment through the LMS platform of the university. Using the convenience sampling method, a sample of 33 (14 males, 19 females) freshman Finance students enrolled in English 1 course at Common European Framework of Reference for Languages (CEFR) A1 level at the Vocational school of a Turkish state university were recruited to participate in the study. Convenience sampling is a type of nonrandom sampling in which participants meeting certain criteria or willing to participate within easy accessibility are included for the purpose of the study (Creswell& Poth, 2016). The implementation was a part of the course and the participants received no extra credit for participating in the study.

Data Collection

This study utilized quantitative and qualitative data collection procedures: a vocabulary test for academic achievement, a rubric to evaluate the English-speaking skills of the participants through their DS videos prepared in three drafts for quantitative data, the cognitive load questionnaire of one item, and eight semi-structured interview questions for qualitative data.

Vocabulary Test

The vocabulary test of 25 questions which aimed to examine the target vocabulary was adapted from the revision tests of the targeted three modules of the course book Smart Choice Starter. The test required students to write the correct vocabulary for the visuals given or complete the blanks with single or two-word phrases which were studied in three units of the coursebook before the implementation started. The test was administered as pre and posttests. The completely true answers were marked as 2 points, the answers with spelling errors as 1 point, and the wrong answers as 0, accounting 50 at most and 0 at least. A Pearson-correlation was computed to assess the test-retest reliability of the vocabulary test, r(33)= 0.959, indicating excellent reliability. Example items from the vocabulary test are given in Figure 1.

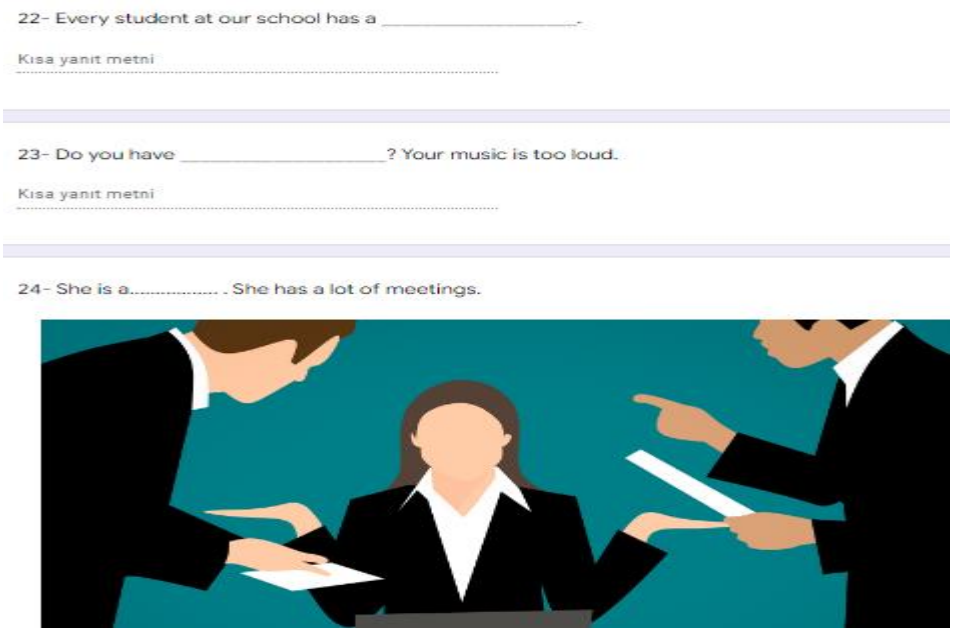

Figure 1. Examples from the vocabulary test

The Speaking Evaluation Rubric

The speaking evaluation rubric adapted from Alkan and Bümen, (2020) included the subcategories of Spoken Grammar, Vocabulary Use, Fluency and Coherence, and Pronunciation, item points ranging from 1 to 3, excluding 0 when no speaking performed at all, which is beyond the structure of this study. The highest score to get is 12 and the lowest score is 4. The speaking skill is analyzed as a combination of subcategories defined in the rubric.

The Cognitive Load Scale

The single-item 9-point rating Cognitive Load scale which was developed by Paas and Van Merrienboer (1993) and adapted to Turkish by Kılıç and Karadeniz (2004) with a satisfactory reliability level of Cronbach's Alpha coefficient 0.78 was administered to the learners after the application process was completed. The aim of the scale was to determine whether students were cognitively overloaded. The highest score and lowest score that could be obtained from the scale was nine and one, respectively. The midpoint in the scoring of the scale was five. Scores below five indicated that the student was not cognitively overloaded, and scores above five indicated that s/he was overloaded. The single item of the scale is shown in Figure 2.

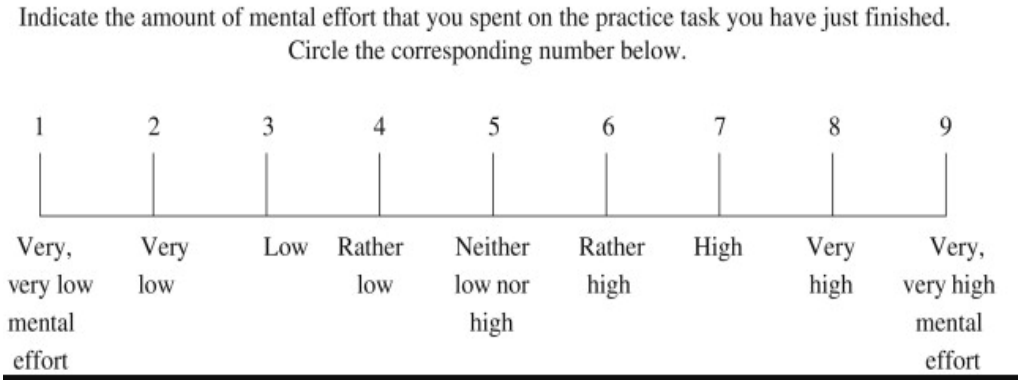

Figure 2. Cognitive Load scale

Interview questions

21 volunteer students were interviewed in the native language at the end of the implementation with three DSs and post-tests to get in-depth data about the process of digital storytelling. The semi-structured interviews consisted of eight questions with the aim of giving students an opportunity to express themselves. The interviews were conducted and recorded in the online environment of the university LMS. Sample questions were as follows:

- How do you think the use of digital Storytelling contributed to your development during the course?
- What are the favorite or unpleasant/troublesome aspects of the DS you developed?
- While preparing your DS, did you notice your pronunciation mistakes and make necessary changes after research about their correct pronunciations?
- How did you feel while your friends were watching the DS you developed in the online class?
- Evaluate the contributions of this DS-integrated English lesson to the development of the following: pronunciation, anxiety, expressing yourself, communication, participation in the course, fun, detecting and correcting error, motivation towards the lesson.

The flow of the study is as shown in Figure 3.

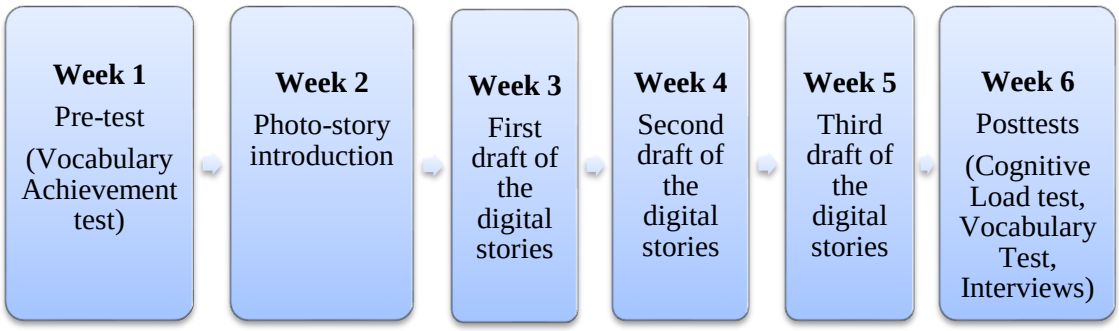

Figure 3. Flow of the study

Study Context

The study lasted for 6 weeks on the online Moodle platform of the university. After having 6 weeks of English lessons conducted in presentation and question-answer method on the online platform, students were given the vocabulary achievement pre-test including the vocabulary from the first three modules of the course book studied until then in the first week of current study. The suggested program, Windows Photo Story 3, to be used during the preparation of their DSs was introduced in the second week of the study. Students were presented with the features of the program as importing pictures and adding title, narrating the pictures, and recording the narration, selecting or creating music, saving the story for view, and viewing the final draft of the story. Following the presentation, students were given opportunities to prepare a draft for practice. However, those who did not have PCs and joined the classes through their mobile phones and had uploading challenges with the suggested program were free to use other editing programs with pictures, music, and narration features such as Viva Video film maker, Inshot, etc. Students were required to prepare three digital stories of at least one-minute-long introducing any person they chose using the structures and

vocabulary covered in the first three modules of the course book. They prepared the first draft of their DS in the third week, introduced it during the online class time, and the teacher gave feedback about the points to be improved in the next draft. The students prepared their second DS draft in the fourth week and the third-final draft in the fifth week of the study, all being watched in the online lessons of the related week with the same procedures of feedback. Those who could not participate in the lesson submitted their DS products on the online Moodle platform in the relevant week and received their feedback via the same platform. The students were given the same vocabulary test online as posttest as well as the Cognitive Load scale of one item in the sixth week. 21 volunteer students were interviewed online on the same online platform of the university, recorded, and the data were transcribed and analyzed descriptively. All the three DSs submitted on the online platform by the students were analyzed by the researchers, one of whom was the course instructor, in terms of Spoken Grammar, Vocabulary Use, Fluency and Coherence, and Pronunciation based on the rubric in Appendix A.

Data Analysis

Various quantitative tests were used in order to get data analysis through IBM Statistics SPSS (Version 21) program. Vocabulary achievement Pre and post test results were analyzed with dependent t-test to put forth the difference. One-way ANOVA for repeated measures was performed to determine whether test means of repeated DS videos in three drafts were different and to examine the effect of preparing DS repeatedly on the speaking skills of the learners. Multiple linear regression analysis was used to determine the relationship between English speaking skills and Spoken Grammar, Vocabulary Use, Fluency and Coherence, and Pronunciation. Finally, in order to get qualitative data about the use of DS, students were interviewed online, and the data were transcribed and analyzed descriptively by formulating themes and categories from the repeated data expressed by the interviewed participants.

Results

Quantitative Findings

Normal distribution of the data was tested with Kolmogorov-Smirnov and all the test variables were found as normally distributed ($p>0,05$).

Vocabulary Achievement

The first research question focused on the effect of DS on Vocabulary achievement. The participants were given the Vocabulary Achievement test before the application of DS and the same test after the application of DS. The results show that there is a statistically significant difference between the pre and posttests of the learners, $t_{(32)}=-2,773$; $p=0,009$; $p<0,05$. The participants' vocabulary achievement before DS application in pretest was $\bar{x}=15,93$ and it was $\bar{x}=19,48$, showing increase after DS in posttest, indicating the positive effect of DS on the vocabulary development of the learners. The result of the paired sample t-test is as shown in Table 1.

Table 1 *Paired Samples t-test Results for Vocabulary Achievement*

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-Vocabulary Achievement Post Vocabulary Achievement	-3,54545	7,34460	1,27853	-6,14974	-,94117	-2,773	32	,009

$P < .05$

Cognitive Load

The second set of research question aimed to examine the effect of DS use on the cognitive load level of the students. The students were given the Cognitive Load scale after the application of DS in order to find out how much they were cognitively overloaded while preparing their DS. The results as in Figure 4 indicate that 3 out of 33 students scored under five points (9,9 %) and 30 out of 33 students scored over 5 points (99,1%), which clearly expresses students' being cognitively overloaded while studying with DS.

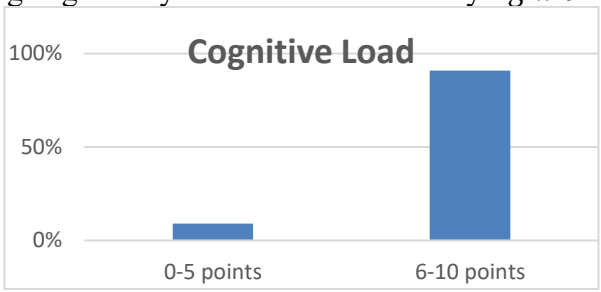

Figure 4. Cognitive Load Scores of the Students after the Application of DS.

English Speaking Skills

The third set of research question aimed to examine the effect of repeated DS use on the English speaking skills of the students. The DS videos of the students were analyzed to find out if there were any significant differences between the first, second, and third videos in the drafts in terms of Spoken grammar, Vocabulary use, Fluency and Coherence, and Pronunciation, the defined dimensions of the Speaking skills. The results of One-way ANOVA for repeated measures revealed a significant difference among the videos developed in time in terms of Spoken Grammar, $F_{(1,32)}$=523,831; p=,000; p<0,05 (Table 2). The mean scores were $\bar{x}$=1,96, $\bar{x}$=2,09, $\bar{x}$=2,30 in video 1,Video 2, and Video 3, respectively, for Spoken grammar, revealing continuous improvement. There was a statistically significant difference among the videos developed in terms of Vocabulary use, $F_{(1,32)}$=638,136; p=,000; p<0,05 (Table 3). The mean scores were $\bar{x}$=1,93, $\bar{x}$=2,15, $\bar{x}$=2,42 in video 1, Video 2, and Video 3, respectively, for Vocabulary use, revealing continuous improvement. There was a statistically significant difference among the videos developed in terms of Fluency & Coherence, $F_{(1,32)}$=737,159; p=,000; p<0,05 (Table 4). The mean scores were $\bar{x}$=1,87, $\bar{x}$=2,15, $\bar{x}$=2,45 in video 1, Video 2, and Video 3, respectively, for Fluency & Coherence, revealing continuous improvement. There was a statistically significant difference among the videos developed in terms of Pronunciation, $F_{(1,32)}$=584,361; p=,000; p<0,05 (Table 5). The mean

scores were x̄=1,84, x̄=2,09; x̄=2,45 in Video 1, Video 2, and Video 3, respectively, for Pronunciation, revealing continuous improvement. The results indicate positive effect of DS use on the improvement of speaking skills.

Table 2 *Results of One-Way ANOVA for Spoken Grammar, Videos 1,2,3*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Difference	Partial Squared	Eta
Intercept	445,455	1	445,455	523,831	,000	2-1,3-2	,942	
Error	27,212	32	,850					

P < .05

Table 3 *Results of One-Way ANOVA for Vocabulary use, Videos 1,2,3*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Difference	Partial Squared	Eta
Intercept	466,919	1	466,919	638,136	,000	2-1,3-2	,952	
Error	23,414	32	,732					

P < .05

Table 4 *Results of One-Way ANOVA for Fluency and Coherence, Videos 1,2,3*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Difference	Partial Squared	Eta
Intercept	462,586	1	462,586	737,159	,000	2-1,3-2	,958	
Error	20,081	32	,628					

P < .05

Table 5 *Results of One-Way ANOVA for Pronunciation, Videos 1,2,3*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Difference	Partial Squared	Eta
Intercept	449,707	1	449,707	584,361	,000	2-1,3-2	,948	
Error	24,626	32	,770					

P < .05

The fourth set of research question aimed to examine the relationship between English speaking skills and its subcategories. In order to find out the relationship between English speaking skills and Spoken grammar, Vocabulary use, Fluency and Coherence, and Pronunciation, Multiple Linear regression test was performed. Binary and partial correlations revealed a positive high-level relationship between English speaking skills and Spoken Grammar(r=0,857), English speaking skill and Vocabulary use (r=0,884); English speaking skills and Fluency and Coherence (r=0,851), and English-speaking skill and Pronunciation (r=834) (Table 6).

Table 6 *Pearson Correlation Results of Speaking elements*

		Speaking Total	Spk Gr Total	Voc. Total	Flu & Chr Total	Prnc. Total
Pearson Correlation	English Speaking	1,000	,857	,884	,851	,834
	Spoken Grammar	,857	1,000	,830	,559	,519
	Vocabulary use	,884	,830	1,000	,611	,573
	Fluency & Coherence	,851	,559	,611	1,000	,775
	Pronunciation	,834	,519	,573	,775	1,000
Sig. (1-tailed)	Speaking Total		,000	,000	,000	,000

Note. Spk Gr=Spoken Grammar, Voc= Vocabulary, Flu & Chr= Fluency & Coherence, Prnc= Pronunciation

Evaluation of the Experiences with DS

The last set of research question aimed to reveal the evaluations of the students on their experiences with DS. The reflections of the students about DS use in English lesson were examined to get in-depth information about the process. Semi-structured online interviews were carried out with 21 participants who volunteered to answer the interview questions. The content analysis of the interview questions revealed three themes as *advantages*, *disadvantage*s, *feelings*. The themes and categories list can be seen in Appendix B. 14 of 21 (67%) participants expressed the advantages of DS use under the categories of *vocabulary, pronunciation, sentence formation, speaking English, error-correction, self-study, and fun.* The participants emphasized the positive effects of DS on their vocabulary development, improvements in pronunciation as well as speech fluency and coherence. P7 expressed "*Digital storytelling is really nice as it develops our vocabulary and pronunciation at the same time.*" Besides, students expressed having the opportunity of forming their own meaningful and correct sentences with DS activities, leading to better speaking skills and higher interest in speaking English. P12 stated "*My pronunciation got better with DS…..and I could learn how to form correct sentences while preparing my DSs.*" Furthermore, the most often referred advantage of DS was for error correction by 18 of 33 (55%) participants. P16 expressed "*DS allows me to see my mistakes and correct them.*" The participants underlined the effect of DS on their self- study as well as having fun during that process. P21 stated "*I do something trying by myself and I can see that actually it is not difficult; I can pronounce the words, and it is fun. I realize that I can speak English…..and I am doing something trying by myself, which improves my English.*" Overall, the evaluations by the participants reflect the advantages of DS.

Though not as frequent as *advantages*, 7 of 21 (33%) participants expressed the disadvantages of DS use under the categories *of technical difficulties* and *methodological difficulties*. While participants generally expressed positive feelings about DS, their digital competency and technical opportunities may have led to answers about the drawbacks of DS use. P18 stated "*When I used the wrong word or pronounced incorrectly, I had to delete the audio narration and do it all over again, which was really troublesome for me.*" As well as technical problems, the duration of the video required and preparing three drafts were considered as troublesome. P6 expressed "*I had a problem while preparing my DS, because the software our teacher suggested runs on application but as I have no PC and use my mobile phone for online education, it did not go as I wished and it had poor quality. I really tried hard to do it as I wanted but it was failure for me……..*"*I had a lot of problems in setting the soundtrack of the story and sending it to teacher online, and I had to struggle with all these three times as it included three DS preparations."* Not all of the participants could express their feelings as they had not participated in the online class at that time.

The participants expressed their *feelings* about watching their DS products in online classes. The categories included *embarrassment*, *anxiety*, *self-confidence*, and *excitement* and *curiosity*. 7 of 21 (33%) expressed they felt embarrassed while watching their DS. P4 stated "*I felt embarrassed because it was the first time I had prepared a presentation like this and so many people watched it*." Another negative feeling about DS product watching was anxiety. P3 said "*I felt anxious and did not want it to be watched as I am shy about speaking English*." Unlike the negative feelings, some participants reported positive feelings as well. Some participants reported being excited about learning other people's opinions about their videos. P11 stated "*I was excited about what others would comment on my video*." Overall, various feelings were expressed about DS product watching.

Discussion and Conclusions

Our study took into account the effect of DS on vocabulary achievement, cognitive load, and speaking skills by creating three digital stories in an online English course at the tertiary level. To develop this inquiry, quantitative tests and surveys and qualitative interviews were used. Among the results gathered, one crucial finding displays the effect of DS on the vocabulary achievement. Students displayed improved success in vocabulary achievement after the use of DS and reported high benefits of DS on their vocabulary improvement. In line with this finding, Leong, Abidin, and Saibon (2019) reported in their study that DS use enables implicit vocabulary learning through guidance, practice, and assessment. Similarly, Samsi (2016) found improved student vocabulary mastery after they got treatment with digital storytelling and dictionary. Abdul-Ameer (2014) explored the effects of digital stories on vocabulary learning and found improved new vocabulary comprehension as well as improvements in the four basic language skills especially listening comprehension. Similar to the studies in the literature, the current study also reflects vocabulary improvement after three digital story preparation processes displaying the effect of DS practice in repeated use.

The second question in this study was the Cognitive load resulting from DS. According to Cognitive Load Theory (Sweller, 1988), working memory has a restricted capacity and, therefore, dealing with the visual or auditory input can be overloading for human memory. The cognitive load theory asserts that animation/diagram and on-screen text should not be introduced together to prevent the cognitive load in the visual channel. Kilic (2014) reported that more than half of the participants in her study had low cognitive load and, therefore, concluded that DS products do not increase cognitive load at a great level. Kılıç and Karadeniz (2004) state that the use of computers more in interactive media results in lower level of cognitive load. In contrast to their studies, at the application level, the students in this study reported high cognitive load in relation to their digital stories. A possible explanation for this might be that the students, as revealed in their interview results, came up with some technical difficulties in preparing their digital videos as for soundtrack, duration, editing, and loading. Another possible reason for this is that some students in our study, having to work on their mobile phones as they did not have PCs, confronted with difficulties in using the suggested software, Windows Photo story, which may explain their high level of Cognitive load. Zhang (2013) reported in his study that the features of the network in web-based learning may impede language learning, increasing cognitive load, which can be only decreased by proper and rational use of the web-based environment. Yee and Hargis (2012) claimed that Photo Story 3, the medium used in this study for creating digital stories, is handled easily and effectively for constructing professional-looking slideshows. However, the participants of this study experienced high cognitive load during their experiences with Photo story 3, which might be due to multiple elements included in the formation of slideshows, called videos in this study, as soundtrack, pictures, script writing as well as speaking a foreign language.

Our study also reports the positive effect of DS on English speaking skills. DS has the feature of trial and error, which, as Robin (2016) stated, allows students to find their own ways for solving problems and to take the responsibility of their own learning. Bashir, Azeem, and Dogar (2011) claimed that speaking involves mechanics which are pronunciation, grammar and vocabulary, implying the use of correct words in the correct place with the correct pronunciation. They also believe that it is the teacher's responsibility to help students produce grammatically correct, logically connected sentences with acceptable pronunciation, which can be facilitated through task-based activities requiring the use of language strategies.

Gernsbacher and St John (2013) emphasized the role of frequency stating that frequency has a great impact on memory, skill acquisition and learning, affecting various aspects of language learning as well. Bozorgian and Kanani (2017) reminded the behaviorists' assumptions that a process of habit formation through repetition results in language learning. They suggested with their study that providing learners with repeated storytelling tasks had a positive impact on learners speaking accuracy and fluency boosting their pronunciation and recall of the story. In line with the results of the previous studies in the literature suggesting the positive impact of repetition on speaking accuracy and fluency (Ahmadian & Tavakoli, 2011; Lynch & Maclean, 2013), the speaking abilities of the participants in our study improved at a considerable level with the repeated DS creation tasks considering correct spoken grammar, proper vocabulary use, fluent and coherent language, and correct pronunciation.

The emergence of Covid-19 pandemic resulted in a shift towards massive online learning on computerized stages, forcing educators to find the best ways to continue the educational process. Sufyan et al. (2020) reported the challenges of online learning as internet access and expense and limited feedback on the online platforms by their teachers. Muslimin and Harintama (2020) added anxiety to this list of challenges. Nartiningrum and Nugroho (2020) reported that another limitation of online learning for EFL learners was lack of effective interaction and feeling not committed to learning, which, participants suggest, can be overcome doing assignments. According to the responses of the participants in this study, DS provided more interaction in their online courses and students got engaged in speaking English with improved pronunciation while creating their digital stories.

This study set out to discover the impact of DS on vocabulary, cognitive load, and English-speaking skills. Our study made an important contribution to DS research by reflecting the impact of frequent DS use on gradual development of English-speaking skills in terms of spoken grammar, vocabulary use, fluency and coherence, and pronunciation. Notwithstanding the high level of cognitive load due to technical difficulties in using Photo Story 3, DS can be effectively used in online education by eliminating the drawbacks of digital incompetency.

There are also some implications derived from this study. When implementing an online EFL course, the use of targeted vocabulary may be improved with digital storytelling activities by facilitating learners to create their own stories within interesting contexts. In addition, students can improve their speaking skills in terms of spoken grammar, vocabulary, fluency and coherence, and pronunciation with repeated use of DS activities in online environments. However, the technical difficulties due to the software or medium used for preparing DS may be overwhelming and increase the cognitive load of the learners, therefore, should be considered and alleviated during the process of DS preparation.

Limitations

The scope of this research does not include some issues. First of all, due to fully online learning during the pandemic period, the findings could not be compared with a traditional face-to-face setting. Second, the students who could not participate in the lesson could only receive their feedback through recordings in the asynchronous online platform, which may have affected their corrections. Third, extraneous factors related to online facilities could not be eliminated in this study. Future studies might consider comparing face-to-face and online environments in terms of DS use with larger number of students in full participation in all the feedback sessions as well. In addition, speaking anxiety and motivation towards English language learning might be researched with DS in comparison with traditional learning.

Funding Statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

Author/s declare that they have no conflict of interest.

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Appendix A.

English Speaking Assessment Rubric for A1/A2 Levels

	Very Good **3 points**	**Satisfactory** **2 points**	**Needs improvement** **1 point**	No Speaking in the videos **(0 pt)**
Spoken Grammar	Generally sufficient, level appropriate and topic-related grammar to complete the task.	Frequent inaccuracies may arise, but attempts and manages to use mostly sufficient, level appropriate and topic-related grammatical structures	Mostly incorrect, insufficient use of grammatical structures to complete the tasks.	
Vocabulary	Makes use of sufficient, level-appropriate and topic related vocabulary with little or no search for it.	Uses level-appropriate and topic related vocabulary, but frequently repetitive.	Very limited range of vocabulary to express his/her ideas properly; mostly uses a number of isolated words and memorized phrases.	
Fluency& Coherence	Generally speaks promptly and fluently without hesitation. The utterances are phrases or short sentences, not just one word answers. Can use basic cohesive devices (and, but, so, because, firstly, then, etc.) with ease.	Slow, hesitant and irregular speech at times, few unnatural pauses; but is able to continue. Uses basic cohesive devices with relative ease.	Very slow, stumbling speech; no extended utterances; delayed responses. Limited use of basic cohesive devices.	
Pronunciation	Generally clear pronunciation of sounds; his/her speech is understandable	Unclear pronunciation of sounds at times, which does not interfere with communication	Major problems with pronunciation of sounds most of the time; often unintelligible	
TOTAL	**12 points**	**8 points**	**4 points**	

Appendix B

Themes and Categories

(1) Advantages
- Vocabulary
- Pronunciation
- Sentence formation
- Speaking English
- Error-correction
- Self-study
- Fun

(2) Disadvantages
- Technical difficulties
- Methodological difficulties

(3) Feelings
- Embarrassment
- Anxiety
- Self-confidence
- Excitement and curiosity