



REFLECTIVE PRACTICE PAPER

The DNA of Digital Storytelling: A Case Study from a Higher Education LSP Classroom

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Abstract

This case study is based on a digital storytelling project conducted with first year Biotechnology with French students at National University of Ireland, Galway. Working in small groups, the students created digital stories in French based on forensic cases in which DNA profiling was used. The study was conducted while they were learning about DNA forensics in their mainstream programme. This study provides a practical example of how Digital Storytelling (DST) can be integrated as a teaching and learning tool into the Language for Specific Purposes (LSP) classroom within a higher education context. It highlights the potential of DST to develop students' language skills within this specialised context and facilitate the acquisition of the transferable skills needed to communicate effectively in an increasingly globalised society.

Keywords

Digital storytelling, languages for specific purposes, higher education.

1. Introduction

DST on a basic level, is the telling of stories using computer-based tools. It can be defined as “the practice of combining multiple modes of technology, such as photographs, text, music, audio narration, and video clips, to produce (...) a story” (Castañeda, 2013, p. 45). In simple terms “digital stories are storylines, two to five minutes in length, that require the complementary integration of text, images and sounds” (Oskoz & Elola, 2016, pp. 157-158). While traditional digital stories (DSs) were largely based on personal stories (Lambert, 2012), current uses also involve historical documentaries or instructional pieces (Robin, 2006).

DST was first developed in the 1990s by the Center for Digital Storytelling in Berkeley, California and it has since been increasingly recognised as a powerful pedagogical tool in education (Robin, 2006). This case study is based on a digital storytelling project conducted with Biotechnology and French students in NUI Galway, where they created digital stories based on forensic cases where DNA profiling was used. The study provides a practical example of how DST can be integrated into the higher education LSP classroom and further explores its potential as a teaching and learning tool in the context of LSP in higher education. It underlines its capacity to not only develop students’ specialised language skills, but also other transferable skills deemed necessary for effective communication in a globalised society.

The following account outlines the documented benefits of DST in education, but specifically in second language classrooms and establishes how the current case study adds to this body of knowledge by examining its potential as a teaching and learning tool in an LSP context. It also situates this case study in the context of LSP and higher education pedagogy, and highlights the need to integrate specialised communication skills and other transferable skills into university learning. The approach taken is subsequently described and the findings which establish the main benefits, in terms of language and transferable skills, are discussed in detail. The study highlights how DST is well placed to contribute to the development of these core skills, while also developing students’ specialised language skills.

2. Literature review

In terms of the benefits associated with the use of DST in education, these are well-established in research and have been summarised by Abderrahim and Gutiérrez-Colón Plana (2021: 41) as including ‘the acquisition and consolidation of knowledge and skills; heightened engagement and motivation towards learning activities; the acquisition of digital literacy skills; improvements in overall academic performance; the development of writing, technical, presentation and research skills; advancements in higher order thinking, social, language, reflection and artistic skills; the opportunity for students to make authentic connections between their own experiences and the academic content of their lessons’. Rutta et al. (2021, 2) also highlight the educational benefits of DST established in research and argue that these studies allow DST to be considered as ‘a successful medium to be employed in an educational context’. However, over time, DSs have also been increasingly integrated in second language classrooms and it is within this context that this study is situated.

In recent years, DSs have begun to feature more prominently in second language classrooms (Oskoz & Elola, 2016). Studies have reported a number of benefits in terms of vocabulary acquisition (Tsou et al., 2006), oral expression (Castañeda, 2013; Lee, 2014b), pronunciation (Lee, 2014a; Pascual Lence, 2013), listening skills (Verdugo & Alonso Belmonte, 2007), academic writing (Oskoz & Elola, 2014, Porto & Alonso Belmonte, 2014), general writing skills, creativity (Liu et al., 2018) and critical thinking (Yang & Wu, 2012), grammatical accuracy (Lee, 2014b; Pascual Lence, 2013; Reyes Torres et al, 2012), student-centred, collaborative learning (Vinogradova et al., 2011), motivation (Huang et al., 2017; Liu et al., 2018), communicative capabilities (Moradi &

Chen, 2019) and digital storytelling in community/heritage language classrooms (Anderson et al., 2018).

DST provides students with a unique opportunity to communicate using a variety of semiotic modes. The role and benefits of digital storytelling to teach learners to communicate in a multimodal context (combining text, images, sound) is well established in research (Erstad & Silseth, 2008; Haffner & Miller, 2011; Hull & Miller, 2005; Nilsson, 2010). It is also felt that digital storytelling “integrates different literacies and language skills” for the language learner due to its combination of “multimedia researching, production and presentation skills with traditional activities like writing and oral production skills” and as such provides “an integrated approach to learning in the 21st century” (Ribeiro, 2015, pp. 48-49). Burgess (2006, p. 210) emphasises that digital storytelling demands creativity in blending multiple literacies “not only learned skills, like the ability to conceive and execute an effective narrative and use a computer, but also the more intuitive modes of collecting and arranging textual elements, (...) oral performance (...) and the combination of sonic and visual elements”.

In fact, the development of new digital literacies is at the heart of many DS studies. Chan et al. (2017) highlight the benefits of DST for improving students’ digital literacy skills, while Oskoz and Elola (2016, 165) describe the range of literacies involved “in the creation of a DS as including the understanding and production of visual images; the selection, evaluation and synthesis of information; the use of technology to improve learning, productivity, and performance; and communication in an ever-expanding community”. They further highlight that this multiliteracy approach to the DS process allows learners to succeed within an increasingly globalized society and to acquire the skills to express their thoughts with new technologies.

However, Oskoz and Elola (2016, 158) argue that “despite the burgeoning number of studies on DSs, their implementation remains innovative, challenging, and underexplored in the L2 classroom”. While all of the above-mentioned studies attest to the benefits of DST for the language learner, the implementation of DST in LSP remains underexplored.

3. LSP in higher education

Languages for Specific Purposes (LSP) as a term has been defined, interpreted and applied in various ways. Sager et al. (1980, 68) for example, define it as “specialist-to-specialist” communication. However, in the context of higher education, it is important to remember that the language learner may not yet be a specialist in their particular area. Chambers (1996, 233) emphasises the need to take into account that different levels of specialisation may exist amongst learners, that language learners “may initially be non-specialists both in the language and in the subject they are studying.” Dudley-Evans and St. John (1998, pp. 4-5) and later Arnó-Macià (2014, 5) also underline that English for Specific Purposes (ESP) and LSP are designed to meet the specific needs of learners, to help them to enter specific discourse communities and as such draw on relevant activities, methodologies and practices. However, Tual et al. (2018) are careful to highlight that LSP is not just about the acquisition of discipline-specific lexis, but about communication and that general language and LSP courses are not mutually exclusive. This argument is supported by Gollin-Kies et al. (2015) who insist that successful communication is about far more than the meaning of individual phrases and lexical items. Therefore, while LSP is indeed a form of language teaching driven by students’ specific linguistic needs, its primary focus is on teaching students to become successful communicators within their discourse community. These skills can, however, be extended to all aspects of their professional, academic and personal lives. The participants in our study are first year undergraduate students on a BSc in Biotechnology programme with French and are thus non-specialists in either Biotechnology or French. Their language programme uses specific methodologies and activities that aim to help them become effective communicators both within and beyond the discourse community of Biotechnology.

In recent years, increasing globalisation and internationalisation have heightened the need to re-evaluate the scope and purpose of language learning in higher education (Bonetto et al., 2020). Tual et al. (2018) emphasise that universities across Europe are

putting an increasing emphasis on “employability and internationalisation.” Ainsworth (2019, 1) highlights the key role played by language in a global economy, drawing attention to the increased need for workers “who possess communicative, interactional, discourse and linguistic competences.” Globalisation has thus led to an increased demand for the teaching of foreign languages for specific purposes (Gollin-Kies et al., 2015; Uber Grosse & Voght, 2012) as LSP courses play a central role in preparing students for a globalised market (Arnó-Macià, 2014). By focussing on “soft” and “hard” skills in addition to developing languages and other relevant skills side by side, LSP courses are ideally placed to prepare students for professional practice in a globalised environment (Tual et al., 2018).

The simultaneous development of language and other relevant skills is also in line with contemporary higher education pedagogy. Barnett and Coate’s (2005) framework of “knowing”, “acting” and “being” encapsulates the idea that learning at university is about far more than just gaining knowledge of one’s discipline, in this case languages and science. It is also about the acquisition of key skills and the personal development of each student. Uden and Beaumont (2006, 26) also insist that “university education should, ideally, provide students with the necessary skills, values and attitudes that are essential to cope with the dynamic complexities of the modern world” and further, highlight the lack of deep learning about the complex issues and problems that graduates have to face in the real world. It is generally acknowledged in current higher education pedagogy that while students need academic rigour in their learning, they also require real-life connections and competencies transferable to future professions and work (Morley & Jamil, 2021). What then are these key skills so central to LSP and higher education pedagogy? In addition to language learning, what other skills are targeted in LSP education and in this DST project?

Breslow (2015, 421) explains that during the second half of the 20th century and early 21st century, a set of skills emerged that were said to be essential for young people to work in a “knowledge economy”. These skills included the ability to analyse, synthesise, problem solve, think critically, collaborate, work effectively within a team, deal with conflict and communicate. In 2002, The Partnership for 21st Century Learning (P21) was established. This is a collaboration between the US Department of Education and Apple, Dell, Cisco and Microsoft, together with other non-profit organisations, government agencies and corporations. According to them, creativity, innovation, collaboration, communication, critical thinking and problem solving were all deemed essential skills, which needed to be integrated into the teaching of core academic subjects.

Above all, Herget (2020, 163) highlights that specialised communication skills are crucial to address the demands of today’s complex reality. However, while there has been a flood of interest in the concept of “transferable skills” and multiple attempts to define “transferable skills”, “21st century skills” and “key competences”, little has been done to deeply examine how these skills can be learnt in a university setting (Breslow, 2015, p. 420). This study aims to address this gap by providing a practical example of how DST can be used as a tool in a university setting to not just improve students’ language skills, but also teach key competences to help students address the complexity of today’s globalised society.

4. Case study

4.1. Participants and setting

The participants in this study were 12 first year students in NUI Galway on the BSc. in Biotechnology programme. Biotechnology can be described as the application of biology for the benefit of humanity and the environment. It harnesses living organisms to provide foods and medicines, and for tasks such as cleaning toxic waste or detecting harmful substances. Students on this 4-year degree programme study subjects such as biology, chemistry, biochemistry, microbiology, genetics, toxicology and pharmacology. In addition to their science studies, students on this programme study either French or German for the first three years. Many students choose this programme because of its unique offering of science and a language, an option usually uncommon in STEM

programmes. These students tend to find employment in industries such as biopharmaceuticals, diagnostics, healthcare and the environment.

The French component of this programme is allocated 3 hours per week. It is designed to develop students' language skills within a Biotechnology context. In first year, the module aims to introduce them to scientific French and more specifically to French for Biotechnology, and also to improve their understanding of the fundamental structures of French. The module thus allows students to extend their knowledge of the French language within the context of Biotechnology, using a variety of multimodal language learning activities such as text analysis, discussions, role-plays, grammar activities, communication games, multimedia lab work, a reflective journal and a digital storytelling project. In first year, classes and activities are generally based around contemporary topics of interest such as Covid-19, epidemics/pandemics, health, nutrition, animal testing, cloning, animal biotechnology, genetically modified organisms, DNA and forensic science.

4.2 Project

The main objectives of the DST project were to help students enrich their competency in French, with a particular emphasis on oral communication skills and the acquisition of specialised vocabulary relating to DNA and forensic science. The project also required students to use the passive voice and the basic past tenses in French (*le passé composé* and *l'imparfait*) which form an important part of the 1st year French module. In addition, the project aimed to enhance other transferable skills such as organisational, communication and digital literacy skills, and it enabled students to link their language learning with their mainstream Biotechnology studies.

Students were asked to create a 3-minute digital story in pairs based on a forensic case in which DNA profiling was used. They were assigned the name of a case and asked to include the following elements: the background to the case, how DNA profiling was used, and how the use of DNA profiling affected the outcome of the case. In order to ensure a coherent link with their Biotechnology studies, the project was run at the same time as they were covering DNA forensics in their mainstream programme. The cases assigned to the students were carefully selected in consultation with their lecturer in DNA forensics, in order to ensure they were appropriate for the DST task given.

Students were given six weeks to complete this project and it accounted for 20% of their module assessment. Key vocabulary relating to DNA profiling was taught at the beginning of this 6-week period to ensure students had the correct terminology they would need to complete their task. Since students were required to present a forensic case, which had already concluded, the past tenses in French were also revised and covered in detail in the weeks preceding the project. The passive voice was also taught during this period, as it is the action itself rather than its performer that is more important when describing scientific processes in STEM.

In terms of the technical side of creating a digital story, students were given a preparatory workshop and taken through the steps involved in the creation of a DS. Students were shown that digital storytelling is composed of 4 main phases (Chung, 2006). These stages include preproduction (designing a storyboard), production (preparing multimedia contents and recording voices), post-production, and distribution (arranging contents and editing). They were thus advised to begin by gathering materials and researching the information needed. It was then suggested they start collecting images and writing their script before creating their storyboard. The students were invited to submit their storyboard and images to their lecturer for approval before going on to digitise their media, record their voice-over and add any other elements they wished (such as music). The final stage was to edit their digital stories before submitting them via the University's virtual learning environment Blackboard. In the course of the preparatory workshop, students were shown how to use MS Photostory. They were invited to use Photostage Slideshow or PowerPoint if they preferred, but encouraged to use MS Photostory due to its intuitive user interface. They were reminded to note copyright issues, to reference all

images used, and to favour sources such as flick.com where images could be selected that were copyright-free or that simply required attribution.

This study took place between January and March 2021 when a mandatory Covid 19 lockdown was in place, students were therefore working remotely in pairs. They were encouraged to communicate with each other via Microsoft Teams and in many cases they recorded components individually before blending them together at the editing stage. They were invited to show their digital stories during a French class, which took place as part of a 2-day on-campus workshop towards the end of the semester (April 2021). It was important that students had the opportunity to present their project to their peers, as it is generally agreed that the deepest engagement in student research happens when students participate in all aspects of the process right up to dissemination (Kuh & O'Donnell, 2013).

4.3 Methodology and Data Collection

The pedagogical potential of this teaching and learning activity was evaluated using a mixed method of data collection, combining student questionnaires, semi-structured group interviews and detailed analysis of the DSs produced.

Part One of the questionnaire was designed to gather background information relating to both the learners' language skills and their familiarity with the concept and practice of DST. They were asked how long they had been studying French, if they had ever created digital stories before or used multimedia authoring tools such as Photostory. They were asked to state which multimedia authoring tool they had used and how difficult or easy it was to use. Part Two of the questionnaire focused on the skills they felt they had acquired from the task. In questions 5 and 6, learners were asked to describe how helpful or unhelpful they found DST for learning specialised French terminology relating to forensic science/DNA profiling and general French grammar and structures. They did this by using a 4-point Likert scale ranging from 'very helpful', 'helpful', 'a little helpful' to 'not at all helpful'. Question 7 asked students to compare the use of DST to traditional ways of learning French, while Question 8 asked if they thought they had acquired any other skills (other than language skills) from participating in this project. Question 9 was an open-ended question in which they were asked to list what they felt were the main advantages and disadvantages of creating a DS to learn French for Biotechnology. This questionnaire was administered during the on campus workshop in April 2021, on the same day the students' digital stories had been screened. Consent forms and participant information sheets had been administered prior to this session.

The semi-structured group interview took place during a 30-minute session after class at the end of April 2021. As classes during this period were still being delivered online, this interview was run and recorded via Blackboard Collaborate. The interview aimed to further explore students' experiences and it invited them to reflect carefully on their experience of using DST in the course of this module. At the beginning of the session, students were invited to speak freely and to be open and honest about their experience of the DST project. The questions were carefully formulated to allow students to express their ideas without any undue influence from the interviewer. Learners were simply asked what they liked or did not like about the DST project and what they felt they had learnt. As different points or issues were raised, students were invited to expand on them. The discussion unfolded in a natural and informal way and the interviewer was careful not to express any opinion on the comments made. The session was transcribed prior to analysis.

Quantitative data from the questionnaire was subsequently analysed in order to firstly, establish background information on the students' level of language skills and experience of DST, and secondly, to rate their perceptions of the usefulness of DST for learning French (both in terms of specialised vocabulary acquisition and the development of general language skills). Qualitative data from the open questions in the questionnaire and the semi-structured group interview was studied carefully and then organised into thematic categories of language skills (specialised vocabulary acquisition, grammar and oral communication skills) and transferable skills (digital literacy, teamwork, research and

communication skills) in order to identify key elements of learners' views of DST as a teaching and learning tool for French for Biotechnology.

The DSs produced by students were then analysed to determine exactly what type of language and structures they had used in the production of these digital artefacts, in order to see if they had reproduced the terminology and structures this project aimed to develop. The DSs were also closely examined to see if the views expressed by learners in the quantitative and qualitative data gathered could be substantiated. It was not the purpose of this study to use pre- or post-tests to measure linguistic progress or precise vocabulary acquisition, but rather to see if DST had a potential pedagogical value in this context. The DSs were thus closely analysed and observations were recorded and subsequently compared with initial data from the questionnaire and interview.

5. Results and discussion

12 students in total completed the questionnaire and participated in the group interview. The results presented and discussed are based on quantitative data gathered from the questionnaire, qualitative data collected from both the questionnaire and semi-structured group interview, and observational data extracted from a close analysis of the DSs produced.

5.1 Background information

Part One of the questionnaire sought to elicit background information from students with regard to their language skills and pre-existing level of technical competence with multimedia authoring tools. It was evident that all students surveyed had been studying French for 5 to 8 years. No student had ever created digital stories or used multimedia authoring tools before this project. When asked how easy or difficult they found it to learn to use these authoring tools, 8 students indicated that they found it "easy" and 4 that they found it "a little difficult". When asked what multimedia authoring tool they had used, the vast majority of students had used Microsoft Photostory, while other software used included Microsoft PowerPoint and NCH Suite. The analysis of Part One of the questionnaire, therefore, indicated that while most students approached this project with 5 or more years of French behind them, they had no prior experience of DST. The use of multimedia authoring tools did not seem to pose any significant challenge.

5.2 Language skills

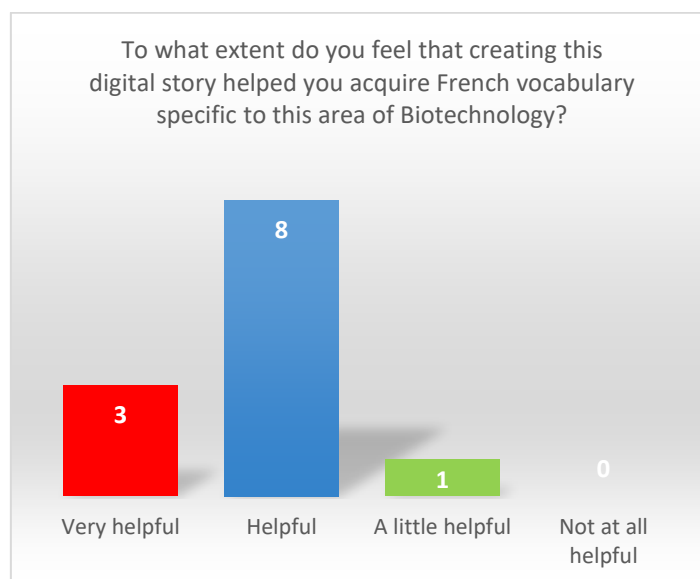
In general, specialised vocabulary acquisition and the development of oral communication skills were identified by students in the questionnaire and semi-structured group interview as the key language skills developed during the course of this project. The analysis of the DSs produced also indicated the use of a high number of specialised terms (acquired both in the classroom and beyond), together with the use of a specific range of grammatical structures and a relatively high level of competence in pronunciation, accent and general oral communication skills.

5.2.1 The acquisition of specialised vocabulary

In Part Two of the questionnaire, students were asked to what extent the creation of a digital story helped them to acquire French vocabulary specific to forensic science and DNA. The response was overwhelmingly positive.

Table 1

Response to question seeking information on how helpful creating a digital story was in terms of acquiring specific French vocabulary.



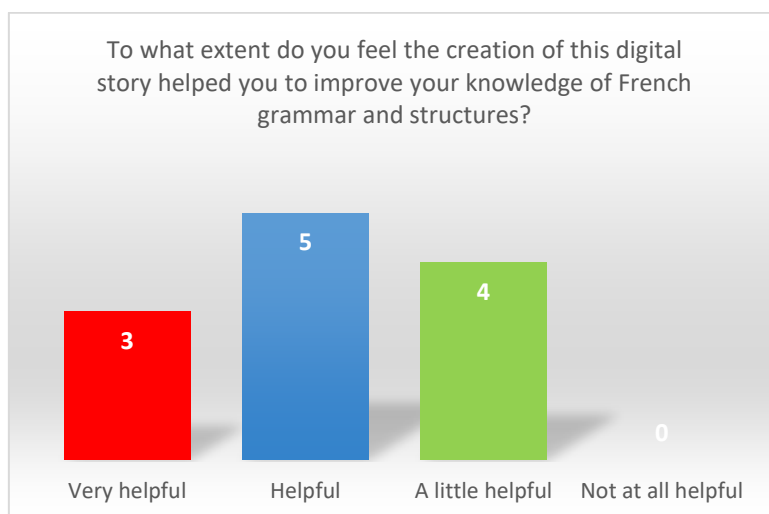
In Question 9, when asked to list up to 3 advantages and disadvantages of DST for learning French for Biotechnology, the main advantage listed by students was the acquisition of specialised terminology. In the group interview, this benefit was elaborated upon, with 5 students speaking about how this project had pushed them to research new terms, to find appropriate equivalents in French for essential terminology, and to subsequently use them correctly. The analysis of the DSs provided evidence of students' acquisition and use of this specialised terminology. In some cases, they were consolidating the use of vocabulary acquired in class and in others they demonstrated their acquisition of previously unknown vocabulary specific to the case they were presenting. General terms covered in class such as "un échantillon" (a sample), "des restes humains" (human remains), "les fluides corporels" (bodily fluids), "une correspondance" (a match) and "les données mitochondriales" (mitochondrial data) featured frequently in the DSs produced. However, students went further to research terms relevant to their own particular case and demonstrated an extensive knowledge of scientific terminology very specific to this domain such as "l'amplification de l'ADN" (DNA amplification), "une réaction en chaîne par polymérase (RCP)" (polymerase chain reaction (PCR)), and "l'analyse des marqueurs STR" (STR analysis). The analysis of the DSs also revealed the use of practical and legal terms relating to the use of DNA in criminal cases such as "une enquête" (an investigation), "un casier judiciaire" (a criminal record), "des indices" (clues), "le lieu du crime" (crime scene) "une parade d'identification" (police lineup) and "la disculpation/la condamnation" (exoneration/conviction). While studies on DST in the second language classroom have reported benefits in terms of vocabulary acquisition (Tsou et al., 2006), it is interesting to note that in the area of LSP, that this can be extended to the specialised terminology so central to this domain.

5.2.2 Knowledge of French grammar and structures

When asked in Part Two of the questionnaire to what extent learners found DST helpful to improve their knowledge of French grammar and structures, the responses were very varied.

Table 2

Response to question seeking information on the extent to which the creation of a digital story helped improve French grammar and structures.



Grammar was not identified in the qualitative data of the questionnaire or the group interview as an area which students felt the project had helped them to improve. However, the analysis of the DSs revealed a high level of competence in students' use of the 3 main past tenses in French, the "passé composé", "l'imparfait" and the "plus-que-parfait". All 3 tenses were used in all DSs produced, in order to establish the chronology of events leading up to the suspect's conviction or exoneration. While some errors were identified on occasion, learners' use of these tenses was largely accurate. In addition, the passive voice was used on a number of occasions in each DS. This grammatical structure had been taught in class prior to the completion of this project and students demonstrated their capacity to use it in a practical context. Phrases such as "l'arme du crime a été trouvée" (the murder weapon was found), "l'accusé a été condamné à la prison à perpétuité" (the accused was sentenced to life in prison) and "la victime a été identifiée" (the victim was identified) were evident in the DSs submitted. Therefore, while students did not identify grammar as an area they felt they had improved as a result of this project, the analysis of the DSs revealed a high level of competence in using past tenses and the passive voice in this context. Reyes Torres et al. (2012) argue that in their study, the awareness of a wider audience motivated learners to use a broader range of tenses than they had in previous work. While the motivation behind the use of a broader range of tenses in this study cannot be definitively established, it is possible that the awareness that the DSs would be presented to their peers may have motivated learners to do so. Finally, as students had to establish a sequence of events in the DSs, the successful use of numbers and dates in French was vital. This factor was mentioned in the questionnaires and interview and the analysis of the DSs revealed that while some small errors were sometimes made, in general dates, time periods and statistics were presented with a largely high level of linguistic accuracy. While the benefits of DST for improving grammatical accuracy have been established (Torres et al., 2012; Pascual Lence, 2013; Lee, 2014b), it is noteworthy that DST cannot only consolidate grammatical learning but also push students to use a wider range of structures.

5.2.3 Oral communication skills

In Question 9 of the questionnaire, where students listed advantages and disadvantages of DST for learning French for Biotechnology, 7 students mentioned the capacity DST afforded them to become more aware of their accent/pronunciation and to correct their errors as a key advantage. This point was developed by 8 students in the group interview, who explained that they acquired a new self-awareness of their speaking skills in French, and appreciated the opportunity the project afforded for self-correction. Interestingly, 4 students mentioned in the interview that because the digital stories were going to be

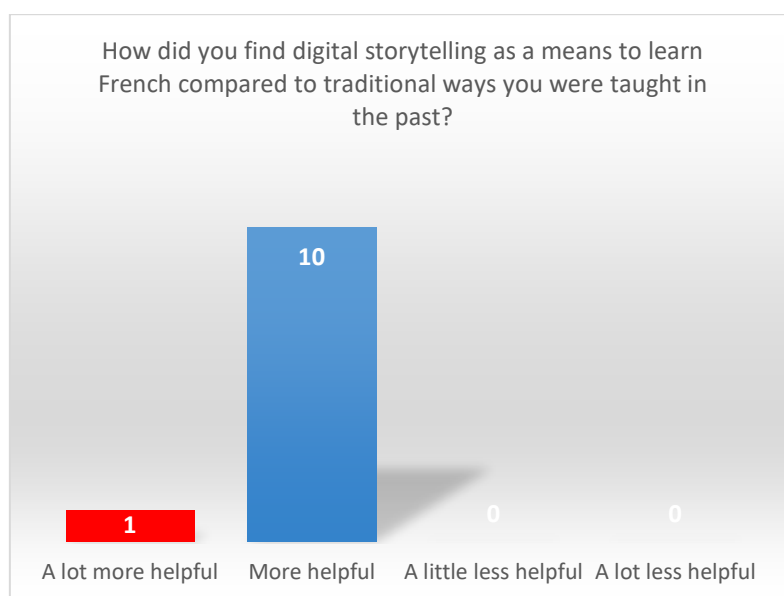
shown to the class, that they aimed for a high standard with as few errors as possible. This reinforces, no doubt, the value of presenting one's work in a public forum (Kuh & O'Donnell, 2013).

While it was not within the scope of this study to measure the exact level of improvement in accent/pronunciation and oral communication skills, it was evident from a close analysis of the DSs, that the participants displayed a high level of accuracy in pronunciation, accent and intonation. They had also made a strong effort to speak slowly and clearly in order to communicate their ideas effectively to their peers. This study affirms previous studies on DST, which reported benefits in terms of oral expression and pronunciation (Castañeda, 2013; Lee, 2014a; Lee, 2014b; Pascual Lence, 2013).

In general, the response to the question of the project's effectiveness in improving the students' language skills was overwhelmingly positive. When asked in the questionnaire to compare DST as a tool for learning French compared to the traditional ways they were taught in the past, all students described it as either 'a lot more helpful' or 'more helpful'.

Table 3

Response to question comparing digital storytelling and traditional learning.



When asked in the same question to explain why they found DST more helpful, 7 of the twelve students surveyed focussed on vocabulary acquisition as a key element, mentioning that the fact they had to research these cases themselves, pushed them to research new terms previously unknown to them. They also felt that this project had improved their speaking skills and made them more aware of the need for correct pronunciation. The role of images in reinforcing vocabulary was also mentioned by the students and, in addition, the simultaneous use of several semiotic modes was outlined as a key benefit by 5 students who explained that this project required them to speak, write and engage practically with the French language. It is interesting that the interplay of different semiotic modes was perceived by learners as advantageous to their language learning. This supports previous studies, which emphasised the integration of different literacies and language skills as a key benefit of DST (Burgess, 2006; Ribeiro, 2015).

From examining the stories produced, it was felt that above all this project had given students the opportunity to actively engage with and express themselves in the target language in a meaningful way. Federici (2017: 74-75) describes the transformative shift in language learning as "when students move from considering themselves as learners, to a concept of themselves as language practitioners", as the move from "L2 learners to

L2 users and thinkers". DST gives learners the opportunity to undergo real transformation as language learners, a concept key to higher education pedagogy. Carson (2017) also describes active language use and communication as a threshold concept, as communication in any language requires putting all the elements together – grammar, vocabulary, writing, listening, speaking – into one idea, using the language. This integration of the various elements through the production of a DS allows the learner to cross the threshold from passive language learner to active language user. It was not simply about the acquisition of specific language skills, but an opportunity to cross an important threshold in language learning.

5.3 Transferable skills

Digital literacy skills, teamwork, research and communication skills were also mentioned by students in the quantitative and qualitative data gathered as key transferable skills acquired. The analysis of the DSs produced is indicative of the potential of DST to develop these skills.

5.3.1 Digital literacy skills

In Question 8 of the questionnaire, students elaborated on skills other than language that they felt they had acquired from participating in the project. 11 out of the 12 students surveyed cited digital skills as the key non-language skills acquired during this project. They felt that they had improved their digital literacy skills by learning to use programmes such as Photostory and by recording voiceovers.

The digital literacy skills acquired by all 6 groups were evident in the high production quality of the digital stories produced. Images were carefully chosen and matched to appropriate segments. In many instances, images were created using a combination of text and silhouettes. Zooming and fading were also used to modify segments and the multimedia authoring tools chosen were used competently. It was clear that students had worked as teams and communicated effectively to organise turn taking and merge files to produce coherently structured DSs. As mentioned earlier, the development of new digital literacies is at the core of many DS studies (Chan et al., 2017; Oskoz & Elola, 2016) and there is no doubt but that this approach helps learners to succeed within an increasingly globalised and digital society.

However, technical difficulties and challenges were listed as a disadvantage by 10 students which is surprising given that 8 students had previously described it as 'easy' to learn to use the multimedia authoring tools needed for this project. We can only infer that these difficulties were minor and surmountable. Minor technical challenges were also mentioned in the group interview with difficulties such as merging and converting files being identified.

5.3.2 Teamwork

Another advantage mentioned by 6 students in Question 9 when listing the advantages of DST for learning French for Biotechnology, was the opportunity to engage in teamwork and to be able to work with somebody else. In this instance, it must be noted that when this project took place, students were predominantly at home and engaging in online learning. It is thus understandable that this dimension featured so prominently here and emerged as a strong point in the group interview. Students also explained how nice it was to work with others and engage with each other, albeit remotely. The other key advantages mentioned included the opportunity to be creative, to use new software and to engage in interactive learning. The adjectives "fun" and "enjoyable" were also used to describe the project. The adjective "different" was used several times in the group interview with many students simply saying that it was nice to do something "different".

Nevertheless, when listing disadvantages in Question 9, the second main disadvantage listed (after technical difficulties) was the difficulty of communicating with each other in an online environment when creating the digital story. Again, given the context of online learning during this period of the pandemic, this response was very understandable. While

the opportunity to work with their peers was undoubtedly an advantage, it definitely also appears to have posed a challenge.

5.3.3 Research skills

A key point, which emerged in the group interview, which did not feature in responses to the open questions in the questionnaire, was the opportunity this project gave students to learn more about the content area. 6 students elaborated on how much they learnt about the practical applications of DNA profiling and how interesting they found it to learn about the cases assigned. In the development of the material necessary for the DSs, learners were thus required to engage in a substantial amount of preliminary research. The analysis of the DSs showed that students had researched and presented detailed information as to the background to the case, how DNA profiling was used and how it affected the outcome of the case. The project thus seems to have provided a strong bridge between their language skills and mainstream science studies and it echoes Moradi and Chen (2019, 2) who highlighted that “creating a promising digital storytelling project demands teachers to pose conditions that are significantly associated with contents of the course”. In addition, students not only had to research the cases assigned, but also the French scientific terminology specific to their particular case and the role played by DNA profiling. It confirms Moradi and Chen’s (2019, 2) view that in the course of completing a DST project, “learners are challenged with critical thinking about combinations of content material and multimedia components while considering the standpoint of audiences”.

5.3.4 Communication skills

Communication skills were also identified as a key competency acquired during the course of this project. While again, it is impossible to measure the exact level of improvement in this area, students’ communication skills were evidenced by their successful communication of the story behind the case assigned to them and the DNA profiling technique used. All groups had made a huge effort to make their DS as clear and as visually appealing to their peers as possible.

6. Conclusion

This project was carefully designed to enable students to improve their language skills within the context of a French for Biotechnology course, more specifically DNA and forensic science. It aimed to provide students with transferable skills that will be useful to them in the future both in a professional and personal context.

The study adds to the body of research on DST firstly by providing a practical example of how DST can be integrated in the higher education LSP classroom, and secondly by demonstrating the potential of this activity to advance not only students’ language skills but also other transferable skills essential for preparing graduates for a globalised society. It affirms that DST can provide students with the discipline-specific lexis that is central to LSP, as well as the communication skills that represent an equally central tenet of LSP pedagogy (Tual et al., 2018; Ainsworth, 2019). Current higher education pedagogy also calls for the inclusion of competencies transferable to future professions and work (Morley & Jamil, 2021) and the specialised communication skills that are crucial for addressing the demands of today’s complex reality (Herget, 2020). This study highlights that DST is well placed to contribute to the development of these skills in the higher education LSP classroom, while also developing students’ specialised language skills.

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