

S Using of Digital Storytelling in the Teaching of History

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Abstract The paper presents the results of an empirical study in which students (N=41) made digital stories in history classes in two different age groups. The aims of using digital storytelling in history classes were, on the one hand, to find and use relevant written and visual sources, and on the other hand, to create a personal connection to a historical person or event. The purposes of the research were (1) to clarify the conditions of applying digital storytelling in history classrooms in lower and upper secondary school levels and

(2) to measure the impact of it on students' learning competencies. The teachers wrote case studies, and students wrote learning diaries about their educational experiences. Students' reading, writing, and listening skills were measured with pre- and post-tests. Throughout the project, the active involvement of students, their own learning activities, and creativity with digital tools were observed. We have found that the method creates a link between generations. Meanwhile, core competencies such as reading and writing were developed. The didactic limitations of using digital storytelling could be traced back to the lack of time, digital equipment and rooms.

Keywords digital storytelling, subject pedagogy, Hungary

1. Introduction

In the information society, new tools and new channels became available for a wide range of students. Today, there is a smart device in the pockets of almost every student suitable for producing and sharing multimedia content. With computers and smartphones, anyone can find and produce digital content on the Internet. The Web 2.0 tools, especially video sharing sites, blogs, and social media surfaces, allow unlimited publishing of reflections and self-made content. The disadvantage of it is that (1) the students are constantly hanging out on their smartphones using social media or gaming interfaces, which

distracts them from offline social interactions and learning; (2) they unreflected upload photos and videos to social networking sites, comment quickly and superficially on other people's shared contents; (3) they are not able to search for reliable and relevant sources, and they do not organise the information.

The question in the classroom of the 21st century is, on the one hand, how the teachers can replace students' unreflected, sometimes irresponsible online behaviour into interactive, reflected, and participatory content management; and on the other hand, how could students' technological knowledge be incorporated into the learning process, taking into account the usual self-representation on social media.

The solution can be to apply a new teaching and learning method, namely digital storytelling, by which students can work on a subject, search and use resources, and create written and audiovisual content.

1. 1 Digital Storytelling

Digital storytelling (hereinafter referred to as DST) is an art-based method with a short-narrated filmmaking process developed by Lambert and Atchley (2002/2013) in the *Center for Digital Storytelling* (today *StoryCenter*) the early 90s in San Francisco. It combines story-writing with using the newest digital technologies and multimedia tools. Individuals can tell their personal stories from different perspectives with the help of still or moving images, sound, and narrative voice (Lambert, 2002/2013). Since the millennium turn, more and more educational institutions worldwide have been using the DST's complex methodology to tell personal stories and process subject contents using ICT tools.

The framework, called *California model*, includes the phases of the method (Figure 1) and shows how to make a digital story through researching and continuous discourse with classmates and the facilitator, and how to include own voice-recording and video editing software (Lambert, 2002/2013).

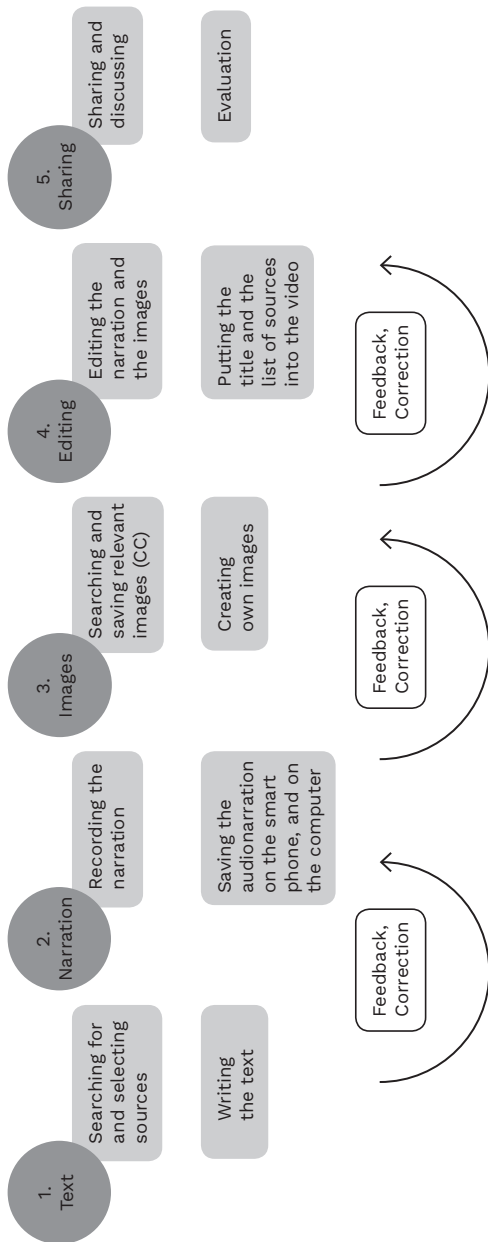


Figure 1. The steps of DST.

Phase zero in the process is the so-called *Story Circle* which aims to create a confidential atmosphere in the group and introduce the subject topic and the writing process with team building and storytelling games. This is followed by the creation of the text. The teacher introduces the main topic, which is to be divided into smaller segments. It helps students to define their specific points of view and subtopics. Before writing the text, students can optionally conduct independent research in libraries and archives, supplemented by interviewing an eyewitness. Subjective experiences and interpretations related to the topic can also be included in the text of the digital story, and students can thematise family memories, their own experiences or interpret an artwork related to the topic. The teacher has a facilitating role by searching and selecting the sources, and the subjective experiences and reflections can be discussed in the classroom. All these are the basis of the text writing which main criteria are: conciseness, causality, and the tripartite structure of the narrative. The texts are discussed, and the classmates or the teacher can suggest stylistic, grammatical, and content changes.

The second phase is recording the voice-over narration and saving the audio file onto the smartphone or computer. It is also individual work, but the classmates can give feedback regarding the quality of the audio material (e.g. intonation, pronunciation, disturbing background noises, too loud/silent volume, too fast/slow speech). The third phase is searching relevant images. At this phase, the teacher informs the students how important it is to search and use images ethically and introduce them to Creative Commons restrictions. Students also can create their own photos and use them in their videos. In the fourth phase, the students edit their videos with a video editing software (e.g. Openshot Video Editor) and align the voice-over narration with the visual content. It can be helpful to use a storyboard before editing. In addition, participants can consult with the group leader and members on an ongoing basis. In the last stage, the completed digital stories are shared, discussed, and assessed. The last step of the process is the presentation and sharing of videos, after which the participants evaluate each

other's production and the whole process (Lambert, 2002/2013, p. 75; Lanszki, 2017, pp. 28–30).

According to this process and the video products, DST is a *didactic framework* that:

- enables interpersonal interactions and individual creative activities in the classroom;
- is a good practice of using digital tools to tell stories or present a specific topic told from a particular point of view;
- has a result of 2–5 minute videos with still or moving images and voice-over narration recorded and edited by students (Lambert, 2002/2013, pp. 37–38; Robin, 2008, p. 222; Ohler, 2013, pp. 175–178).

DST is a narrative form of content organisation. After analysing and synthesising existing sources, the creator builds his text based on his logic and displays it in an audiovisual form in his digital story. Especially in education, students create two kinds of digital stories: personal narratives and research-based presentations. A research-based presentation is typically a digital story about a factual subject topic (e.g. a chemical reaction, the life of a politician). In this sub-genre, students synthesise content based on sources. In a personal narrative, the student's text is based on a personal story (e.g. a survivor trauma in the family) or experience (e.g. Covid-19 epidemic), and the student tries to look behind the story and searches facts in libraries or archives. Robin (2008, p. 224) defines three major categories of students' digital stories: (1) personal or narrative stories, (2) stories that inform or instruct, and (3) stories that re-tell historical events.

DST's methodology allows students to learn in an integrated (school, network, and home) learning environment and actively participate in the learning process. Extensive empirical research in Europe and worldwide has examined DST's impact in various educational contexts on the students' competency areas. In the native and foreign language classes, DST primarily serves to improve the ability of the students writing, listening, and reading skills, and also plays an important role in their vocabulary extension as well as in their oral communication development (Xu, Park & Baek, 2011; Green, 2013). DST's positive

aspects can also be used in teaching mathematics and natural sciences; the digital stories build on the students' physical perceptions and environmental experiences, prior subject knowledge, and new information on the textbook and the Internet (Sadik, 2008). Nevertheless, DST is also beneficial for the arts and the education of students with special educational needs (Michalski, Hodges & Banister, 2005).

1. 2 DST in the Subject Pedagogy of History

Saritepeci and Çakir (2017) and Kirikci, Cigerci and Arikan (2020) examined the effectiveness of DST in the social studies subjects and stated that the technology-based method increased students' satisfaction, enthusiasm, and motivation towards the subject. The students developed positive attitudes towards the social study lessons because they could actively and productively participate in the learning process.

The applicability of DST is plausible in the case of the thematisation of all social sciences subjects in which there is a legitimate interest in the appearance of personal narratives, thus also in the teaching of history and citizenship (Bou-Franch, 2012).

Students can also reflect on current events in their personal videos. In this case, narratives and private photographic material in digital stories represent a given age that gives further nuances to a specific historical, social context (Stewart & Gachago, 2016; Bell, Carland, Fraser & Thomson, 2016). In addition to the stereotyped topics of the mainstream media, digital stories can also present situations of people in marginalised social status. The first-person narrative allows students to detach themselves from social stereotypes and present their actual situation and reflections (Matthews & Sunderland, 2013).

Hull and Katz (2006) also examined the identity-forming power of DST in adolescents. During the DST process, the students placed themselves in their social environment, reacted to it, and formulated criticism. In this sense, digital stories can be seen as self-representations that show individuals' place in the community. DST also helped articulate and relativise Spanish pre-service students' life situations in a broader social and intercultural context. Based on online interviews about the difficulties of Syrian refugees, the students compiled

a summary in a digital story with their reflections. Students gained new knowledge in the process and relativised their life situations when confronted with the stories of Syrian young people of their age (Diaz, 2016).

It is clear that DST plays an important role in maintaining social memory as well (High, 2014). However, DST is more than recording testimonies and documenting oral history because it provides an opportunity for students to interpret, reconstruct historical events, and identify social positions through personal examples and a reflective presentation of life paths. IWitness is a collection of testimony videos of Holocaust survivors and eyewitnesses online from the USC Shoah Foundation, founded in 1994 by Steven Spielberg. It has been part of the University of Southern California since 2006, and the institute's audiovisual collection includes video interviews collected over 12 years in 24 languages in 57 countries. The undoubted power of oral history affects students; however, the institute has developed good pedagogical practices based on students' activity. Thus, the integration of DST was evident, as it includes student reflections on first-hand stories told in conjunction with the student's prior knowledge and family experiences. Students can cut out parts from the original video and incorporate them into their own stories. Upper secondary students can thus gain a deeper knowledge of morals and human nature (Cole, Street & Felt, 2013). Another example of thematising Second World War stories with DST was a Norwegian project week with 9th-graders. Students' task was to present the chosen topic from the perspective of a real or fictional figure by using and editing authentic images. Students collaborated excellently, and their digital stories were created by discussions and social interactions (Silseth, 2013).

2. DST in Hungarian History Classrooms

In contrast to the international praxis, the use of DST was not widespread in Hungarian public education in the 2010s, and only two nationwide initiatives took place before 2016: both of them aimed to explore Holocaust narratives in Hungarian families. The *Glass Cabinet Project* (= *Vitrinmesék*) was organised by the Association Anthropolis, involving ten teachers and upper secondary students. The project's primary goal

was to recall memories about the Holocaust by opening the family photo albums and glass cabinets and telling stories about concerned friends and family members who might have been victims, assistants, offenders, heroes, or helpless witnesses in the Second World War. The other project was organised by the Yad Vashem Institute, the Ministry of Human Resources of Hungary, and Budapest's Holocaust Memorial Center. The project was announced as a high school competition entitled *Let's Tell it in Pictures...* (= *Képekben-kockákban mondjuk el...*) in 2016. In the winning digital story, the student highlighted her great-grandmother's personal relationship with a deported family for whom she worked as a servant. The student used not only family narratives but also archival data (Lanszki, 2015, 2016).

As mentioned before, DST could not spread in Hungarian public education. One reason was that most Hungarian teachers preferred the traditional frontal form in their teaching practices instead of cooperative forms of creative learning. The Hungarian public education is highly centralised: specified subject contents should be taught in specific grades. The primary pedagogical goal is to transfer data as effectively as possible. The prescriptive Hungarian curriculum did not allow enough flexibility and autonomy for the teachers regarding contents and schedule.

The other condition – that could make DST's integration difficult in Hungary – was that the digital equipment of most Hungarian schools was very poor in the 2010s. In international research, the most common challenge by the implementation of DST was the lack of number and quality of digital devices and Internet connection, but the lack of rooms and time was also challenging (Dogan & Robin, 2008; Sadik, 2008; Clarke & Adam, 2010; Sweeney-Burt, 2014).

In this research, the conditions for the applicability of DST in history classrooms were explored. Two history teachers facilitated a DST process in their classrooms. The aims of using DST in history classes were, on the one hand, to find and use relevant written and visual sources, and on the other hand, to create a personal connection to a historical event. The 10th grade students (N=9) created digital stories based on family

Holocaust narratives, and the 6th grade students (N=32) created digital stories about the life paths of famous historical figures in first person.

The purpose of the research was (1) to clarify the conditions of applying the method of DST in history classrooms in secondary and high school levels and (2) to measure the impact of it on students' learning competencies.

One of the main questions of the examination was in what conditions it is possible to integrate DST in the Hungarian school system that needs much time and digital tools (namely DST), and how it is possible to apply it by different age groups of students. According to it, the research focused on teachers' and students' views on the effectiveness of DST and the challenges teachers and students have to face by using DST in the classroom.

According to the previous research results about the effect of DST on students' writing, reading, and listening skills (Abdolmanafi-Rokni & Quarajeh, 2014; Gimeno-Sanz, 2015; Xu et al., 2011), another research question was what kind of student skills can be developed by implementing DST in the classrooms. I hypothesised that DST contributes to developing various competencies, such as reading, writing, and listening skills.

3. Sample and Methods

Two independent learning groups were involved in the study. The 6th grade students (N=32) were 11–12 years old and went to a rural secondary school with a talent development profile in Northern Hungary. Twelve students were male, 20 students were female. The socio-cultural background and the learning performance of the students were heterogeneous. Two of the students came from disadvantaged families. The 10th grade learning group was much smaller and more homogeneous. The students (N=9) were 14–15 years old, went to an art high school in the capital city, and all students were female. Nobody had a low SES index or poor performance in this learning group.

Both learning groups had history lessons twice a week at school. The teacher of the 6th-graders also taught the subject 'social studies'

in the class once a week, which she could use for the DST project. The application period lasted four weeks in both learning groups.

The research aimed to measure the usability and impact of the DST method in history lessons. Capturing didactic processes is only possible with complex research methods. For this reason, the methodological triangulation principle was followed: quantitative measurements were supplemented by qualitative examinations (Figure 2).

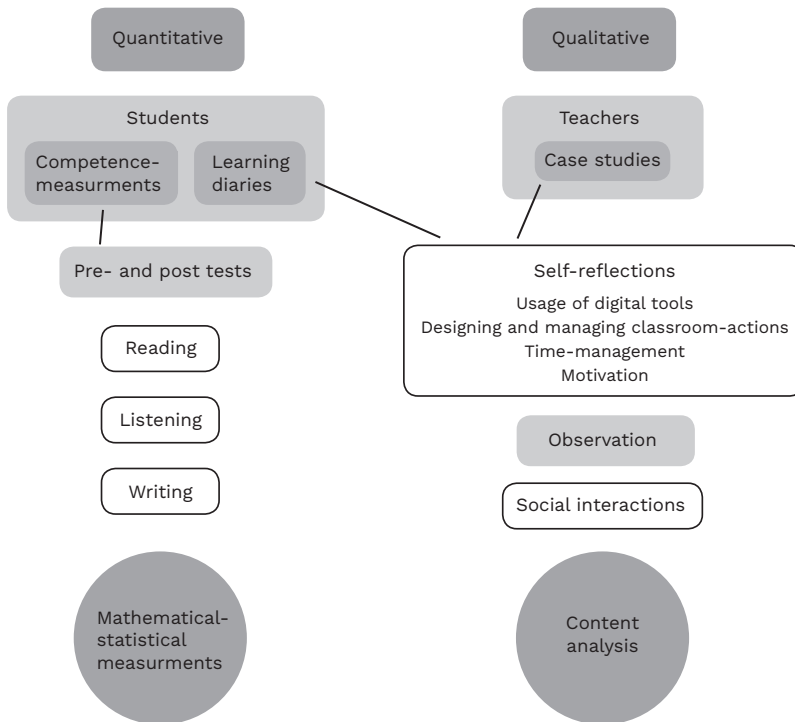


Figure 2. Research tools and methods.

Students' skills development could be measured with reading and listening comprehension tests such as writing tests before and after the intervention. The reading tests were developed and standardised by the Hungarian Educational Authority for 6th and 10th grade students. The writing tests criteria were based on the Hungarian high school entrance examination for the two age groups, and the listening tests were developed by the researcher. The tasks were of equivalent difficulty in the pre and post measurements according to students' school degrees. Pre- and post-test data were compared and analysed with SPSS software.

Qualitative methods have also been applied in the research. The outsider researcher recorded classroom interactions in a semi-structured observation. The main focus points in the observation diary were the teachers' differentiating, supporting communication, classroom management and evaluating skills, the schools' digital equipment, and the pedagogical atmosphere, such as the students' motivation, attention, and cooperation. The observation data were supplemented with teachers' and student's beliefs. After the intervention, the teachers wrote case studies, and the students wrote learning diaries about their first-hand classroom experiences. Both the students and the teachers reflected on time management, usage of digital tools, organisational forms in the classroom, motivation during the different phases, and the advantages and challenges while implementing the method. Data from the observation diary, students' structured learning diary and teachers' case studies were analysed with content analysis.

4. Results and Discussion

The research results were obtained on the one hand from a mathematically statistically based analysis of quantifiable data from competency measurements, and on the other hand, from content analysis of students' reflective learning diaries, the teachers' case studies, and the observation diaries.

4.1 Conditions of Application of DST in History Classes

One of the research purposes was to clarify the conditions of applying the method of DST in history classrooms at lower and upper secondary school levels. According to it, the integration of the method was observed in two different age groups.

4.1.1 Implementation of DST in 6th grade and 10th grade Classes

The 6th-graders (N=32) were taught by a teacher with 36 years of experience in the field. The project was part of a broader examination at the end of the school year. The framework curriculum of the subject made it possible for the teacher and the students to realise the assessment of history and social science subjects based on personal narratives and the presentation of stories. The teacher was an innovative educator who wrote the following sentences: "I am open to incorporating new methods into my work. However, the crucial point was that the students should not experience the process of creation as another boring and obligate school task. Let there be the flow, the joy of creation, and at the same time, learn a new way of learning and creating. Meanwhile, the exam is also ticked."

The students' task was to present the life path of a remarkable historical person in their digital stories. The essence of the concept was that students should not choose people known to everyone. They should choose some extraordinary people, and they had to argue for their choice (e.g. Joan Gamper, the founder of FC Barcelona, Judit Polgár, a chess player and teacher, Coco Chanel or Mata Hari). The project was planned to take 8 (+2) contact hours (Table 1).

	Lesson	Topic	Classroom activities (work form)	Illustration/ homework
Preparation	1.	What is DST?	Introduction (frontal)	<i>Teacher's example (her digital story)</i> https://www.youtube.com/watch?v=rIZ14K-kNIM&feature=youtu.be Projector, desktop, computer <i>Homework: searching sources and data</i>
	2.	Story circle	Presentation of the chosen person (individual work, discussion)	<i>Collection of images and arguments</i> Projector, desktop computer
Creation	3.	My story	Story presentation (discussion)	Interactive whiteboard, mobile phone, laptop, dictaphone, or voice recorder <i>Homework: writing the story</i>
	4.	Images and videos	How to make a voice-over recording? (presentation) Students' lectures on image search, using Movie Maker, and steps to make a film (individual and pair work) Students' lecture on image search (group work) Presentation of a historical personality, making a sample film (plenum and individual)	PowerPoint Presentation, Movie Maker, internet, interactive whiteboard, laptops <i>Homework: searching for images</i> http://www.europeana.eu/ https://www.flickr.com https://www.google.hu
	5.–6.	Video editing	Using video editing software (individual)	Computer room, laptops, internet, interactive whiteboard, laptops <i>Homework: software downloading and using</i>
	7.–8.	Presentation and evaluation	Projecting the videos and assess them (frontal, peer review)	Interactive whiteboard
Presentation	9.–10.	Public presentation	Individual presentation	Sharing
Additional lessons: Individual and group discussion, technical assistance (difficult to count)				

Table 1. DST process in 6th class (according to Molnáré Kövér, 2017).

As a first step, the teacher presented a digital story about a childhood memory, namely a family vacation in Prague in the spring of 1968. She mentioned how unclear the situation for her as a child was and how she could have understood this event later – she, of course, also presented historical facts and documentation about the event. Then she introduced the main topic of the DST project, namely presenting a particular historical person from the given person's perspective. At the beginning of the implementation of DST, the students researched and selected sources about the given person, then argued with a short presentation, convinced their peers, and justified their choice. In parallel, they became acquainted with the concept of Creative Commons and film editing programs. The narration of the script was written and recorded by the students. After that, they edited and animated their films. The result was 32 2–7 minute long digital stories told in first person. Finally, the presentation and evaluation concluded the process. The exam evaluation was done in text after the screening in the form of self-reflections and peer reviews.

The 10th grade students (N=9) were taught by a teacher with ten years of teaching experience. It was a smaller class in an art high school. The project's primary goal was to bring personal human experiences from the Second World War closer to the students. The teacher wanted to show that the Holocaust is not a chapter in a book about the Second World War, but a tragedy that really happened to Hungarian Jews, Gypsies, political persecutors caused by Germans and Hungarians. She wanted the students to experience that the characters in a historical event are actual citizens living among us, not just 'fairy tale characters' in the history book.

This teacher also followed the California model framework for the application of DST and manifested it through the implementation of three major process elements: (1) finding the story, (2) creation, (3) sharing. She left it to the students whether they wanted to work individually, in pairs, or in groups of three. The students wanted to make their own videos, excited by the creative potential of the project and the charm of the personal story. In the introduction phase, the students watched the film *Eyes of the Holocaust*, written and directed

by János Szász, based on childhood memories of Hungarian individuals from the Second World War. The teacher reported about it: “It was hard to speak after that. We ran out of a hundred packs of paper towels during the film. The kids were completely under the influence of the film. Afterwards, we talked a bit about it and the relationship between fiction and reality. The students were upset about the vulnerability of the Jews and what Hungarian people did to Hungarians. Unfortunately, we did not have more time to talk; I asked my ethics colleague, who was teaching in the class, to address the topic further.”

After the introduction, data collection began almost immediately. Students first researched private sources within their own family or in their circle of acquaintances. This ended in all cases in a fact-finding process within the family in which older family members spoke for the first time about a tragedy that happened in their family or neighbourhood. While data searching, students as family members placed their ancestors in a personal and historical perspective. As the teacher put it: “The meeting with the survivors and eyewitnesses was moving in all cases, and made the events of the Holocaust tangible, plastic and authentic for the students. Students came into a dialogical relationship with their grandparents and elderly acquaintances and told stories about an object (e.g. an old family photo or an old tomb that no one visits anymore, a watch that went from father to son). These objects brought to life interesting stories from the family memoirs, which were told in students’ digital stories.” As we can see, the work of generations was revealed during the work process. The elderly relative provided the content, and his descendant used the digital, multimedia, Internet-compatible format to tell the story. An integral part of the dialogue led to arise between the participants and placing the story in a family, possibly in a historical context. The teacher mediated the process with continuous reflection and advice.

Based on the data in the observation diary, it can be concluded that both teachers represented a supportive and differentiating attitude in the classroom. They guided students not only in the classroom but also outside of class via email or Messenger group. The students shared the texts via Google Drive with the teachers, who provided corrections

and comments. Both formative and summative evaluations were characterised by constructive feedback from the students and the teacher in the learning groups. Although the instructional support and the evaluation functioned perfectly, the teachers also had to make rapid decisions in the classroom. Both of them should be sensitive and responsive to students' technical needs and subject-related questions, which was challenging in the large learning group of 6th-graders. The observation diary also reflected on students' creative interactions and active participation in the learning process in both age groups.

4. 1. 2 DST's Advantages

Analysing teachers' case studies, it can be stated that the teachers had a positive opinion about DST in general. Both of them emphasised the active role of the students. The teacher of the 6th-graders put her opinion about the method: "The success and applicability of DST are due to its complexity and learner-centredness. The role of teacher and student changes from the traditional methodological line-up. In addition to the teacher's facilitator role, the students' activity is crucial. The method provides an opportunity for competence development, such as text-writing skills, verbal expressiveness, creativity, and digital literacy. In the process of creation, social competence, collaboration can also be developed. The point could be summed up in the fact that the student is not a passive recipient but an active creator in the process." The teachers' more detailed case study was published in Hungarian in a thematic methodology book on DST (Molnárné Kövér, 2017).

Both teachers mentioned in their case studies that one of DST's main benefits was that the students could participate creatively and actively in experiential learning based on the principle of learning by doing.

The teachers mentioned that students' media literacy improved significantly, especially searching and selecting relevant sources conscientiously and consciously. According to the learning diaries, students' digital literacy also showed significant development. Most students wrote in the learning diaries that they achieved the most progress in video editing (93%), writing (67%), and audio editing (53%). 47% of the students saw the greatest progress in their cooperation skills. Nearly

the same proportion of students mentioned developments in image editing (45%) and Creative Commons resource searching (43%).

According to the teachers, DST helped students to deepen their self-reflection and to develop their self-esteem. The teachers also wrote that students' ability to debate, think critically, and feel responsible for each other and the products developed because a dialogical, analytical cooperation characterised the whole process. Although the cooperation was not always conflict-free, the development of critical thinking and social skills were the areas that both the teachers and the students considered to be the greatest experiences and achievements concerning DST. In addition, students felt that their ability to collaborate developed strongly. The 10th-graders believed that DST supported intergenerational communication within the family.

The teacher of the 10th-graders stated that DST encouraged students to research and solve problems on their own. She also mentioned that the creative processing technique (= editing the film) allowed the appearance of unique verbal and visual content (e.g. family photos and documents). As the teacher wrote: "The strong empathy-building function of DST can help students to create and listen to stories that will enable them to take active social responsibility in the future by thematising and sharing the social injustices experienced by the individual. Overall, it can be concluded that a deeper level of content acquisition can emerge through experiential and emotional involvement with DST. The students also showed more than expected enthusiasm for the topic and method. This 14–15 age group was empathetically very open, not yet ideologically influenced, but mature enough to face the dark episodes of history. They started researching at home after our first meeting." The 10th-graders opinion was in accordance with the thoughts of their teacher. They wrote in their learning diary that they enjoyed the researching and the writing, and they had a flow experience during the entire process. As one of them put it: "I felt I could not stop searching. When I wrote the text, I had to face that it was too long. I had an emotionally hard time selecting the data because I thought it would have

been important and interesting. I was very happy with the result. I was surprised at how well I summed up the point.”

DST, in this sense, typically represented the communicative memory because digital stories were manifestations of the personal autobiographic narratives of a still-living individual in the reinterpretation of students. The commemoration of the personal narratives told by students realised in the process of offline and online sharing. The students of this project presented their digital stories to other students in the school, and after the screening, they had a roundtable discussion with their peers. According to the teachers’ case study, one of the essential elements of the process was the constant reflection between family members and students, students and classmates, and students and the teacher, culminating in the final presentation of digital stories, complemented by self-reflection.

The 6th grade students were satisfied with the method, too. As one of them put it in his learning diary: “Cool, we did not even realise we were learning!” Another student from this class summarised her views on content creation with DST: „I found it very interesting when the teacher mentioned DST. I listened excitedly throughout the DST presentation. It was long and hard to write the text, but I came across interesting information in the meantime. My favourite part was searching for the right images. I found this project a very good idea. Now I can use this knowledge in other subjects as well.”

Comparing DST to traditional school learning, most students evaluated the frontal way of learning faster, but DST was seen as a more effective method as it involves everyone participating in learning.

4. 1. 3 Challenges by Using DST in the Classroom

Although the students enjoyed the active learning with DST, they did not always seem to feel comfortable in the classroom. In terms of challenges, students and their teachers wrote that DST was a highly time-consuming process. Overall, 71% of students said that more time than average is needed for DST. For many students was time management a neuralgic point, especially when editing a digital story was a homework assignment. However, one of the teachers mentioned

that DST helped students developing their time management skills: “They kept deadlines more disciplined than usual, did their homework, sent or brought home-made materials. In the end, we watched the finished stories together with great excitement and were happy with the result together, [...], and we developed many competencies in a short time.” In contrast, the teacher of the larger learning group believed that the high number of creative activities was tiring both for some students and for her. Especially students with slower progression felt they are overburdened of unusual homework assignments. These students needed extra help from the teacher, other students or their parents with researching and video editing. As the teacher had to follow the activities of all the students and give feedback and evaluation for each students’ products, giving additional help and tutoring some students were extra working activities for her. She mentioned that it was very tiring to be available to students at all times outside of school.

Besides that, the teacher of the 6th-graders mentioned in her case study that there were problems with space and learning forms in the large class, and she had to help many students with creative activities after classes, too. She wrote the following about the realisation of the process in her case study: “Of course, the plan only existed on paper. The method is much more time-consuming. The need for space and equipment varied widely: computer room (if we got in), tablets, interactive whiteboard, mobile phone, social network (Facebook closed group, Messenger), and traditional school tools.” Because of the lack of school’s digital equipment, the teacher had to decide to let the students use the computers in pairs which also caused behaviour management issues. Video editing as homework also caused another problem in some cases: not all students had enough memory space on their computers for saving the film. The teacher concluded that technology-based homework should be minimized as not every student could be expected to have a good quality computer at home. The other challenge was to choose the appropriate free video editing software. The 6th-graders were not always able to make their video without a watermark and in the right resolution at home.

The teacher of 10th-graders articulated the challenges she had to face too: “Unfortunately we had to face some problems: editing software would require Internet to install which was unfortunately very poor quality at school. Some laptops did not run editing software because of an older operating system.” The students tried to bridge the technical gap with their own mobile devices and made photos and voice-over recordings with their cell phones. However, they needed school laptops to cut the video. Therefore the teacher had to ask for the help of the school’s IT administrator to reinstall the operating system on the school devices and make access to the high speed Internet which was time-consuming. At the time of providing the technical conditions, the students had nothing to do as they had already completed all the creative phases. The teacher stated that it is extremely important to check schools’ technical equipment for suitability for work before DST. For the 10th-graders, the writing was the least challenging. Therefore, they could have spend more energy on DST’s technical phases. Although the lack of equipment caused rapid problem-solving situations, the students were more motivated during video editing than during writing.

The other challenge in this learning group was that the students were emotionally involved, and there was not enough time for the student group at school to process the ‘information shock’ about Holocaust together. As the teacher noted, Holocaust stories can also have a traumatic effect on students, therefore it is necessary to involve a school psychologist on such sensitive topics. The teacher also mentioned that it should have been more stress on the authenticity and historical relevance of the resources and images found by students. It happened that an irrelevant Second World War photo appeared in the digital story of some students. Due to the shortness of time, they could not devote enough time to analysing all of the visual sources which would have been crucial.

According to the students’ views, the most challenging steps of the project were text writing and learning the video editing program’s usage. The difficulty of writing the text of the digital stories is because students are not accustomed to analysing historical sources, then synthesizing their content and writing the text in their own words. Analysis,

evaluation of facts, drawing conclusions and formulating synthesis are complex cognitive operations that would require more time than DST had in these projects. For younger students, the use of digital tools was also a big challenge. Searching, storing, sharing, and reusing data consumed more energy in their case; therefore – although the amount of homework increased during the DST period – their videos were of lower quality. Nevertheless, 48% of the 6th-graders mentioned experiencing success after video editing, screening and evaluation.

4. 1. 4 DST in the Hungarian Public Education

Both teachers needed a month to complete the whole process. Based on teachers' case studies and students' learning diaries, it can be concluded that both age groups had nearly the same positive and negative experiences. The teachers faced challenges in two interrelated areas: time management and using technology.

Both teachers stated that DST could, in principle, be included in the curriculum of Hungarian history education, but the conditions for its implementation are difficult to establish in practice. This is because most sub-phases of DST cannot be realised in the 45-minute lessons. In Western European and American schools, project teaching is a natural part of everyday school life, but teachers in Hungary have to plan for 45-minute lessons. The integration of DST in Hungary can only be realised without problems in project weeks, camps or afternoon groups.

After all, there is too little time to complete the creative processes at school. In the 6th grade class, the teacher had to outsource research and creation as a homework assignment, and the 10th grade teacher exchanged lessons with other colleagues and blocked them out so they could finish editing the video. Planning students' activities, managing the fitting room, blocking lessons, and constantly giving feedback to students significantly increased teachers' working hours. The obligatory number of lessons per week for teachers working in Hungarian public education are at least 24 lessons on average, which means that the busy teachers only can take time for DST-related activities from their free time. Although all these activities were time-consuming, both

teachers found it worthwhile to take the time to DST because the students were enthusiastic and creative.

Because of the overburdened schedule of the teacher and the mass of educational material, frontal teaching is the most widespread in Hungarian schools. Frontal knowledge transfer is typical of traditional Hungarian history lessons as well. However, one of the conditions for the integration of DST is the innovative attitude of teachers. She or he must be the facilitator of students' active learning. This is natural in Anglo-Saxon pedagogy, but it is still new approach in Hungarian pedagogical culture. Both teachers in the experiment supported the students and coordinated their work from the background as facilitators and allowed students to participate in the learning process actively – and they enjoyed this approach.

The teachers wrote in their case studies that technology-related difficulties severely hampered the DST process. The 6th grade students only had access to desktops in a computer room, and even so, it was often the case that there were more students than computers. At the same time, the utilisation of IT rooms was high, and the non-IT teacher had difficulties accessing them with students. Solving technology issues has significantly increased the amount of time devoted to DST in both classes.

4.2 DST's Effect on Students Reading, Writing, and Listening Skills

Students' reading, writing, and listening skills were measured before and after the DST process. To measure reading improvement, the standardised tests of the National Assessment of Basic Competencies from earlier years were chosen.

In Hungary, the reading comprehension and the mathematical-logical skills of every 6th, 8th and 10th grade student are tested each school year as part of the National Assessment of Basic Competencies. The results show big differences in reading skills of students between the capital and regions with lower regional competitiveness index (Belinszki, Szepesi, Takácsné Kárász & Vadász, 2020). This result is in accordance with the PISA measurement (OECD, 2019), the

Hungarian students' performance in reading literacy was under the average of OECD countries, and the socio-economic status explains 19% of the variance in reading performance in Hungary which is higher than the OECD average (12%).

The school for 6th-graders (N=32) is located in one of the lagging regions of Hungary, where the results of the competence measurement are the lowest average in the country. However, Table 2. shows that the student group's input and output results are much higher than the regional (Belinszki et al., 2020, p. 16) and the national averages in

Grade	Pre-test	Posttest	Average in the region	Hungarian average
6th (N=32)	81.70%	96.72%	65.45%	68.18%
10th (N=9)	76.44%	82.77%	77.27%	75.45%

reading (Belinszki et al., p. 11).

Table 2. Students' reading results and the regional and national average.

The input average of reading was 81.70%, and the output became 96.72% in class average. This can be explained by the fact that the school is a talent development secondary school with a longer training program and a more extended educational profile. As the school offers elite training, comparing the results with national and regional averages is not relevant. Therefore, the input and output values of each student were compared in a self-control examination. Only five students scored the same or lower points at the output measurement, and 27 students' reading results were higher by the post-testing than by the pre-testing (Table 4). To sum both the input and output averages and the individual pre- and post results, it can be stated that the 6th-graders' reading skills improved significantly.

Table 2 also shows that the 10th-graders (N=9) input class average in reading is above the national and below the regional average. The high school is located in Budapest, which results are the highest in the country at the National Assessment of Basic Competencies in every measured competence area (Belinszki et al., 2020, p. 16). Based

on the results of the post-test in reading, it can be stated that the output average of the 10th-graders increased compared both to the input values and the regional average. In this small learning group, only two students had the same results after DST as before, and the reading comprehension results of the others improved after the intervention.

Writing is also a basic skill which is a creative and complex activity. In Hungary, the measurement of writing skills is a crucial part of entrance examinations on the upper secondary school level, organised by the Educational Authority – and in this form, it also has a selective function. The evaluation criteria issued in previous years for national high school entrance exams were applied in the pre- and post-tests in this research. As writing is only one task of the entrance test-set in the native language, the scores as partial results are not published. Due to the unavailability of the national results, it was not possible to compare the writing results of 6th and 10th grade students with the local and national averages. That is why the students' input and output results were compared concerning themselves in the self-control examination. Data of pre and post-test averages of the 6th-graders show that the input average in writing was 86.71%, and that of output became 90.56% (Table 3). Only 12 students' writing output did not change or deteriorated compared to their input results, and 20 students' writing skills improved (Table 4). The results showed progress in the writing skills of the 6th-graders, but this development was less than the improvement of their reading skills. DST also had a measurable positive effect on students' writing skills among the 10th-graders. The learning groups' input average was 78.77% which became 84.77% after the DST process (Table 3). Examining the students' individual results, it can be seen that only one student's writing skill did not change; all the others improved (Table 4).

The measuring of listening in the native language was a challenging issue. The listening comprehension tests in Hungary appear in pre-school education as part of a school-readiness test named Diagnostic Assessment System. In this measurement, students' listening comprehension level is assessed in the last year of kindergarten (Csapó, 2013). The level of the tasks of this test-set was not appropriate for 6th- or

10th-graders. In the 6th grade, students' listening skills are measured again as part of a nationwide foreign language assessment. This test-set was not usable either because it measures foreign language competencies. All this led the researcher to develop native language listening tests. Comparing the listening averages of 6th-graders, it can be seen that the output value increased compared to the input values; however, the change was only 1.56% (Table 3). Examining the individual listening results, it can be concluded that the output results of 22 students did not change or slightly deteriorated compared to the input values (Table 4). This can be explained by the fact that many 6th-graders achieved a 100% result on the input test, so the standard deviation of the measuring instrument was not adequate. The listening improvement of the 10th-grader was higher in average (5.55%) than that of the 6th-graders (1.56%) (Table 3). Nevertheless, compared to the other results of the 10th-graders (reading difference 6.33%, writing difference 6.00%), the smallest improvement was observed in this competence area at the 10th grade group because the difference between the input and the output values was only 5.55% (Table 3). In terms of individual development, only three of nine students scored better than no

	Reading		Writing		Listening	
	6th-graders (N=32)	10th-graders (N=9)	6th-graders (N=32)	10th-graders (N=9)	6th-graders (N=32)	10th-graders (N=9)
Pre test results	81.70%	76.44%	86.71%	78.77%	90.62%	83.33%
Post test results	96.72%	82.77%	90.56%	84.77%	92.18%	88.88%
Difference	15.02%	6.33%	3.85%	6.00%	1.56%	5.55%

or worse results on the output measurement (Table 4).

Table 3. The extent of students' skills development based on a comparison of averages.

Based on the average results, it can be stated that DST had a measurable positive effect on students' reading, writing and listening skills because both learning groups scored better results at post measurements than at the pre-testing (Table 3). The strongest development was found in the reading skills of 6th-graders. Reading was the competence area where 10th-graders improvement was the most pregnant as well. The 6th-graders' writing skills improved moderately (3.85%), and there was a little change in the listening results in this learning group (1.56%). The writing and listening results of the 10th-graders were much better (6.00% and 5.55%) than those of their younger peers (3.85% and 1.56%). But in general, it can be stated that 10th-graders developed to a similar extent in all three competence areas (reading 6.33%, writing 6.00%, listening 5.55%)

Because the number of items was not enough to make an accur-

	Reading		Writing		Listening	
	6th-graders (N=32)	10th-graders (N=9)	6th-graders (N=32)	10th-graders (N=9)	6th-graders (N=32)	10th-graders (N=9)
Better post test result than pre test result	N=27	N=7	N=20	N=8	N=10	N=3
Proportion	84.32%	77.77%	62.50%	88.88%	31.25%	33.33%

ate mathematical-statistical calculation, these tendencies needed to be specified with students' individual results.

Table 4. The extent of students' skills development based on a comparison of individual scores.

Examining the change in individual results, it can be concluded that the development of 6th-graders reading skills was dynamic (84.32%) (Table 4). 62.50% of the 6th grade learning group showed individual improvement in writing, too. Examining the change in the individual performance of the 10th-graders, it can also be stated that more

students achieved better results in the output tests in reading (77.77% of the learning group) and writing (88.88%). In terms of individual performance in listening, it can be stated that less than half of the students achieved better output results – therefore, no progress can be detected in this area.

To sum it all, examining the averages, both learning groups improved in all three competence areas to varying degrees. In this regard, students' reading skills developed mostly in both age groups, and the rate of development was higher in the 6th grade than in the 10th grade group. The reason for it was that writing was a challenge for primary school students; therefore, they discussed their texts with their classmates and teachers several times, which contributed to a more dynamic improvement in their writing skills. It is an interesting result because the 6th grade class had many students with heterogeneous learning performance and SES-index. Nevertheless, this learning group had the highest rate of development in reading. The reason for this phenomenon can be that the school's talent management profile and the teacher's many years of teaching experience compensated for the difference between students.

However, examining individual student performance, it can be concluded that both groups made significant progress in reading and writing, while no improvement was observed in listening.

5. Conclusions

DST is a method that provides interactive, reflective, and participatory content management in the 21st-century classroom. The process is based on students' technological knowledge and their active involvement in the learning process, in which the teacher's facilitating role is crucial. This research was aimed to present how DST can be implemented in the subject pedagogy of history in two different age groups of students in Hungary.

The didactic conditions of applying DST in pedagogical processes were discovered. DST allowed teachers to facilitate students' active learning and expand their teaching praxis by using technology creatively. DST could be used in both age groups of students. The teachers

had a crucial role in giving feedback and helping by interpreting, discussing resources, and correcting students' products (written texts, narrations, videos). Both teachers supported the pupils in and outside the contact hours.

The students actively, creatively and cooperatively contributed to the text and video creation, such as in the interpretation of audio and video texts. DST allowed students to deeply explore the life paths of historical persons and build a connection between generations. Students created narratives with digital devices by collecting relevant and reliable information about personal memories and historical facts while learning to search for content (e.g., images, audio files, videos) to reuse files with Creative Commons.

In line with international research, the time and room management and the lack of Internet connection and the equipment of schools were challenging for the teachers in designing and realising the DST lessons. This study showed that the right number and quality of desktop and/or mobile devices were not available at schools for the implementation of DST, and the students also used their mobile phones for voice-over recording and taking photos. One of the prerequisites for applying DST in the classroom is the availability of digital devices.

The study also revealed that the Hungarian school schedule is unsuitable for performing DST's creative activities at school. The phases of the creation had to be done as homework by the students. In addition, there was not enough time to evaluate resources more deeply and process the emotional effects of DST with a school psychologist. Another condition for the implementation of DST is, therefore, the inclusion of DST as a longer project within the framework of block classes. Implementing DST during a project week also could provide an opportunity for the overburdened teachers not to have to deal with room and schedule changes.

The strongest effect of the intervention of DST was measured in the improvement of students' writing and reading skills, and the smallest improvement was observed in listening. The method also developed the students' digital literacy, critical thinking, cooperation, problem-solving and discussion skills. Through the creation, students learned about

themselves and their students more deeply, and they felt responsible for creating a product for themselves and their community.

The paper presented how DST could be implemented into Hungarian history lessons in two different classes and what skills could be developed with the method. As the sample size (N=41) did not allow to perform deeper mathematical-statistical calculations, only the definition of trends was possible in the study. The research's representativity is also questionable because the two learning groups were privileged: the 6th-graders went to a talent-development institution, and the 10th-grader group consisted only of nine students. It cannot be proven whether the success in the 6th class can be traced back to the fact that DST is a universal method or to the fact that the teacher has been working as a teacher for almost 40 years. In the 10th grade learning group, the success of DST's implementation could be determined by the small number of students and the homogeneity of the group. The other limitation of the research was that the standard deviation of the listening measurement tool was inadequate, so listening results could only be interpreted to a limited extent. A more accurate result of competency development could be reached in a further control group research where only standardised measurement tools would be applied, and the sample size would be more extended.

Despite these facts, the research provides extremely important information about the circumstances of DST integration in Hungarian history classes and trends in the development of students' skills.

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