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A STUDY ON THE IMPACTS OF DIGITAL STORYTELLING ON EFL LEARNERS' SELF-EFFICACY AND ATTITUDES TOWARD EDUCATION TECHNOLOGIES

Research Article

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Abstract

This study aimed to investigate whether a digital storytelling (DS)-integrated pedagogy was effective for developing students' self-efficacy and attitudes toward educational technology. 43 English-as-a-foreign-language (EFL) English-major students from the School of Foreign Languages (SFL) at Sivas Cumhuriyet University (SCU) participated into this study. There were two groups in the study, namely experimental and control groups. The experimental group was exposed to DS-integrated instruction while no intervention was given to the control group. Control group students followed their regular course requirements. Before and after the experiment, both groups were tested by using a survey aiming to determine learners' self-efficacy beliefs for and attitudes towards the use of technology in education. The quantitative data indicated that the exposure to DS impacted the experimental group students' efficacy and attitudes toward educational technology in the positive direction. However, the control group students' scores did not exhibit a noticeable change. The qualitative data also documented that students heightened their self-efficacy and had a positive stance for the use of technology in their learning as a result of participation into this experiment. The resulting information can be helpful for those who are willing to create a teaching environment that meets the needs and expectations of 21st century students.

Keywords: digital storytelling, self-efficacy, attitudes, technology, multi-literacy skills, 21st century skills

1. Introduction

The ubiquitous use of technology has led to a seismic pedagogical shift in educational settings and forced educators to reshape their curriculum compatible with the modern era (Mikusa, 2015). For this reason, scholars are seeking for new ways grounded on a 21st century instructional approach (Best, Franklin, & Walthour, 2015) that caters for the needs and expectations of present-day students described as *Net Generation* (Oblinger & Oblinger, 2005; Tapscott, 1998), *digital natives* (Prensky, 2001), *Internet-savvy* (Levin & Arafeh, 2002), *tech-savvy* (NetDay, 2004) or *i*Generation (Ferriter & Garry, 2010). All these descriptions revolve around the idea of uniformly portraying today's young generation as having an innate ability to use technology comfortably (Prensky, 2001). But indeed such a conceptualization might be a myth (Helsper & Eynon, 2010; Kirschner & Bruyckere, 2017; Margaryan, Littlejohn, & Vojt, 2011; Thinyane, 2010) or an illusion born out of students' familiarity with technology depending on their daily use (Combes, 2006, p. 401) because "there also appears to be a significant proportion of young people who do not have the levels of access or technology skills predicted by proponents of the digital native idea" (Bennett, Maton, & Kervin, 2008, pp. 778-779).

In other words, not all learners may possess the so-called *intuitive* skills, such as digital literacy, spatial-visual, multi-tasking or information-seeking skills associated with using a range of digital technologies (Bennet et al., 2008; Combes, 2012; Margaryan et al., 2011; Thompson, 2013) needed to be considered truly technology literate (Ng, 2012). And the ones who appear to be comfortable with technological devices are largely engaged with basic

technology operations utilized for personal aims in informal settings (Heo, 2009), but not for educational purposes (Kennedy & Fox, 2013; Kumar, 2009; 2010). As suggested by Ng (2012), personal use of technology does not necessarily translate into educational use of technology and *comfort* with employing technology tools on daily basis might not be synonymous with *competency* to utilize these tools efficiently to promote learning (Kennedy, Judd, Churchward, Gray, & Krause, 2008; Oblinger & Hawkins, 2005, p. 12).

Another popular claim for a homogenous generation of digital natives is to assume today's students as always positive for welcoming new technologies in educational contexts, yet this may not be the case at all time (Combes, 2009; Margaryan et al., 2011), because there could also be "as much variation *within* the digital native generation as *between* the generations" (Bennett, et al., 2008, p. 779). It is evidenced that there are still some students in the digital age who are not interested in technology adoption in education (Clayton, Blumberg, & Auld, 2010; Margaryan et al., 2011; Thinyane, 2010), and who do not like the use of technology (specifically the Internet) as learning materials (Combes, 2009; 2012) or not prefer technology-based instruction (Littlejohn, Margaryan, & Vojt, 2010). But as suggested by Ertmer (1999) and Kiili, Kauppinen, Coiro and Utriainen (2016), for successful technology integration, the internal barriers of persons such as negative perceptions of competence, negative attitudes or resistance should be surmounted because the more students become confident and positive for technology use in education, the more enhanced is their participation in learning. Therefore, preparing students who have great comfort in and willingness for the integration of technology is a must in the contemporary education system.

Considering the invasive influence of technology on the way of learning and using a language, language education is no doubt without exception to this phenomenon (Afrilyasanti & Bashtomi, 2011; Eaton, 2010; Kanokpermpoon, 2012). That is, compatible with the modern era, language educators are expected to develop learners' competencies in technology skills and promote positive views on these skills in education settings (Eaton, 2010). Students' effective navigation of technology tools might, in turn, help language learners express themselves better in different modalities (Chun, Kern, & Smith, 2016), which is a prerequisite for an effective adaptation to the society that is constantly producing multi-layered texts in communications in today's world (Torres, Pascual y Cabo, & Beusterien, 2017). To this end, tangible and pedagogically sound methodologies not based on simply equipping classroom with technology, but letting a deliberate technology use through authentic, meaningful, and engaging ways are needed (Eady & Lockyer, 2013; Mikusa, 2015). DS, the combination of the narrative with non-verbal elements (images, sound, voiceover, or videos, etc.), is such a methodology creating a virtual learning environment in which students navigate digital technologies effectively (Robin, 2008; 2016). As a real-life technology-mediated pedagogy, DS allowing for the transfer of personal technological devices into educational venues easily (Heo, 2009) might eventually lead to a change in learners' efficacy and attitudes toward educational technologies in the positive direction. However, examining the effectiveness of DS on learners' self-reported self-efficacy beliefs and their attitudes for educational technologies remains unexplored in the literature.

1.1. Aim of the Study

Depending on the gap in the existing literature, this research study aims at exploring (a) the possible effect of exposure to DS on learners' (self-assessed) efficacy beliefs for the technology use in their learning behaviors and (b) the effectiveness of DS on learners' attitudes toward technology use in learning. In light of these purposes, the study addresses the research questions (RQs) below:

RQ 1: Does a DS experience have an impact on EFL learners' (perceived) self-efficacy beliefs for the use of technology in education?

RQ 2: Does a DS experience have an impact on EFL learners' attitude towards the use of technology in education?

The resulting information might add a lot to the existing literature as to the efficiency of a technology-rich application on enhancing the two affective constructs- *efficacy expectancy* and *attitudes*- towards technology use in educational settings through hands-on experiences gained by composing stories digitally.

2. Literature Review

2.1. Definition(s) and Description of Digital Storytelling

At the simplest form, DS refers to the new form of the traditional storytelling (Gregori-Signes, 2014; Figa, 2007). Various definitions exist in the literature for DS, also described as multimedia storytelling (Tang, 2016), interactive narratives (Schäfer, 2004), digital compositions (Tatum, 2009), or virtual storytelling (Figa, 2007), but all definitions center around the idea of mixing the narrative with multimedia devices such as images, graphics, music, sound and the author's voice (Gakhar, 2007; Gregori-Signes, 2014) to tell and share a story which generally lasts for 2-5 minutes (Rance-Roney, 2008).

DS emerged in the 1990s and gained popularity with the help of the Center for Digital Storytelling (CDS) (https://www.storycenter.org). Through this Center, the notion of DS has spread out and a lot of people from different fields of study have become interested in composing a digital story (Robin, 2008). The CDS has also shared the ways of composing a digital story highlighting its basic elements and suggested seven important elements of digital stories (Robin, 2006; Robin, 2008, p. 223) presented in Table 1:

Table 1. *Center for Digital Storytelling's seven elements of DS*

Elements	Description
Point of View	is the main point of the story
A Dramatic Question	is the question that attracts the audience's attention and is usually answered when the story is finalized
Emotional Content	refers to the points connecting the audience to the story in a personal and powerful way
Gift of Your Voice	is surrounding the narration with the voice of the author to make the story more effective and personal
The Power of Soundtrack	is the music corresponding the story in the background and thus supporting the storyline
Economy	is telling the content as economically as possible
Pacing	is the rhythm of the story

(Robin, 2006; Robin, 2008, p. 223)

In addition to these elements, the stages to compose an effective digital story are also suggested (Frazel, 2010):

- *the preparation stage* in which the students find a topic and write their scripts to be the basis for their digital stories and edit their scripts through feedback
- *the production stage* in which the students select the suitable multimedia elements (e.g., music, images, sound, or voiceover) accompanying their scripts and make their digital stories by using video editing tools (e.g., PhotoStory, iMovie or MovieMaker) or Web 2.0 applications
- *the presentation stage* in which the students show their stories through in-class presentations and post them to the web.

Although some variations can be seen in the process, by following more or less the same stages in the digital-story making, DS can be a valuable tool for educational contexts as a technology-rich application.

2.2. The Use of DS in Education (Specifically for Developing 21st Century Skills)

The previous research evidenced that DS offers numerous advantages such as creating an authentic environment for learning (Sadik, 2008), building language-driven knowledge (Van Gils, 2005), fostering critical thinking skills (Yang & Wu, 2012), interactive communication (Castañeda, 2013), creativity and inventive thinking (Porter, 2009), creating an agentive sense of self (Hull & Katz, 2006), promoting authorship (Skinner & Hagood, 2008), increasing engagement (Sadik, 2008), academic achievement and motivation (Yang & Wu, 2012), and language learning (Afrilyasanti & Bashtomi, 2011; Gimeno-Sanz, 2015; Yang & Wu, 2012).

DS also helps learners to gain 21st century skills by encouraging them to express themselves in different modes, to negotiate, to collaborate, to activate analytical thinking and to communicate interactively (NCREL & Metiri Group, 2003; Niemi, Harju, Vivitsou, Viitanen, & Multisilta, 2014; Robin, 2016). In the 21st century framework, effective communication is not limited to using language-only mode, but it covers using different channels and skills to convey the intended message (Torres et al., 2017). Therefore, considering the close relationship between technology and language for expression in different modes, in this new era, the educational standards need to be updated in a way that prepares especially language learners to gain multi-literacies vital for the 21st century citizenship (Kalantzis & Cope, 2008). In this sense, DS, grounded on the 21st century skills framework (Robin, 2008), might improve multiple literacies (Robin, 2016) in the language education settings. The evidence from the previous research (Castañeda, 2013; Thang, Mahmud, Ismail, & Zabidi, 2014; Vinogradova, 2011) confirmed that the use of DS had positive impacts on building 21st century skills by engaging language learners in the process of meaning-making in different modes, negotiation, collaboration, activating higher-order skills, managing complexity, and networking.

2.3. Impact of DS on Self-efficacy

In addition to the enhancement in 21st century skills as a result of participation into DS, this methodology can also positively impact learners' *perceived efficacy* towards technology skills, which are, as suggested by Robin (2016), inextricably linked to the 21st century skills.

Bandura (1997) describes self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Bandura (1986) claims that self-efficacy is one of the most influential conceptions in someone's everyday life execution (p. 390). He also expresses four important sources of self-efficacy as mastery experiences, vicarious experiences, social persuasion and emotional and physical reactions (Bandura, 1994, pp. 2-3).

Depending on the common sense, while modern-day students are often portrayed uniformly as self-efficacious for using digital technologies, it has been reported that a proportion of students still have limited skills in proper use of technology (Combos, 2006; 2012; Kennedy, et al., 2008; Margaryan et al., 2011; Ng, 2012; Thompson, 2013). And the ones characterized as digital natives feel comfortable with using digital devices in personal uses, but infusion of these technology skills in personal lives may not always ensure being efficacious in utilizing technology for educational purposes (Kennedy & Fox, 2013; Messineo & DeOllos, 2005). That is to say, the pedagogic use of technology in learning contexts may not be the characteristic feature of this Net generation (Kirschner & Brucykere,

2017). Therefore, today's students may also need to develop technology literacy skills specifically applicable for educational purposes, through active participation into authentic and relevant technology integrated activities such as DS (Heo, 2009; Sayavaranont & Wannapiroon, 2017). Digital-story preparation can change learners' beliefs in regards to the perceived technology proficiency level in the positive direction by creating a virtual environment in which learners effectively navigate technological tools to make meaning in different modes throughout the digital story making process including designing, shooting and evaluating steps (Robin, 2008).

In this vein, a small but growing amount of research evaluated the effectiveness of DS on learners' self-efficacy beliefs. Heo (2009) conducted such a study with the participation of 98 pre-service teachers whose major was English language teaching by testing the effect of experiencing DS on self-efficacy beliefs and dispositions toward educational technology in a pre- and posttest survey design. Before and after the implementation, a Likert scale survey was applied in order to assess the possible changes in the variables as a result of participating in a DS-integrated methodology. The results indicated positive changes in the researched foci after the DS-integrated implementation.

Similarly, Li and Morehead (2006) examined how a DS experience affected self-efficacy beliefs for technology use with 20 students from a mid-western American university, each of whom formed a digital story after six workshops. The data were collected by pre- and post-surveys and semi-structured interviews. The findings showed that DS was effective in teacher education programs in order to raise students' self-efficacy for technology use in education. As a more recent study, Kauppinen, Kiili, and Coiro (2018) also investigated the possible uses of DS in improving self-efficacy level for technology integration through self-evaluation reports administered following the DS implementation. The participants were 37 pre-service teachers who composed a digital story in small groups. The researchers reported that DS had a great potential to enhance learners' confidence for technology use in their learning.

Given these findings, it is safe to conclude that DS is a promising method to heighten prospective teachers' self-efficacy beliefs for the use of technology in education. However, these studies were notably conducted in pre-service teacher education programs; therefore, it might be misleading to generalize the results to other *learner populations*. Spicer's (2013) study may contribute to the literature in this sense by examining the use of DS to heighten confidence in technical skills from the learners' point of view. The study scrutinized whether DS impacted perceived self-efficacy for technical skills specifically in media production. There were 12 students participating to the study in which data were collected through pre- and posttest surveys and semi-structured interviews. The researcher concluded that an experience of digital story making affected learners' self-efficacy beliefs in technical skills in the positive direction. Castañeda and Rojas-Miesse (2016) also attempted to research whether DS was effective on the construct of self-efficacy towards technology use in education from the learners' perspectives in a one-semester mixed-methods study. The participants were 11 university level foreign language students. Quantitative data were gathered from pre- and posttest surveys. The researchers concluded that DS facilitated learners' perceptions of technology self-efficacy in a language learning environment.

2.4. The Impact of DS on Attitudes (toward Educational Technology)

In addition to ensuring some possible changes in the self-efficacy level after having hands-on experiences through technology-enhanced learning, DS, a technology-rich methodology, can also have the potential to affect the participants' attitudes toward educational technologies. *Attitude*, defined in the negative sense as negative dispositions, feelings or resistance toward a certain situation (Aiken, 1980), is needed to be overcome for effective

technology use in educational settings (Kiili et al., 2016). Opposing to the assertion of a homogeneous generation who unanimously expects a radical transformation in traditional education in a way that is equipped with technology (see Prensky, 2001; Tapscott, 1998, for discussion), some students may not be as favorable as assumed for the adoption of educational technologies (Margaryan et al., 2011; Bennet et al., 2008), presumably because the frequent and personal use of technology may not predict motivation for the educational technology (Margaryan et al., 2011; Mikusa, 2015). In order to make students more positive towards technology employment in education, as suggested by Heo, (2009) and Sadik (2008), there is a need for the exposure to real-life, meaningful experiences like DS that encourage positive perceptions of technology utilized for learning and further adoption.

Although the research focus is not on the attitude change, Yavuz Konokman and Yanpar Yelken (2016) investigated the effect of digital story-making on prospective teachers' resistance toward research and technology-oriented education with 50 participants at Mersin University in Turkey in two groups: one experimental group asked to compose a digital story through an inquiry-based learning approach and one control group asked to prepare a digital story through an explanatory teaching approach. The results indicated that digital storytelling changed the experimental group students' resistance toward technology-based instruction in the positive direction. Balaman (2016) also explored the effectiveness of DS on learners' attitudes toward instructional technologies with one group pre- and posttest research design with 20 students from Turkey. The students composed a digital story within a 14-week period of time. Data were gathered from a survey implemented before and after the experiment and semi-structured interviews when the implementation period was finalized. The results showed that DS experiences changed learners' attitudes in the positive direction even though the result is not statistically significant.

As seen from the above, DS can effectively change someone's attitudes, perceptions, perceived abilities and competences, all of which, as suggested by Bandura (1994), are forming the underlying structure of one's *self-system* holding a major role in shaping perceptions of specific situations in the world and the reactions in differing environments. The findings of the existing studies mentioned above are important in shedding light on the literature as to the positive effect of DS on the two variables, namely *self-efficacy* and *attitudes*, which are quite important for acceptance and the utilization of technology in education, but there is a lack of research which tests the efficiency of the tool in affecting both factors within the same context. Moreover, most of the above-mentioned studies were notably conducted with pre-service teachers; the results of which may not be generalized to *learners*' settings. More importantly, apart from Castañeda and Rojas-Miesse's study (2016), not much information was evidenced in a research study regarding the role of DS in developing either variable from the learners' perspectives in a language education context. Depending on this gap, this study might add a lot to the related literature in this vein.

3. Methodology

3.1. Participants

This research was implemented at SFL, SCU, which is a state university in Turkey. There are two one-year English language instruction programs at SFL, one is based on compulsory English language education and the other has a voluntary basis. The participants were 43 EFL students (12=male, 21=female) recruited for the study in two groups: experimental (n=23) and control groups (n=20). The participants were English-major students at prep school where one-year intensive English language instruction was compulsory. These students' proficiency level was intermediate. The participating students were taught in four language skills and grammar 25 hours a week in total. The researcher was also the instructor of these

students in the writing course in which this current study was carried out. The students were given a five-hour writing course per week.

Since this study aimed to test the possible changes in the related variables for technology use, prior to the implementation, students' existing computer and Internet experiences were also determined in both groups (Heo, 2009). Depending on the results, it is found that students existing computer experience ranges as follows: less than 1 year (9.3 %), 1-3 years (20.9 %), 3-5 years (18.6 %), 5-7 years (16.3 %) and more than 7 years (34.9 %). In addition, their Internet experiences change from less than 1 year (4.7 %), 1-3 years (2.3 %), 3-5 years (34.9 %) to 5-7 years (23.3 %) and more than 7 years (34.9 %). The statistics for students' daily computer use range from less than 1 hour (62.8 %), 1-3 hours (32.6 %) to 3-5 hours (4.7 %). Their daily internet use changes from less than 1 hour (24.9 %) and 1-3 hours (23.3 %) to 3-5 hours (30.2 %) and more than 5 hours (21.6 %). With all this demographic information, it can be stated that the students had a considerable amount of experience in terms of the Internet and computers.

3.2. Materials and Instruments

For the experimental group, online video-editing software, namely *WeVideo* (www.wevideo.com), a tutorial for the software use, storyboarding sheets, *Google Drive* (https://drive.google.com) and *Facebook* (www.facebook.com) accounts were utilized. *WeVideo is* free cloud-based software allowing storytellers to capture, create, view and share their digital stories. Through this video-editing tool, anyone can create a digital story by mixing both verbal (e.g., the script) and non-verbal elements (e.g., images, music, effects, or voiceover) and store it online. This Web 2.0 tool provides a virtual environment in which students prepare their stories collaboratively. What distinguishes *WeVideo* from the other software tools (e.g., *PhotoStory* or *MovieMaker*) is the feature of not requiring any programs to install on a computer. Students can work on their digital stories at any time on a computer which has the Internet connection. Therefore, *WeVideo* is largely recommended for educational purposes (Gliksman, 2016; Robin, 2016). See the figure below:

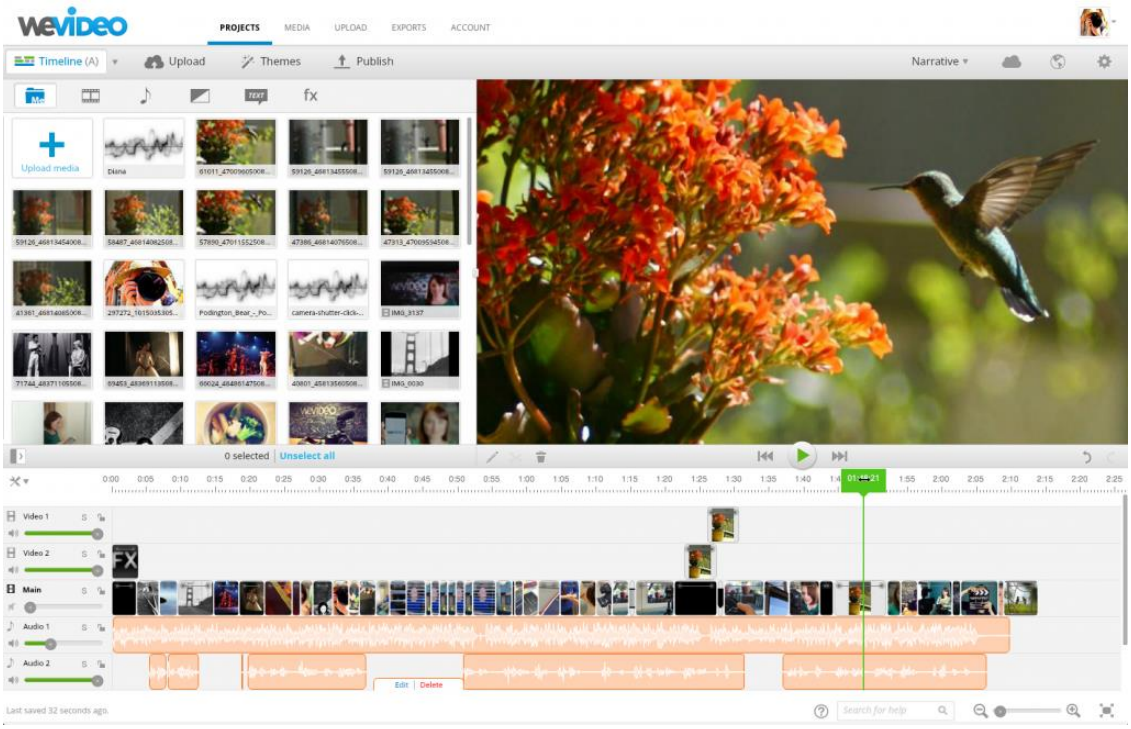

Figure 1. Screenshot of *WeVideo*

Google Drive (https://drive.google.com), a cloud-based application, was also utilized for getting feedback about the storyboarding sheets in which students made plans about the structure of their digital stories in detail. The digital storyteller got feedback either from the teacher or from a classmate by using his/her account. This application with its important component namely *Google Docs* allows users to make or receive comments or edit the text collaboratively (Ambrose & Palpanathan, 2017) by highlighting the specific parts of the text. As for sharing the videos, *Facebook* (www.facebook.com), a social networking site, was utilized. Before the implementation, the researcher had created a closed *Facebook* group, namely *Digital Storytelling*, only the members of which could share digital videos, see the posts, make comments or like posts. The students from the experimental group used this Facebook group throughout the implementation (See Figure 2 for a sample digital video shared on *Facebook*).

Figure 2. Screenshot of a sample digital video posted on *Facebook*

The students in the traditional instruction type did not use any of the materials mentioned above. As for the data collection instruments, a pre- and posttest survey was used for both groups. This five-point survey, ranging from strongly disagree (1) to strongly agree (5), was composed of two sections. Before using this scale in the actual study, it was piloted with 51 students from SFL at CU. This piloting section helped the researcher to check the internal consistency of the instrument. Additionally, the piloting session allowed the researcher to make necessary changes such as deletion of irrelevant items, adding new ones or rewording ambiguous expressions. The finalized version used in the actual study had 39 items in total. In addition to these 39 items asked in the two sections, this survey also had a cover page and a demographic information part asking the participants to state their experience with computer and the Internet (Heo, 2009).

The first 16-item section aimed to assess participants' self-efficacy beliefs for technology use in their learning behaviors. This section was adapted from the survey used by Wang, Ertmer and Newby (2004) in order to assess pre-service teachers' self-efficacy beliefs for technology integration in their instruction. Since the original scale was prepared to be used for pre-service teachers, the researcher of this current study made necessary changes in the wording such as using *learning* instead of using *teaching* before the piloting the instrument.

The reliability scores of the first section of the survey were .92 and .96 Cronbach's *a* scores at pre and posttests, respectively.

The second 23-item section of the questionnaire was designed to explore learners' attitudes toward technology use for educational purposes by adapting the existing questionnaires including the Information and Communications Technologies Scale by the University of British Columbia (*UBC ICT Instrument*) (Guo, 2006) and the other well-grounded scales found in the previous literature (Kay, 1993; Kirsch, Jamieson, Taylor, & Eignor, 1998; Loyd and Gressard, 1984). This section of the survey had .90 and .93 alpha scores at pre- and posttests, respectively.

The two-section survey was administered to students in two groups in Turkish before and after the experimental phase. Another data collection instrument was the semi-structured interviews conducted with ten experimental group students after the intervention was finalized to explore their in-depth analysis of the implementation. These interviews were carried out in Turkish and recorded by the researcher.

3.3. Data Collection Procedures

At the beginning of the term prior to the study implementation, the instructor/researcher was assigned to two prep classes by SFL at SCU. With the purpose of this research study, the researcher named these two classes as experimental and control groups randomly. The researcher was responsible for teaching writing to these both groups in five hours a week. This current research study was implemented within a 14-week period in total. The DS-experiment was integrated into this five-hour writing course for the experimental group. Each student from the experimental group composed five different digital stories in the given topics in the narrative paragraph-writing genre, but not in the other paragraph types. Initially, five hours per week were allotted for the implementation, but the allotted time was reduced to two or three hours a week in course of time. Each digital story was prepared by following the route (Frazel, 2010; Mitsikopoulou, n.d.) shown below:

Table 3. *Digital story making procedure*

Preparation stage

- Writing the narrative paragraph on the given topic to be the basis of the digital story (about 180-200 words)
- Discussing and editing the script via feedback given by the teacher or classmates using Google Drive accounts
- Storyboarding, a graphic organizer in which plans as to visualizing and detailing all aspects of the story are made

Production stage (technology integration stage)

- Selecting or creating non-verbal elements (e.g. images, sound, or music)
- Accompanying the script with non-verbal elements using the storyboards
- Capturing the written script as a digital voiceover in the digital story (using *WeVideo*)
- Rendering into the video file format by using all the related elements (e.g., script, music, and images) using the *WeVideo* tool
- Finalizing the videos by making final checks

Presentation stage

- Playing the stories for the audience (showing the artefacts through in-class presentations)
- Posting the digital stories to Facebook
- Getting further feedback for digital stories (through Facebook) and commenting on others' digital stories (on Facebook)

The control group followed routine pen-and-paper-based traditional writing practices. Like the experimental group, the control group students wrote five paragraphs in the same topics in the narrative writing genre. Both groups had the same syllabus and teaching materials for the five-hour writing course throughout the process. But experimental group students were also expected to go through a digital-story making process alongside with the course requirements.

At the beginning of the experimental phase both groups were administered a pretest survey to reveal the participants' existing efficacy and attitudes toward the educational technology use. The same test was re-administered to the two groups at the end of the experiment as the posttest survey. Moreover, ten experimental group students were interviewed by the researcher as to whether digital story making was effective for the two foci in question at the end of the study.

3.4. Data Analysis

To answer the RQs aiming to explore the impact of DS experiences on learners' self-efficacy levels and attitudes toward educational technology, both quantitative and qualitative data were collected. The quantitative data were yielded from the pre/posttest survey with two sections (the self-efficacy subscale and the attitude subscale) administered to both groups and analyzed by the Statistical Package for Social Sciences (SPSS) program. For the first RQ, the scores gathered from the first section of the pre- and posttest survey were averaged for an overall self-efficacy score for each group in each test and these average scores were used for the subsequent analyses. Then a 2×2 mixed Analysis of Variance (ANOVA) was used to test the possible impact of DS on learners' self-efficacy for technology use in their learning. A similar procedure was followed for the second RQ regarding the quantitative data gathered from the second section of the pre- and posttest survey results and analyzed using the SPSS program. The quantitative data were averaged for an overall attitude score for each group in each test and these average scores were used for the subsequent analyses. Then, a two-way mixed ANOVA was run to determine if there was an interaction between the variables. The independent variables in this study were *group* and *treatment time points* while the dependent variables were pre- and posttest scores.

In addition to the quantitative data, for an in-depth analysis, the researcher also collected data for the two RQs through semi structured interviews carried out with ten experimental-group students at the end of the current experiment. The interviews were carried out in Turkish. The students were asked if the DS-making process affected their self-efficacy and attitudes toward education technologies. The recorded interviews were transcribed verbatim, coded and grouped into the themes by the researcher.

4. Results

4.1. The Impact of DS on Learners' Self-Efficacy Levels

The results yielded from the analysis of both groups' pre- and posttest scores through the mixed ANOVA test were shown in Table 4:

Table 4. *The mixed ANOVA results for self-efficacy scores*

Source		Sum of Squares	df	Mean Square	F	Sig.	η^2
time* group	Sphericity Assumed	5.899	1	5.899	16.488	.000	.287
Error(time)	Sphericity Assumed	14.668	41	.358			

This table indicated that a statistically significant group by time interaction was found, $F(1, 41) = 16.488$, $p < .001$, partial $\eta 2 = .287$, suggesting that the treatment type (group) differentially impacted the participants' self-efficacy levels in technology use over time.

The source of this two-interaction was further analyzed by using graph lines and General Linear Model (GLM) follow-up ANOVAs.

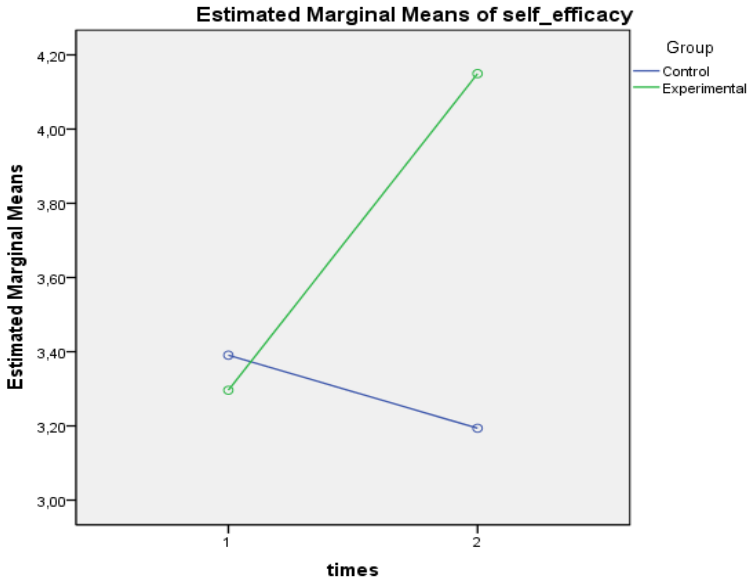

Figure 4. The estimated marginal means of self-efficacy

Figure 4 illustrates that the crossover of the lines means an interaction between the independent variables (*time and group*) for the dependent variable (self-efficacy scores). In the pre-test, the two groups' scores were nearly the same; however, at the posttest, although the control group students' scores did not change dramatically, the experimental group substantially increased its score. It is clear that the gap between the groups was widened at the posttest, suggesting the superiority of the treatment instruction (*DS-integrated approach*) over the traditional method.

Follow-up between-group and within-group univariate ANOVAs also indicated that the experimental and control groups' pre-test results were not statistically different at the outset, $F(1, 41) = .174$, $p = .679$, partial $\eta_2 = .004$. However, after the experimental phase, a significant difference between two groups was calculated, $F(1, 41) = 20.279$, $p < .05$, partial $\eta_2 = .331$, suggesting that the level of self-efficacy beliefs for the technology integration was statistically significantly higher in the experimental group ($M = 0.96$, $SE = 0.21$ mmol/L, $p < .05$), compared to the control group.

As for within-group comparisons, no statistically significant effect of time on self-efficacy scores for the control group was found, $F(1, 19) = 1.153$, $p = .296$ partial $\eta_2 = .057$. This result implies that the control group students' self-efficacy levels did not change over time. For the experimental group, a statistically significant effect of time on self-efficacy scores was elicited, $F(1, 22) = 22.247$, $p < .05$ partial $\eta_2 = .503$, demonstrating that the experimental group significantly scored higher at the posttest, ($M = .85$, $SE = 0.18$ mmol/L, $p < .05$), compared to the pre-test. Overall, on the basis of the simple main effect of time results, it can be concluded the treatment type differently affected the groups' self-efficacy scores in favor of the DS-integrated instruction type.

In addition to the quantitative data, the qualitative data aiming to gather learners' perceived beliefs for their efficacy in educational technology use were also analyzed and found that a vast majority of the interviewees (9/10) expressed that they had a heightened level of efficacy for technology use as a result of the participation into this implementation. Sample quotations are shown in Table 5 below:

Table 5. *Sample extracts taken from interviewees' responses for RQ 1*

Interviewee	**Interviewees' responses**
1	*"At first, of course I had difficulty in preparing my video. But in the second or third ones, we started to develop these videos more comfortably. I feel more confident in those issues now".*
2	*"Yes, I have never prepared a digital story before. Through this implementation I learned how to make a digital story. It is good for me. (...) but at first when you first stated this [the DS implementation] at the beginning of the year, I was really anxious for that because I had never used such video-making programs before. But not now".*
3	*"My stress level for technology use decreased after this implementation".*
6	*"Before this study, I did not even have an email address, so with this task I had my first email address. Additionally, I had difficulty in combining multimedia elements such as visual music etc. I was typing very slowly. But after this project, I started to type faster".*
7	*"Yes, because at the beginning, I did not have any idea about technology use. So, at first, I was really afraid of not preparing the task properly or not comprehending what I had to do. But then, I saw that I could use the technology in my learning effectively".*
10	*"Yes, it [this implementation] increased my confidence. At the beginning, I was afraid but after this project, I believe that I can help anyone who needs help in technology use in learning".*

As seen from the excerpts, students seemed to overcome their initial anxiety for the use of technology and they developed a sense of confidence for getting involved in such tasks. Additionally, some interviewees (Students 1, 2 & 6) also noted that through this implementation, they felt more comfortable in using technological tools for subsequent technology-integrated tasks (Table 6):

Table 6. *Sample extracts taken from interviewees' responses for further use of technology*

Interviewee	**Interviewees' responses**
1	*In my subsequent projects, I can comfortably use technology and will have no stress.*
2	*By using these programs [DS programs], I saw that I would use those programs by myself for any technology-supported projects. I had high confidence for technology use after I prepared my videos.*
6	*Now I had a higher confidence for any technology-based projects. Now I know everything related to computers because while preparing my digital stories I mistakenly entered into other sites many times, which in turn increased my efficacy for technology use in my learning.*

To sum up, the collected qualitative data revealed that an overwhelming majority of the students did not feel anxious for using technology in their learning after this implementation. That is, in accordance with the survey results, it seems that DS positively impacted the students' self-efficacy beliefs for the technology use in their learning.

4.2. The Impact of DS on Learners' Attitudes toward Educational Technologies

The quantitative data results yielded from the analysis of the two groups' pre and posttest scores via the mixed ANOVA are presented below:

Table 7. *The mixed ANOVA results for attitude scores*

Source		Sum of Squares	df	Mean Square	F	Sig.	η^2
time*group	Sphericity Assumed	2.453	1	2.453	9.280	.004	.185
Error(time)	Sphericity Assumed	10.838	41	.264			

Table 7 illustrated that there was a statistically significant two-way (group*time) interaction, $F(1, 41) = 9.280$, $p = .004$, partial $\eta^2 = .185$, suggesting that the treatment type (group) differentially impacted the participants' attitudes toward the technology use over time. The source of this interaction was further analyzed by using graph lines as shown in Figure 5 below:

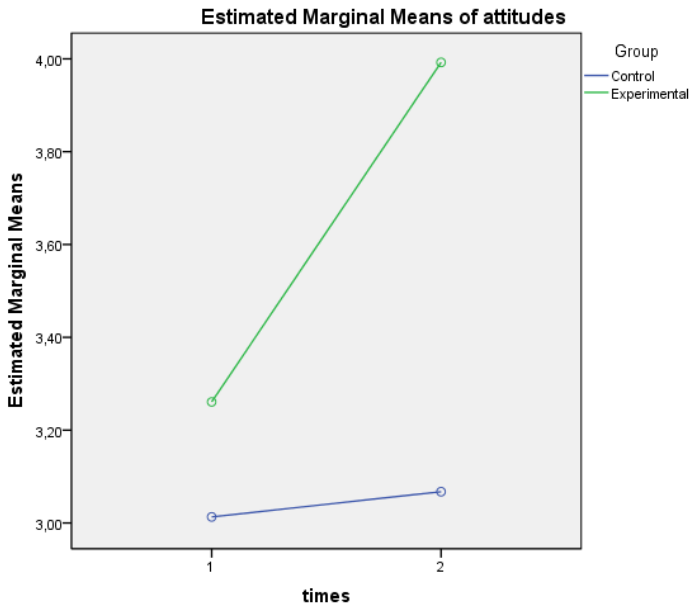

Figure 5. The estimated marginal means of attitude scores

This figure illustrates that at outset the difference between the two groups' pretest results was not very high; however, at the posttest, the two groups' posttest results were very different from each other in favor of the experimental group. Although the control group's scores did not exhibit a noticeable change, the experimental group substantially increased their scores. It clearly reveals the superiority of the treatment instruction (*DS-integrated approach*) over the traditional method.

In addition to this, between- and within-group comparisons were also calculated by using univariate ANOVAs. No statistically significant difference between both groups' pre-test results was found, $F(1, 41) = 1.528$, $p = .223$, partial $\eta^2 = .036$. But the experimental group's posttest results were significantly higher from those of the control group at the posttest, $F(1,$

41) = 34.636, $p < .001$, partial $\eta^2 = .458$, suggesting that through DS, the experimental group had more positive attitudes toward the technology use in education, (M= 0.92, SE = 0.15 mmol/L, $p < .05$), than its traditional counterpart.

Within-group ANOVAs also indicated that there was not a statistically significant effect of time on attitude scores for the control group, $F(1, 19) = .122$, $p = .730$ partial $\eta^2 = .006$, implying that that the control group's pre and posttest results did not change significantly.

For the experimental group, it was found that there was a statistically significant effect of time on attitude scores, $F(1, 22) = 21.655$, $p < .001$ partial $\eta^2 = .496$. This finding shows that the experimental group had more positive attitudes toward technology integration at the end of the implementation, (M= 0.73, SE = 0.16 mmol/L, $p < .05$), compared to the pre-test scores. Overall, the quantitative data illustrated that the DS-integrated pedagogy was effective for positively impacting learners' attitudes toward the use of technology for educational purposes.

The qualitative data collected through semi-structured interviews illustrated that all of the 10 interviewees unanimously stated that they were more positive for the utilization of technology in education as a result of participating into this task. Table 8 indicates some sample excerpts:

Table 8. *Sample extracts taken from interviewees' responses for RQ 2*

Interviewee	**Interviewees' responses**
2	*"I became more positive towards such tasks. I started to do them by enjoying. To be honest, I did not enjoy at first and I was negative towards technology use in class but later it changed. I started to enjoy. Now I find those tasks more enjoyable. Therefore, such implementations should be used in courses because they can attract students' attention and students can participate into such courses more".*
5	*"At first, I was negative but after I prepared my digital stories I started to deal with technology because it made my job easier. I am more positive now. I found it more enjoyable and much easier. I think I can do well with computers".*
7	*"Before this implementation, I did not have any knowledge, desire or interest for technology. But after I saw that I could use technology effectively in my learning, I became more positive because it was more enjoyable".*
9	*"At first, I have not heard about WeVideo, so actually I was a bit negative because of my anxiety for technology use. But by using this program, it became enjoyable for me. Even now I show my other friends how to use this program because it is really enjoyable".*

As seen from the quotations above, in time students seem to have overcome their fears of using a technology-rich application and enjoyed more. What is striking is that these students mentioned that they were willing to use this technological tool in later projects, clearly indicating that they had a positive stance towards the use of this tool in education. In conclusion, depending on both qualitative and quantitative findings, it is worth noting that the students were more positive towards using technology in their learning through DS. Hence, it seems that the DS-integrated pedagogy positively affected the participants' attitudes towards technology use.

5. Discussion

In line with the claims by Bennet et al. (2008), Li and Ranieri (2010), and Margaryan et al. (2011) suggesting that today's students are not as homogenous as assumed in technology use with ease and confidence, students in this current study reported having fears, anxiety or hesitation towards education technologies in the initial phase of the study. But the exposure to DS impacted participants' confidence and also their attitude towards education technologies in the positive direction. Moreover, this study revealed that the DS intervention positively affected the students' likelihood of integrating technology in their subsequent activities.

The findings of this study are parallel to the results of the previous research reporting that the DS experience positively affected participants' technology competencies (Castañeda & Rojas-Miesse, 2016; Heo, 2009; Kauppinen et al., 2018) and views (Balaman, 2016; Yavuz-Konokman & Yanpar-Yelken, 2016) on using technology for educational aims.

The positive outcomes of this study with regard to the heightened self-efficacy scores can be tied to the following points: First, students dealt with the technology tools effectively in almost each phase of the implementation from finding the related multimedia elements to publishing the digitally-composed videos on Facebook and as mentioned by Gimeno-Sanz (2015), the *learning-by-doing mechanism* enacted through the DS-intervention might have positively influenced learners' perceptions of their abilities in employing technology tools in educational settings.

Also, the *mastery experience*, the most important source of the self-efficacy construct (Bandura, 1994), which is based on the idea that one's performance accomplishment or failure is determinant of one's self-assessment of success in an endeavor (Bandura, 1977; 1997) can explain students' high scores in the variables of the current study. Throughout the study, students' creation of five tangible end-products might have given a sense of accomplishment in this technology-oriented task based on hybridizing the traditional storytelling with new ways utilizing technology products and practice, and this evidence of mastery experience might have eventually reinforced efficacy in the subject matter (Castañeda & Rojas-Miesse, 2016).

The other source of self-efficacy, *vicarious experience* (Bandura, 1997), might have been promoted through the evidence gathered by observing others' performances in digital-story making and in turn believing that they can also show similar performances (Castañeda & Rojas-Miesse, 2016). Additionally, the third source of self-efficacy, *verbal persuasion* (Bandura, 1994), might have been fostered by both the teacher and classmates' constructive comments made on the performances (Castañeda & Rojas-Miesse, 2016), most of which were in the positive direction. As suggested by Bandura (1997), getting positive feedback from the others is associated with an increase in one's efficacy perception. The last source of this construct impacted in this intervention is *emotional arousal* (Bandura, 1977). The non-threating but supportive environment ensured in this study might have been effective for overcoming learners' negative feelings such as anxiety, discomfort, or fear and have helped learners become comfortable in navigating technology tools much more effectively.

The results as to the positive attitudes toward educational technology use yielded in this study can be best explained by the *perceived usefulness of the task*, an important factor for the technology usage intention (Davis, Bagozzi, & Warshaw, 1989). Because this technology-oriented task promoted effective expressions in different modalities, the participants might have evaluated that technology tools are of essence for multimodal communications relevant to today's world, eventually resulting in holding a more positive

stance for technology-enhanced instruction. The positive results regarding the attitude score can also be attributed to another essential factor for the intention to use technology, the *enjoyment* factor (Lee, Cheung, & Chen, 2005). As highlighted in the interviews, students seem to have enjoyed through this real-life pedagogy, thus favorably affecting the views on using technology in education. *Perceived ease of use* in this innovation also emerges as an important factor affecting the students' views of using technology tools in learning behaviors, as evidenced in the related literature (Davis, 1985; 1989; Lee, 2009). Through DS students deployed readily available technology with ease, which might have led the students to be more positive for such technology-enhanced tasks by helping them transfer their knowledge and experience regarding the use of technology for daily routines to learning environments.

Moreover, the *positive attitude* for educational technology after participating into this study can also be linked to the mutual relationship with the concept of *self-efficacy*. The evidence from the previous studies (Agarwal & Karahanna, 2000; Compeau & Higgins, 1995; John, 2015) confirmed that because self-efficacy is antecedent to cognition, one's positive perception of the competencies in technology skills is the predictor of technology acceptance. That is, if someone believes that s/he has the related skills to accomplish a task or feels that s/he can be capable of doing a particular job, that person becomes more positive, excited and enthusiastic in performing that task (Kulviwat, Bruner, & Neelankavil, 2014, p. 192). Moreover, it is suggested that when someone becomes efficacious with a technology-oriented resource, the more likely s/he will evaluate the subject as useful, enjoyable, and easy (Kulviwat et al., 2014), all of which are the important factors for the "attitude" variable (Alenezi, Abdul Karim, & Veloo, 2010). From the opposite point of view, it is also documented that someone's attitude for technology use is the determinant of his/her efficacy expectancy (Wu & Tsai, 2006). And few other studies (e.g., Alanazy, 2018; Yau & Leung, 2018) confirmed that there is a significant positive relationship between these two constructs in technology acceptance and use. In this sense, yielding high scores regarding the two variables, *self-efficacy and attitude*, can be associated with the reciprocal relationship between these two foci. Depending on this, a possible future study which will specifically investigate whether these constructs are related to each other within the scope of DS-intervention might contribute a lot to the existing literature.

6. Implications and Conclusion

On the basis of these findings, it can be underlined that DS is a viable methodology to improve confidence in technology literacy skills and to help learners become more positive towards such technology-based practices. Considering that holding favorable attitude and positive expectancy beliefs is a precursor to adoption and use of technology continuously (Mikusa, 2015), the conclusions of this study can help those who would like to open up a new channel enabling learners to overcome the internal barriers by navigating technology tools effectively and transferring their technology knowledge to education environments. Having regard to the close link between language and technology, especially the educators in the language-education context need to develop their learners' competencies in technology skills and promote positive views on these skills in education settings (Eaton, 2010) and for these purposes, DS seems to be a promising way to enable language learners to deal with technology tools effectively to gain multiple literacy skills.

However, teachers who are willing to benefit from DS should be cautious in some points. First, it should not be expected to integrate technology at every phase of teaching. That is, because DS requires a long duration to be implemented, for each course it may not be feasible to integrate this technology into the instruction. Moreover, before implementing such a tool, a careful planning should be made predetermining the needed time, sufficient

materials, applicability of the tool in the relevant context and the match of DS-integrated instruction with the curricular objects. Otherwise, the process can be overwhelming both for educators and for students. However, all in all, with a careful design of the process, DS can be effectively applied in classroom settings where students will gain vital skills and competencies needed in this millennium (Miller, 2009; Sweeney-Burt, 2014).

ENDNOTE

*This text reports partial findings of the author's PhD dissertation entitled "*The impact of digital storytelling on English as a foreign language learners' writing skills*".

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