


Developing Students' Digital Literacy with Digital Storytelling Projects in Design and Media Arts

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Abstract

Digital media literacy is essential in today's world, where media in the form of interfaces, images, words, and sounds is omnipresent. Within this context, educators are tasked with equipping students with the ability to critically analyse and effectively create digital content. This paper explores the role of digital storytelling projects in fostering digital literacy among students, particularly in design and media art disciplines. Grounded in design-based research, the study highlights key pedagogical strategies like project-based learning to support the development of students' skills, like critical thinking, creative communication, collaboration, networking, and technological proficiency.

We propose a digital storytelling project framework for professors and students to convey personal experiences, engage with complex issues, and develop a deeper understanding of the media they consume, share, and

produce. The framework includes guidelines to set the learning environment and to support several phases of student's projects, from initial ideation to online sharing. We present a literature review to scaffold the proposed framework and case studies of different kinds of personal stories created by students using diverse media formats like video, interactive video prototypes, and virtual and augmented reality projects. We highlight several positive outcomes of the framework including resilience and sustainability, as it has been used in several different classes and could be implemented within different modalities.

Keywords

Digital Media Literacy • Digital Storytelling • Project-Based Learning • Design-Based Research • Media Art Education • Audiovisual Production • Pedagogical Framework

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1. Introduction

The omnipresence of digital media necessitates the preparation of young people to navigate, interpret, and create in this complex landscape. According to UNESCO's 1982 International Symposium on Media Education, the mission of educators is to prepare students for a world dominated by powerful media. This paper examines the practice of employing digital storytelling projects to develop students' digital media literacy, aligning with pedagogical goals, personalization, emotional engagement, and cognitive development. We focus on higher education students' projects developed from 2011 onward that contributed to support core ideas adopted in more than 10 years of teaching in the fields of audiovisual design and production and media arts. The subjects varied from Audiovisual Production for Marketing students, Multimedia Production for Design students, Multimedia Project for Art and Heritage Sciences students, and Interaction Experience and Virtual and Augmented Realities for Multimedia Art students. The variety of main subjects and classes where these projects were developed supports the idea that the proposed framework and guidelines for professors may be applied in a myriad of classes.

2. Methodology

The methodology followed to develop the study stated in this article starts with a literature review on the topic of digital literacy, digital storytelling, and project-based learning. Departing from previous research projects (Maneira, 2014), we gathered recent studies that discuss the use of digital storytelling in educational contexts, focusing on those developed in tertiary education. We present a framework, and a set of guidelines used for developing briefings, the learning environment and a set of guidelines to support students in their learning process. We then present and analyze a selection of graduate students' audiovisual work considering formal aspects and also methodological approaches relevant to the final outcome. Finally, we discuss the main benefits and constraints resulting from our different approaches in teaching practice and summarize the most relevant aspects that contribute to the definition of a model of teaching that may be considered effective, resilient, and sustainable. The main methodologies used follow a Design-Based Research (DBR) approach in pedagogical contexts due to its iterative, collaborative, and context-sensitive nature (Svihla, 2014).

Design-based research uses iterative processes involving multiple cycles of design, implementation, analysis, and refinement, which allows for continuous improve-

ment of educational interventions. This iterative nature ensures that the interventions are closely aligned with the evolving needs of the educational context and theoretical developments in the field of education and in the field of digital technologies. Assuming this methodological approach, we can accommodate contributions from other researchers, educators, and students. This collaborative approach ensures that the interventions are practical and grounded in real-world educational settings, enhancing their relevance, effectiveness and resilience. Together with practice-based research in digital arts (Candy & Edmonds, 2018; Mendes, 2020), these research methodologies aim to integrate both theory and practice, bridging the gap between theory and practice by using a framework to guide the design of interventions and by refining theories based on practical outcomes. The final objective is the development of robust educational practices that are theoretically sound and practically sustainable.

3. Literature Review

3.1. Digital Media Literacy

The main problem we address in this work is the need to address the lack of social and digital skills for young adults to engage as part of our society. The number of skills each student brings to class may vary; however, in our experience from the first years of college to the last one, there are always a number of skills and attitudes toward digital media and digital production that are lacking in most students, and that can be learned or supported. Digital literacy, like most literacies, assumes that to be literate, not only one must be able to read and interpret but also be able to participate in the creation of new digital media (Jenkins, 2006; Jenkins *et al.*, 2009; Manovich, 2002; Murray, 2018).

Regarding the Development of Critical Skills, digital media literacy encompasses the ability to critically analyze interfaces and media content but also be able to master the skills to participate responsibly in the development of these media (Jenkins *et al.*, 2009; MILD, 2018). Many authors support the importance of educational institutions to cultivate an attitude towards online content that emphasizes the responsibility of the media students to frame inappropriate content (Popova, 2012; Weaver & Ford, 2019).

Creative communication skills are essential for navigating the digital landscape of the 21st century and being an active part of it (Cheng & Liu, 2018; Shelby-Caffey *et al.*, 2014). Digital storytelling helps students improve their writing, speaking, and communication skills. It allows them to organize and prototype their ideas, express opin-

ions, and construct narratives creatively and effectively (ISTE, 2016; Ivala *et al.*, 2013; Peña & Cassany, 2024).

These projects often involve collaborative efforts, helping students develop teamwork and networking skills. This is particularly beneficial in media and design industries where collaboration is key (Fisher & Hitchcock, 2022). Participating in social networks is vital for better understanding complex topics and connecting with relevant specialists in advanced fields. Knowing how to find and engage in different communities is fundamental for being up-to-date and participating in the most relevant contexts (Jenkins *et al.*, 2009). Mayer and Fiorella (2022) emphasize the importance of social cues in multimedia learning, highlighting the need for conversational and polite styles to enhance engagement from others. Students gain hands-on experience with various digital tools and software, enhancing their technological proficiency, which is essential for their future careers in media, art, and design (Vaishnavi & Ajit, 2023).

The playful exploration of different tools supports a proactive attitude toward technology. More important than knowing how to use a specific tool to do something it is important that students get more confident in finding and engaging in the exploration of new tools, as there is no single software that will be the best option forever and for all challenges that students will face in the future.

3.2. Digital Storytelling Frameworks

Historically, the definition of digital storytelling started with a series of workshops in the 1990s by Dana Atchley and Joe Lambert, among others, explicitly with the aim of empowering citizens through the development of their personal narratives, narrated by themselves (Hartley & McWilliam, 2009). The main idea – that anyone can learn to create powerful narratives and share them – has been adopted ever since. The workshops they offered proposed a project methodology inviting students to follow some phases that are very similar to a design project.

Multiple examples of educational use of digital storytelling can be given from formal to informal educational contexts (Fisher & Hitchcock, 2022; Lambert & Hessler, 2018; Ungerer, 2019), from traditional settings to online learning. Digital Storytelling may be defined as a set of components that characterize not only the artefacts but also the process of creating. Lambert and Hessler (2018) identify seven components that are generally assumed: *Self-Revelatory* – stories convey new insights, giving a sense of immediacy and discovery; *Personal or First Person Voice* – stories are personal reflections with emotional significance, focusing on lived experiences; *Experiential* – lived experiences are presented as descriptions of moments and scenes; *Photos more than Moving Image* –

still images are preferred, creating a relaxed visual pace; *Soundtrack* – music or ambient sound adds meaning and impact; *Restrained Length and Design* – stories are brief (under 5 minutes) with minimal editing (emphasis is placed on basic techniques such as pans, zooms, and dissolves, with occasional use of compositing or special effects); *Intention* – self-expression and authorial control are prioritized over publication or audience concerns, emphasizing ownership and ethical considerations.

The interest of professors is resulting in the inclusion and research of digital storytelling projects' impact in the most varied learning contexts. Many authors support the use of digital narratives in their classes and present evidence of its contribution to developing already-mentioned digital skills like critical thinking, researching, teamwork and networking (Fisher & Hitchcock, 2022; Peña & Cassany, 2024; Vaishnavi & Ajit, 2023). The results we describe here also seem to validate that the characteristics of digital narrative projects positively contribute to diverse educational contexts.

The use of projects as part of the learning strategies dates back to the beginning of the last century, and since John Dewey in 1938, project development by students in class has been used and studied as a prominent part of experiential learning supported by active and constructivist pedagogies (Handrianto & Rahman, 2018). Project-Based Learning approaches blend with digital storytelling frameworks as projects tend to explore topics dear to their authors, resulting naturally in high emotional involvement. Consequently, this process leads to extra engagement in the pursuit of objectives. Consistently, motivation is considered a key element for learning and retention (Fisher & Hitchcock, 2022; Ivala *et al.*, 2013).

Research by Schrader, Kalyuga, and Plass (2021) highlights the significant role of motivational constructs, such as self-efficacy and positive emotions, in optimizing learning outcomes. Personalized and voice-infused storytelling projects align with these principles by fostering emotional engagement. Digital storytelling actively engages students by allowing them to be creators rather than mere consumers of digital media. This engagement is frequently reported as linked to increased motivation and enthusiasm for learning (Ungerer, 2019; Niemi & Multisilta, 2016).

As for the students' approach, Project-Based Learning (PBL) was used as an instructional method in which students acquire knowledge and skills by working over an extended period to investigate and respond to a real, engaging, and complex question, problem, or challenge (BIE, 2023; Kingston, 2018). PBL is a student-centred learning practice designed to teach concepts using real-world problems and challenges. It is commonly used to develop critical thinking skills and produce engaging classroom models and lesson plans. Teachers often employ PBL to

provide students with in-depth learning experiences, helping them progress. Typically, students are presented with a real-world problem or challenge to solve and are asked to apply what they have learned to create a solution. The teacher acts as a guide and facilitator rather than a traditional lecturer. Projects may be individual or group-based and often involve interdisciplinary approaches, bringing together concepts from different subject areas. In this case, the aim is to motivate students, enabling them to take ownership of their learning, explore topics of interest, and observe the practical application of what they are working on.

3.3. Personalization and Voice

The presence of the protagonist's voice, typically present in digital narrative production (Lambert & Hessler, 2018), has its own place of prominence in current social media. Partially, this derives from the increasing use of personal devices like cell phones (Morris & Turkle, 2018). People carry them all around and use them in close and personal communications. Other persons they hear or see on their phones are often family or close friends and they will also be on their phones. In this way, the proximity to the camera and the use of first-person voice makes these stories adaptable for watching on mobile phones. As Mayer and Fiorella (2022) suggest, students benefit from narratives presented in conversational tones. Digital storytelling leverages personal narratives to encourage students' investment in learning. Sharing personal experiences is a helpful contribution to engagement and for developing a sense of community (Lambert & Hessler, 2018). Therefore, personalization and voice in storytelling are considered strategic for educational contexts.

4. Digital Narratives Project Framework

The proposed framework highlights key aspects that contribute to the effective use of digital storytelling in educational contexts. First, students are encouraged to explore complex and meaningful topics that challenge their critical thinking and creativity. The project includes distinct phases where students present their work progress, allowing for feedback and iterative improvement. Some adjustments can be made to the initial briefing, considering the project duration. In one of the classes where the project spans a full semester, the students had to write a detailed briefing and a response to the briefing explaining what and how they would develop their audiovisual project. The last phase, however, requires

that the final works are presented and discussed to foster reflection and shared learning among peers.

The final works should be published and accessible to the class community or open to the public to broaden their impact. Minimum technical requirements should be set, and students should be encouraged to utilize the tools and equipment they have more accessible to them; however, institutions should also provide access to essential equipment and software that students might otherwise lack, setting a baseline of minimum technical requirements to support the successful completion of their projects. Furthermore, an important part of the framework is that students are usually invited to collaborate with each other, share ideas, and build upon each other's contributions.

4.1. Challenges

Digital narratives enable students to create and share meaning on complex issues. As Joe Lambert and Brooke Hessler (2018) put it, a story can have many functions and can be a way of learning and exercising our memory, a way to create connections in a changing world, a form of reflection space, a way of creating agency, and a way of making sense of our lives and our identity (Lambert & Hessler, 2018). The story as an artifact can have all these functions and the process of creating it in class can be considered as the main tool to explore and overcome all the difficulties within a safe environment.

As students gradually understand these functions and the potential of stories and storytelling in their lives, they gain meta-skills that can be considered the basis for sustainable lifelong learning cycles. For them to develop a compelling story, they really have to embrace the topic. Students are frequently encouraged to address a societal problem and how it relates to themselves, exploring how it can be charged with emotional drive. When looking for images and other resources, students are going through the initial steps of discovery. When scripting, they need to hear it, and they should set the right tone and think about the music and the soundscape that will work better. Part of the challenge for students is to know what they want to say, in other words, what the communication objectives are. They must idealize the story they want to tell, and they should find the best possible way of telling it. Providing students with a set of components for digital storytelling contributes to guide students in their process. We don't present them as a set of rules but rather introduce them as a reference and depending on the level of proficiency with digital media, we may adjust them.

Taking as reference the components earlier presented from Lambert and Hessler (2018), we may omit the com-

ponent that emphasizes still image or put the tonic in the desired effect, “creating a relaxed visual pace” where still images may or may not have their role. The “restrained length and design” may not have a limit of 5 minutes, and for instance, the “intention” may be reframed as in one specific project developed with students in Marketing graduation, where there was a clear objective to convey a specific message to a specific audience.

Students will often ask for examples and part of the professor's role should be to find diverse examples. These can be either very creative and innovative or very classic. They can be very simple or very complex, showing how they all work to grab and maintain our attention. Examples are generally shared and discussed in class but are also made available to students on online platforms.

A good example reuses the University of Applied Sciences Potsdam Massive Open Online Course (MOOC) “The Future of Storytelling” (2013), which has been shared in the class blog of one of the courses. Students should understand that they don't need to “reinvent the wheel” and that there are several ways to tell a story that can be used or adapted for their specific purpose.

The last challenge for students arises after assembling their stories: they need to share them. In the educational environment, students may have a step-by-step approach to making their stories public by sharing early versions with colleagues and in class. Also, part of the challenge will be to be available to receive feedback and to discuss and reflect on possible improvements to the project. As many authors support (Eissa, 2019; Lambert, 2010; Doorley *et al.*, 2018), this approach can be seen mainly as a communication design approach, and students should be given opportunities to improve their final projects.

4.2. The Phases

The digital narratives project framework is structured around a series of phases designed to guide students in creating meaningful digital storytelling projects. These are informed by combining established methodologies such as Design Thinking (Doorley *et al.*, 2018) and the Double Diamond (Eissa, 2019). Such methodologies emphasize iterative processes, user-centered design (Hanington & Martin, 2012; Rogers *et al.*, 2023), and problem-solving. While there may be variations depending on the specific approach adopted in each course, a shared core structure ensures consistency across projects. Below is a generic description of the main phases, including their objectives, methodologies, and outputs.

The first phase focuses on research and the establishment of objectives. Activities in this phase include group formation (when applicable); domain characterization by understanding the project's thematic focus; tech-

nological platform analysis, identifying the tools and platforms to be used; stakeholder and target audience analysis, defining partners and end users; objective definition by outlining the goals of the project; a justified needs assessment plan that includes a description of information-gathering activities, critical analysis of findings, development of use scenarios, user tasks, and user models; and conclusions and project requirements.

Conceptual Design or ideation is the second phase, which involves creating a conceptual framework for the project. Key activities include storyboard development to visualize the narrative flow; mind maps and concept description or scripting, summarizing the main concept, metaphors, and narrative structure. After pre-production, the third phase is the production part, where students create a video prototype that demonstrates one or more usage scenarios for their proposed project. This step focuses on translating the conceptual design into tangible representations.

Evaluation, in the fourth phase, is critical for refining the project. Students are required to develop a justified evaluation plan, conduct evaluation activities to gather feedback, summarize and critically analyze the results, and conclude with a description of future work and possible project improvements. Students are also encouraged to collaborate throughout the project, supporting one another in various tasks and leveraging multiple tools.

To better align with professional practices in digital storytelling, the framework also integrates a structured production workflow that includes: Pre-production (research and ideation, such as creating mind maps, scripting and storyboarding, production mapping and task planning, information design, including tools and support systems); Production (prototyping and iterative development); Post-production (final editing and integration of all project components).

5. Case Studies – Personal Stories Projects

In the chapter *Stories of Our Lives*, Lambert and Hessler (2018) present different kinds of personal stories that we can tell: “The Story About Someone Important” (including Character and Memorial stories), “The Story About an Event in My Life” (with Adventure and Accomplishment stories), “The Story About a Place in My Life”, “The Story About What I Do”, and “Other Personal Stories (such as Recovery, Love, Discovery, Dream, and Coming of Age stories). We applied Lambert and Hessler's taxonomy to organize the case studies we present as a selection of our students' projects. To protect personal data, student names are not disclosed in this document. However, the authors' names are credited through the respective sources cited in the figure captions.

5.1. Stories About Someone Important

The story *Inexorável* was developed by a student in her fourth and last year of a Communication and Multimedia graduation. The student aimed to portray the main character, an old, dying man, and his relationship with his granddaughter. The story develops as the main character realizes he has a terminal disease, and his granddaughter shows up soon after. The heavy topic becomes lighter by exaggerating the character traits. The old man is portrayed as unbearable and anti-social, while the granddaughter is a careless teenager who interacts more for fun than out of great concern about the old man. The project's initial idea was to make a miniseries. However, for the challenge proposed it had to be shortened to be delivered within the semester. The final script included a diagram (Figure 1) with 22 scenes and 6 different endings for the experience. The student wanted to allow the public an interactive experience so that they could better understand the kind of options the old man had to face. The student had never done an interactive video, and she had only recently started mapping interactivity for a web project. However, she was able to create a fully interactive story with a beginning, middle, and end with up to 20 short videos. The character's options were funny, and most students in class wanted to go through the experience again and again following different options to see the diverse outcomes. The outcomes could be very different as the old man could die sooner than expected or accomplish all his last final wishes. The student was creative and explored her storytelling skills, making the options relevant and funny. She also overcame her fears by using a new application to develop the interactive part of her project, exploring more than one software. She became proficient in all aspects of production, from directing the main character to planning the interior and exterior settings.

In another course, and inspired by the project by the project briefing focus on human-robot interaction – with additional considerations of intergenerational dynamics – the *Anjicare* project aimed to improve the quality of life for both residents and staff in nursing homes. The challenge posed to the students was to reflect on

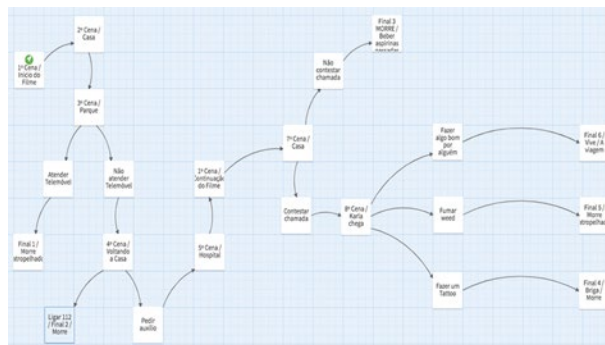


Figure 1. Scripting map of the project *Inexorável*, 2020



Figure 2. Starting shot with the title of the video and a screen with options where the old man can choose to make one of his dying wishes

affective interaction with robots, questioning what types of interactions they wished to promote and what emotional connections could potentially be fostered. As an outcome of this challenge, the students created a video prototype that illustrated the loneliness and boredom experienced by many elderly individuals in care homes and how the introduction of the *AnjiCare* robot could help mitigate these issues.

The main character of the story *Anjicare* video prototype, was inspired by memories of one of the students when visiting her grandfather at the nursing home. The story explored the potential of robots in assistive care in the Interaction Experience class. The group project that adopted the story of one of its members was then highly motivated to create an expressive character capable of shifting its facial expressions from mistrust to tenderness, symbolizing the development of emotional bonds.



Figure 3. *Anjicare* project, 2024. Source: <https://ei202425.wordpress.com/2024/12/11/anjicare-artigo-iii/>

Throughout the design process, the team encountered several challenges, including how to convey emotional nuance through the robot's expressions and how to represent the evolving relationship between the robot and its human companions. These challenges were addressed through iterative prototyping, storytelling techniques, and user feedback, ensuring that the final design effectively communicated warmth and emotional connection.



Figure 4. *Breez-e* project, 2024. Source: <https://ei202425.wordpress.com/2024/12/19/fase-final-breez-e/>

5.2. Stories About Someone Important

Through the *Breez-e* project video prototyping activity in the Interaction Experience class, students were asked to share an emotionally driven narrative involving interaction with robots. This group project evoked a sense of home and well-being by selecting a familiar park, blending personal imagery with the theme of connection to nature. By situating their robot interaction narrative within this meaningful space, the students combined emotional storytelling with the design of affective experiences, reinforcing the potential for robots to contribute to well-being through familiarity and environmental connection. This response to the challenge proposed demonstrated how narrative techniques – particularly those rooted in personal and place-based experiences – can deepen engagement in design projects.

Combining emotional storytelling, spatial awareness, and interactive design principles, the students created a prototype that reflected both individual memories and broader themes of social connection and environmental well-being.

The *Ribeira de Barcarena* was initially intended to be a documentary about Barcarena stream passing near the student's residence. The student was challenged to develop it as an interactive experience. The straightforward solution the student came up with was an interactive map with video segments accessible through geolocated thumbnails. He was further challenged to make it look closer to a story with a beginning, middle, and end. He then created an initial video and prepared a cloud of videos with keyword connections in Korsakow to manage the generative system. The student had to make a great investment to explore the technical aspect of having both the Korsakow system running and having the fixed menu over the map. The final interface had two navigation menus, and users could easily choose between both ways of exploring the stream. Once again, the student's close connection to the subject made it a personal project with great emotional investment from the start. The level of difficulty of the challenges was incremental, and, in this way, several technical and soft skills were supported.

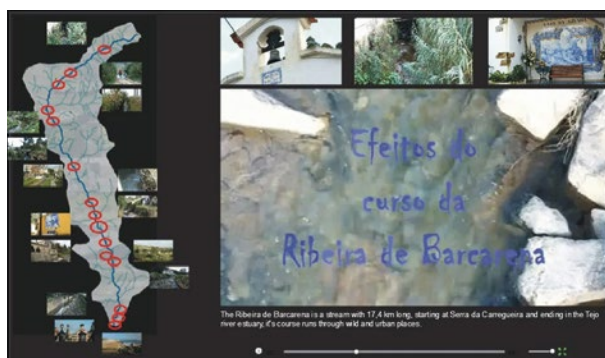


Figure 5. *Ribeira de Barcarena* project, 2011. Main interface. Source: <https://multimedia201112.wordpress.com/2012/01/17/efeitos-do-curso-da-ribeira-de-barcarena/>

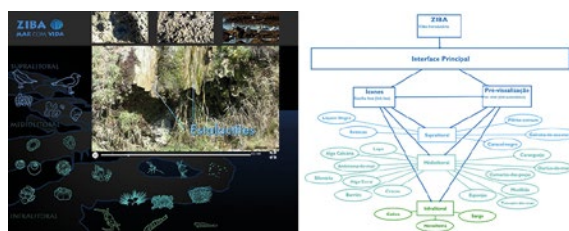


Figure 6. *ZIBA* project, 2012. Main interface and Navigational map. Source: <https://cargocollective.com/mpmultimedia201213/ZIBA>

In *ZIBA*, as in the previous project, the student chose a location near his residence. In this project, the student objective was initially to make a glossary of species from Avencas Beach to bring awareness to the new status as a protected area of biophysical interest. For this project, the student recorded videos for over 22 species from the ecosystem and prepared illustrations for each of them. The initial idea was to make an interactive webpage showing all the different species stratified by zones of the habitat. This student also followed the challenge of making it an interactive video by adding three videos for context to structure the cloud of video segments managed with the Korsakow system according to the areas where the species thrive.

As part of the *Virtual and Augmented Realities* course, students were challenged to engage in a practical exploration within the Reality-Virtuality Continuum. This explo-

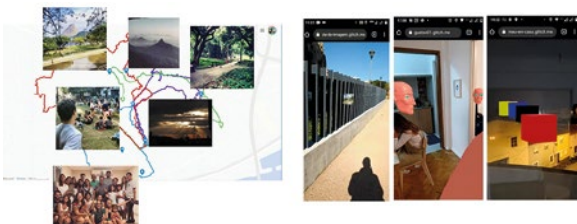


Figure 7. *Memories Gallery* project, 2021. Navigational map with GPS drawings and augmented reality application with 3D content. Source: <https://rva2020.wordpress.com/2021/01/16/museu-das-memorias/>

ration required the development of a project documented through an article or essay, integrating technologies in a way that aligned with their intended master's research themes. To address this challenge, the *Memories Gallery* project aimed to explore the connection between artistic walking practices, design, and public space expression through augmented reality (AR). Inspired by a sense of belonging, the student developed an interactive experience using GPS drawing and location-based AR to link urban spaces in Lisbon, Portugal, with meaningful places in Rio de Janeiro, Brazil. Integrating 3D elements and refining AR.js for location-based interactions were technical challenges faced throughout the process, as well as managing GPS tracking.

The project effectively transformed public space into a virtual storytelling platform and merged personal memory with urban narratives. The process not only enhanced the student's technical and digital storytelling skills but also deepened his emotional connection to his hometown.

5.3. Stories About an Event in My Life

The interactive adventure story *Can You Be Fast Enough?* was developed in the last year of a Communication and Multimedia graduation. The student created an interactive video as a game where the protagonist is trying to save his life as his stock of vital medicine just ran out. He has to choose to drive to the next pharmacy by car or by motorcycle. He dresses up accordingly and then has to choose between legal and illegal driving options to get on time to take his needed medicine. The student's objective was to make the audience feel the stress of being late for something. The interactivity was created with direct links between video segments using Klynt. The randomness of what would happen increased the levels of stress and frustration of users as many legal and illegal options would make the protagonist fail to get on time to the pharmacy. The project took some weeks to film as the student could not film everything in one

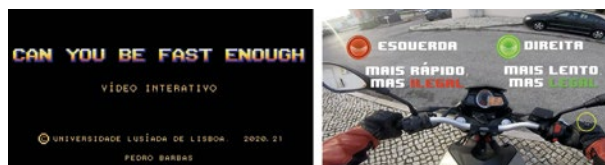


Figure 8. *Can You Be Fast Enough?* Project, by Pedro Barbas, 2020. Starting screen and typical user interface with two options (Left: “faster but illegal”; “Right: slower but legal”)

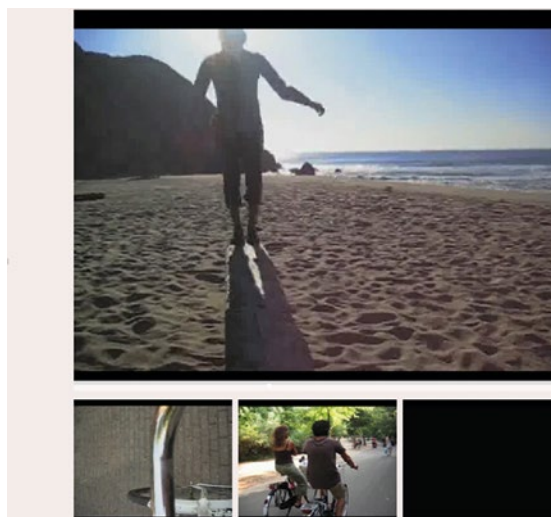


Figure 9. *Media Lab Project*, 2011. Starting screen with the typical 3 options thumbnails summoned in Korsakow system

day and the weather conditions were very different from one day to the next. The student reported that the major difficulty was finishing the project on time.

Another typical event story was developed by a media student in the last year of graduation in a Media Lab class. It had no particular objectives other than showing moments and short glimpses into the author's summer holiday. This project was particularly interesting as the student was able to gather a vast number of archive material coherently under one single narrative. The project had dozens of videos and pictures dating back to the summer holidays with friends. Many of these materials would show the author's point of view or show very closely the author's experience. This project allowed the student to revive memories from friends and her hometown. The shared moments of happiness with friends make it a story about friendship. The author organized the keywording in Korsakow system in a way that allowed the user to see all her videos. The project had a very simple interface that matched the simplicity of the narratives within the project.

The student had the objective of learning a new skill, so she decided to invest her time in non-linear video editing using *Premiere*, an application she had never used before

and wanted to master. She could be found spending extra hours in the class computers editing her work and getting support from colleagues and the Teaching Assistant. By the end of the project, she said: "The main takeaway from this course is that for most projects, you are not able to do by yourself" (Maneira, 2014).

Although mostly interested in creating short segments with a beginning, middle, and end, she started enjoying the map mapping activity to structure ideas and segments together. She also stated that Korsakow system's keywording process was very challenging.

5.4. Stories About What I Do

As part of a video exercise, students were challenged to explore video production techniques hands-on, following a structured methodology that included research, brainstorming, planning, filming, editing, and publishing. The objective was to develop audiovisual narratives that effectively conveyed a chosen theme while experimenting with time as a creative dimension. In accordance with the brief, the aim of the video *Fenómeno* was to capture the essence of BMX, not only showcasing the sport itself but also exploring the broader context surrounding it. The student aimed to highlight the environment, relationships, and lifestyle associated with BMX, emphasizing how these elements contribute to a "sublime" experience both for

practitioners and observers. In this scope, a good story emerges from exploring familiar subjects from a fresh perspective (Lambert & Hessler, 2018). A significant difficulty encountered during the production was the manipulation of both visual and audio elements. The student used video editing tools to cut footage, adjust colour, gamma, and contrast, and eliminate unwanted noise. The post-production process emphasized the analogue qualities of the cassette medium to evoke a sense of nostalgia, a creative decision that involved manipulation of the footage to highlight its vintage texture. The editing tasks allowed the student to expand skills in both technical editing and creative design, achieving a narrative that blended nostalgia with contemporary filmmaking techniques.

Throughout the production of *Fenómeno*, the student developed various skills, including advanced filming techniques, editing, and narrative construction. The process fostered the ability to balance multiple elements, such as technical proficiency and emotional expression, while creating a cohesive story. The student also honed skills in capturing the subtleties of environment and relationships, learning to convey abstract ideas and emotions through visual storytelling.

In the *Heritage Intervention* project, Art and Heritage Sciences students tell the story of the stages of intervention they do on cultural heritage, specifically the restoration work in the corridor of the Fine Arts Faculty where they study, undertaken as part of the course *Technological*

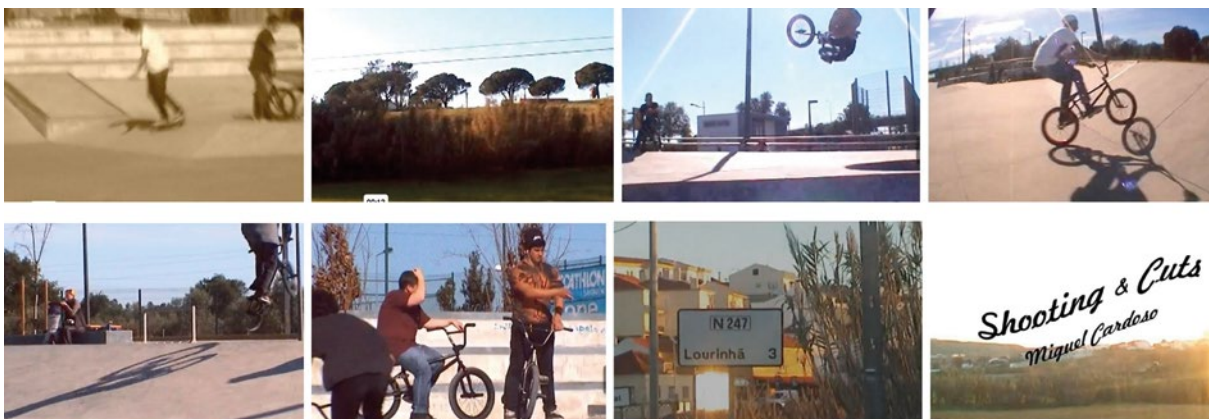


Figure 10. *Fenómeno*, 2013. Source: <https://multimedia2013.wordpress.com/2013/04/22/projeto-video-fenomeno/>

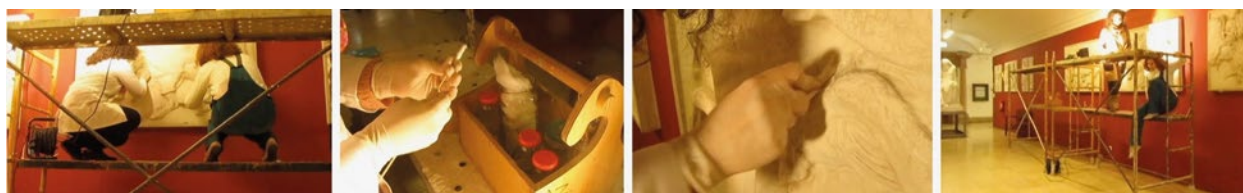


Figure 11. *Intervenção no património* (Heritage intervention), 2015. Source: <https://multimedia2015.wordpress.com/2015/04/14/projecto-video-final-2/>

Studies in Conservation and Restoration IV. The students aimed to create a documentary-style record of their work, which they approached as an artistic performance, highlighting both the technical and creative aspects of heritage preservation. Articulated with the perspective that a life story is shaped by what we do (Lambert & Hessler, 2018), the video reflects the students' subjective artistic expression of their professional training.

The project presented challenges, such as the logistical difficulties of filming in an active restoration environment. They coordinated their efforts to capture the dimensions of the restoration process. The editing process required particular attention, as it involved refining the footage and combining it with a soundtrack that aligned with the narrative and emotional tone of the project. The video successfully presented their restoration work in a way that emphasized both the technical processes and the artistic nature of their practice. The inclusion of feedback from peers underscored the impact of the project: "This exercise was very enjoyable because we filmed something meaningful to us and used it to share our work with our colleagues".

Through this project, the students developed skills such as teamwork, documentary filmmaking, and visual storytelling. By framing their restoration work as an artistic performance, they were able to create a record of their activities that also invited viewers to see the significance of heritage preservation.

5.5. Other Personal Stories

The project *Too Good to Go* was developed by a group of two students for an entire semester. In this class, the challenge for students was to create an ad for a service or product related to the broad topic of "food waste". The students followed all the requests for the initial challenge, which comprised creating a marketing briefing, the plan proposal to reply to the briefing and developing the final video. They gathered information about the topic, identified the most relevant steps for a discovery story, identified an app that gives the title to the project, and described how saving food from going to the garbage benefits both clients and restaurants. They wrote the script, drew a storyboard, prepared a schedule for the production, and finally produced and edited the video, exploring multiple techniques and scenarios. They created and overlaid data from their topic as infographics and illustrated the narrative with images from the web. Students used editing software like *Premiere*, *After Effects*, and *Illustrator*, making the video look and sound informative and compelling. Both students assume characters in the video, and they managed to shoot the scenes inside a coffee shop after closing hours and exterior scenes close by. Part of the

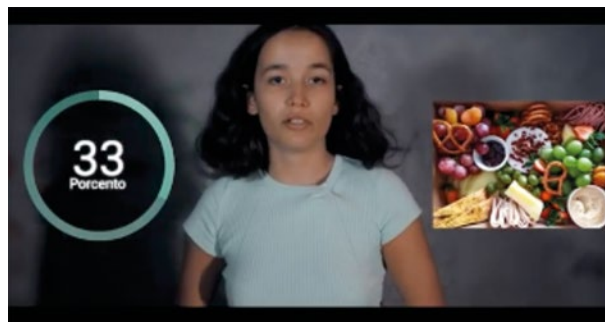


Figure 12. Too Good to Go project, 2020



Figure 13. *Além da Escuridão* (*Beyond Darkness*), 2022. Source: <https://ei202223.wordpress.com/2022/12/14/artigo-iii-alem-da-escuridao/>

project was developed during confinement, which made students become extra creative to work only with their personal recording equipment like their cell phones.

Also, as a discovery story, the common memories of the *Beyond Darkness* project student group when visiting exhibitions as a child – and the adventures felt in the dark environment while holding a lantern – motivated the group of Interaction Experience class students to respond to the challenge of redesigning the experience from the child's perspective. Drawing from their shared childhood memories, they focused on fostering curiosity and wonder, embracing the fertile imagination often associated with childhood exploration. In this context, students were encouraged to freely experiment with different techniques to convey the spirit of discovery. Such work covered both the goal of exploring human-nature interactions through multimedia artistic experiences and the challenge proposed in the exercise briefing: to create an interactive experience that reflects and informs people's relationship with the world through digital media. Inspired by the visit to the "Natural Variations" exhibition at the National Museum of Science and Natural History, the students explored the theme of human-nature interaction by reimagining the sensory and emotional dimensions of exploring natural spaces. Following the outlined methodology, the project progressed through distinct phases: research, conceptualization, prototyping, and evaluation. By integrating narrative techniques and digital media tools, the students developed a prototype that immersed participants in a darkened space, illuminated only by the interactive use of handheld lanterns. This design choice not only recreated a familiar childhood experience but

also engaged participants in a meaningful reflection on human-nature interactions, enhancing their awareness of the natural environment.

6. Discussion

Students develop numerous skills while progressing their digital storytelling projects. In this paper, we chose to focus on an array of skills that relate specifically to digital literacy.

The claim that digital storytelling facilitates the development of essential digital literacy skills is widely supported by teachers and professors since the 1990s (Brigido-Corachán, 2014; Lambert, 2018). The project-based learning approach described here systematizes some settings to create a learning environment that proposes to be particularly supportive of critical thinking, collaboration, and playful exploration of advanced technology.

Our experience highlights the importance of fostering students' desires and personal drives to talk about themselves or elaborate stories of people, places, or other topics that are close to them. We trust that this approach contributes to students' enjoyment and consequently to making extraordinary investments in their projects, thus leading to high levels of engagement with others, high autonomy, more self-confidence, and elevated learning outcomes. These results are in line with the Cognitive-Affective Theory of Learning with Media as it advocates that motivational constructs such as self-efficacy and positive emotions have a positive influence on learning outcomes (Schrader *et al.*, 2021).

The design approach proposed to students includes appealing initial challenges, a diverse range of themes that can relate to personal stories and a well-defined set of phases that support the development and tutoring of consistent projects. Setting a broad theme and adding examples that can relate to social causes encourages students to engage in projects that also have some kind of contribution to social issues. This project-based learning setting allows students to align their projects with the humanity-centered design approach proposed by Donald Norman (2018). We acknowledge this is also a key aspect of the learning environment that makes it adaptable and, therefore, more resilient as it fosters the connections of students' projects to the real world.

The challenge of exploring interactive media fosters cognitive puzzlement and ambiguity as there is an extra challenge for authors and viewers to share the flow of the experience and sense-making. The complexity added to the artefacts supports extra cognitive persistence and effort (Schrader *et al.*, 2021), which is also related to the feeling of confusion that sometimes arises. Emotion-based learning strategies proposed in the presented framework encourage

sustained engagement, as described by Schrader *et al.* (2021). Students' investment in their narratives enhances their learning experience and their peers' (Vaishnavi & Ajit, 2023; Yang & Wu, 2012).

To prototype their narratives, accessible digital tools are key to supporting students' autonomous work. Prioritizing the specific storytelling goals makes the use of these tools a natural consequence and eventually less stressful, leading to the development of skills in video editing, animation, and interactive media within the students' cognitive development range (Robin, 2009). The use of digital tools plays a role in conceptualizing and prototyping storytelling. Within the scope of digital design and user experience, tools for interface mockups, system design, rapid prototyping, and screen-based device specifications are recommended. Additionally, vector design and mockup tools, bitmap or raster image manipulation software, and diagram editing applications contribute to visualizing problems and creating visual aids. Audio and video editing, along with annotation tools, enhance the storytelling process. Furthermore, the incorporation of team collaboration tools and the recommendation of online platforms encourage students' autonomy and agency in selecting the most suitable tools for their project development.

One of the foundational ideas of teaching digital narrative is that the students don't need to be proficient users of technology to start or complete their projects. The investment in technological proficiency is facultative. Regarding digital devices, students are invited to use whatever they have at hand and can even use and reuse archive material. This setting contributes naturally to making production more accessible and sustainable. Students can use photographs instead of videos to create or enhance their work, whether as a more accessible medium or due to limitations in sourcing other materials for their story. However, students should be challenged to idealize their stories first and only after considering the needed technologies and tools. Professors, depending on the class objectives, show examples of digital stories both at low and high technological levels. Professors are expected to provide support for some of the suggested applications. Depending on the resources available and critical discussions in class, students naturally understand that it would be unreasonable to expect the professor to be proficient in all technologies that could be considered. Students are also invited to try software or tools that they have never used before. These tools should have practical use and contribute to doing things they could not do without them or would need additional effort or time investment (Robin, 2009; Maneira, 2014). Overall, digital storytelling projects have been observed to increase student engagement significantly. We find that an increasing number of students are eager to tell their

stories. We find that students with biographical projects or with a strong personal connection often put extra effort into their projects and usually surpass expectations with the results they achieve both on creativity and the amount of work associated. Their stories and the ways they present them are emotionally resonant, and the whole class tends to engage with the projects, investing extra levels of attention and often contributing with positive feedback. Having the students' voice narrating or including their visual representation in their projects usually makes them feel more authentic and contributes to higher engagement from other students. The higher the level of engagement students have, the more effort they will make to try to understand each other or the topics they are showcasing. Ultimately, it makes this approach and the resulting digital stories self-relevant as learning tools, as one student mentioned: "I Always look to others for inspiration [...] After watching some of the other fabulous projects, I couldn't help but get inspired to do more with my own". Sharing experiences and projects among professors and researchers is of great relevance to challenge ourselves in exploring new creative ideas and technologies.

Historically, we have seen how digital storytelling has evolved. We recognize that there should always be a balance between the story and the use of technology. Significantly, students understand the power of depth and emotion for a story to be compelling and memorable. Structure, voice, ideas, self-confidence and creativity must be central (Balaam *et al.*, 2019). Shifting from a human-centred design to a Humanity-centered design approach should also be considered a challenge. We still have no definitive answer to how students can create projects that, while being personal or autobiographical, can still relate to global social concerns. Although undergraduate students in our universities have always lived surrounded by digital media and are frequently on their mobile devices visualizing and sharing all varieties of media, we have observed that the great majority don't create content or share it online. After the experience in our classes, most students have indicated more confidence in having a more active stance as creators online. In the learning cycle, students receive information through concrete experiences, transform it through reflection and thought, and transform it again through their actions to intervene in the world – thus becoming not only receivers but also creators of information (Kolb & Kolb, 2018).

This perspective emphasizes the importance of higher education that incorporates social values and practical experiences to prepare students for a rapidly changing world. In a global vision of future skills and higher edu-

cation within the reflection on shaping the university of the future, Wolfgang Stark (2024) highlights the need for a closer connection between universities and civil society, especially from the perspective of students. He argues that the universities of the future must integrate "social responsibility" and "experiential wisdom" into academic knowledge to enhance their practical and societal relevance. In this regard, universities of the future must be collaborative in terms of civic relevance and excellence, thereby contributing to addressing society's significant future challenges (Stark, 2024).

7. Conclusion

Digital storytelling stands out as an expressive approach to enhancing many soft skills, including digital literacy. By integrating personalization, emotional engagement, and digital technology, educators can foster a deeper connection between students, learning materials, and the real world. The examples presented underscore the potential of this approach to prepare students for a media-rich world where they assume their stand not only as consumers but also as active, creative participants. The implementation of digital storytelling projects within the framework of design and media arts education serves as an approach to developing students' digital literacy while addressing broader educational goals. By integrating social responsibility with storytelling skills into academic practices, design and media arts, students foster meaningful connections between knowledge, societal relevance, and practical applications with critical tools.

This proposed framework's adaptability mirrors the larger mission of higher education to remain flexible, collaborative, and forward-thinking, ensuring that it meets the needs of a demanding society. Digital storytelling, as highlighted throughout this paper, not only supports creativity and personalization but also empowers students to find their voice and agency in digital media production. These projects allow learners to engage with narrative techniques, digital tools, and collaborative processes, enabling them to produce meaningful works that reflect their personal experiences.

In an era where digital media literacy is critical, integrating digital storytelling in design and media arts curricula promotes an effective pedagogical strategy. It prepares students to think critically and create purposefully, enhancing skills that are essential for navigating both their professional careers and their roles as active, socially responsible citizens in a digital age.

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Bio

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