ABSTRACT

Video games are part of ordinary life for many people, with a noticeable effect on the way of thinking, acting, and learning. In addition, it appears that video games have a great potential to communicate and teach specific knowledge, by designing experiences that could lead to desired learning outcomes. This was proved also in communicating the values of cultural heritage, both material and immaterial, and in increasing the interest in physical places where videogames are set. The representation of reality and real places in video games is a topical theme. In fact, the accuracy in the representation of a real place is not a supplementary value, but it can make the difference in the choice of a video game.

The contribution proposes a digression on the use of a new unreleased tool in two learning events related to heritage. The tool and the events are parts of a research, aiming to explore the potential of first-person cinematographic video games as support for cultural and environmental heritage promotion. Analysed events differ in many aspects, including learner categories, spatial and temporal organization, and finally the social condition in which the events were held. The first one was held in attendance, before the Covid-19 pandemic, and the other in a period of strong mobility restrictions, as an online experience.

KEYWORDS

Cultural Heritage, Game Authoring Tool, Learning

1. INTRODUCTION

Some Italian territories seem to lack the ability to produce innovative touristic imaginaries, which are no longer scholastic-oriented, but leaning towards integrated, narrative, and experiential uses. One of these territories is Sardinia, which despite its recognized cultural and landscape values, is penalized by the obsolescence of communication and promotional practices.

From these premises, the Pac-Pac top-down cluster research project was born, acronym of “Point-And-Click per la promozione del Patrimonio Ambientale e Culturale”, developed and coordinated by the University of Cagliari and funded by Sardegna Ricerche. The main goal of Pac-Pac is the proposal of an alternative model for the promotion of cultural and environmental heritage (henceforth, for brevity, only heritage) for touristic-cultural purposes, to trigger contamination mechanisms between new technologies and multimedia content production practices, especially for territories that are not part of traditional tourist circuits, and with a particular focus on Sardinia.

The proposed model consists of digital games and interactive storytelling, created through a web-based platform "designed and developed to allow end-users without development skills to create point-and-click games, exploiting different media and in particular 360-degrees videos." (Blečić et al., 2021).

Parallel to the platform, the Pac-Pac project aimed at defining a production methodology, in order to create a complete package designed for cultural associations, public administrations or generic stakeholders who have similar interests. A feature that often unites the persons identified as users of the platform is the partial or total lack of previous coding and/or game design skills and experiences. It was therefore necessary for the platform to be user friendly and easy to learn. For this reason, the project has envisaged a series of events with the dual objective of testing the ease of learning in the use of the platform and, at the same time, offering basic training on game design mechanics, oriented towards the awareness of heritage.
The events therefore had two constraints: the use of the platform as a development tool and having as case study the heritage of the places where they took place.

The events were organized with the intention of exploiting and highlighting the bivalent potential of game design as a teaching tool (Kiiii & Tuomi, 2019) and as a means of promoting heritage, trying to combine both aspects in a single didactic program. Two of these events were analysed, the qualitative results of which are presented in this paper, in order to verify the effectiveness of learners’ learning (Robertson & Howells, 2008).

2. VIDEO GAMES AND LEARNING

Video games are nowadays a largely diffused medium on a worldwide scale. They have become part of ordinary life for many people, often with no constraints of gender, age, or cultural origins. Alongside a huge impact on the economy and on pop culture, there is also a noticeable effect on the way video games are now part of the way we think, act, and learn.

It has been observed before (De Kerckhove, 1991) how every medium eventually has both positive and negative outcomes in influencing behaviours and abilities of its users: when the user approaches the medium, something can be gained, and something can be lost. It may vary from case to case, from individual to individual. Yet, when it comes to video games, this process appears to be clear, as the player is required to internalize behaviours and schemes in order to acquire the problem-solving skills necessary to traverse the game-text itself. Interactive properties, or ergodic abilities (Aarseth, 1997), are in fact required to progress through any given game.

However, the structure of many games reinforces or creates new behaviours in players by design. This peculiarity has been defined as procedural rhetoric (Bogost, 2007): through repetition of mechanics and dynamics, a process of internalization of behaviours becomes possible (Fauconnier & Turner, 2010). Based on this assumption, it appears that exists a great potential for using video games to communicate, or even teach, specific knowledge (Squire, 2006), by designing experiences that could lead to desired learning outcomes.

It appears possible to design ludic experiences that could lead to a positive outcome in changing people’s behaviours towards cultural heritage. Specifically, using games to communicate a given heritage could influence many aspects of culture, from shared knowledge to tourism.

Based on the previously mentioned assumptions, video games can therefore be considered as designed experiences, which eventually lead to positive outcomes when it comes to teaching and learning. From this perspective, it appears important that the professional figures entitled to designing said interactive experiences are properly formed and trained.

3. VIDEO GAMES AND CULTURAL HERITAGE

Using a metaphor related to space, video games can be understood as an “experiential route” through the game world (Grodal, 2003), unfolding their potential of spatial engagement, which is the core and distinctive trait of the medium (Calleja, 2011).

This particular connection with space can create an affective relation with represented places, enhancing the awareness of cultural values (Calabrese & Ragone, 2016). The involvement might also increase when a video game is set in real places or inspired by those.

The representation of reality and physical places in video games is a topical theme, which is gaining more and more attention not only from game designers but also architects and urbanists (Gerber & Götz, 2019). In fact, the accuracy in the representation of a real place can make the difference in the choice of a video game and provoke delusion when it falls short of expectations (Aarseth, 2019).

The accurate representation of real places is particularly important when it involves cultural heritage, in its wider sense, from constructive cultures to customs. Video games proved their potential in communicating the values of cultural heritage, both material and immaterial (Anderson et al., 2010), and increasing the interest in places, attracting visitors, and inducing tourism (Dubois and Gibbs, 2018). The use of digital games in the communication and promotion of cultural and environmental heritage is well-known and it
involves companies and associations that work with heritage, museums, and institutions (Mortara et al., 2014; Paliokas and Sylaiou, 2016).

Moreover, when speaking about video games and cultural heritage we can distinguish between those realized mainly with educational purposes, serious games for cultural heritage, and commercial ones, with an entertainment purpose. In serious games for cultural heritage, the focus is the information and transmission of the values of the heritage represented, trying to go through all its stratifications and complexities. In commercial games, real places and cultural heritage are usually used for thematizing or creating certain atmospheres, and its accuracy could be biased by game mechanics or the plot’s necessity (Balela & Mundy, 2015). However, the effort put into the realistic representation of heritage is noteworthy, and since video games are a fundamental component of pop culture, they act as a driver for the transmission of cultural values and are therefore an important way to increase heritage awareness. Having a wide range of examples in which heritage can be narrated and represented, from the didactic to the entertaining, in the experiences discussed in the next section we sought to convey these assumptions to learners.

4. THE PAC-PAC AUTHORING ENVIRONMENT

In the didactical experiences reported in the contribution, the Pac-Pac Authoring Environment was used.

The tool presents a user-friendly interface, designed to recall widely used common tools like PowerPoint, in which users can add traditional or panoramic (360°) video or images to create the game scenes. The interface is composed by a toolbar in the upper side, where the game objects are located, a main preview of the current scene is in the centre of the screen, with a list of thumbnails of the scenes on the left and object properties on the right; under the main preview the table of the rules can be found (Figure 1).

![Figure 1. The interface of the Pac-Pac Authoring Environment](image)

In each scene is possible to add interaction objects, classified on the type of interaction offered to the player. Some examples are “transitions” that allow the player to move between the scenes, “switch” and “buttons” used to trigger events, “points of interest” that can be used to script some camera movements, and so on. In addition to these local objects, specific to every scene, the tool offers some global features, including counters for scores and player life points, and a timer for the total in-game time.

All the mechanics of the games are controlled by the rules associated with the game objects, local or global. The rules follow an Event Condition Action (ECA) logic, written in natural Italian language according to a fixed pattern (Fanni et al., 2019):
When <subject> <action> <object/value>
If <condition>
then <subject> <action> <object/value>

Event and action sentences, introduced mean the identify words “when” and “then” respectively, are mandatory; condition sentences introduced by the word “if” are optional (Figure 2). A single rule can involve multiple sentences for both condition and action types.

Figure 2. Some examples of rules used in the software

In parallel with the tool development, an exploratory research phase was conducted to establish a methodology for optimising the design and creation processes of the games. In fact, multidisciplinary knowledge is needed, involving cinema, music, audio, storytelling, and game design professionals. Furthermore, to test and analyse the features of the tool, some prototypes and games were designed and developed (Piano & Cuccu, 2020). Part of these prototypes are the results of two didactical events held during the project, the “Scientific School” and the “Video Game Design and Production Workshop”, analysed in next chapters.

5. THE PAC-PAC TOOL FOR EDUCATIONAL PURPOSES

The Pac-Pac project supposed to include educational and communication events, on the one hand to test the intuitiveness of using the development environment and on the other to explore what possible new ways of using it could arise from users not involved in the project itself.

The contribution proposes a comparison between two of these events, chosen for their differences in terms of users and teachers categories involved, spatial and temporal organization, and learning activities management. The chosen experiences are a scientific school, involving undergraduates and professionals, and a workshop, involving exclusively high school students.

5.1 The Scientific School

The first analysed event is the “Scientific School”, held in Pula (Italy) in the research structures of Sardegna Ricerche, in September 2019. The scientific school was designed as a hybrid of game jam and educational laboratory, during which the learners could learn multiple aspects related game design and the use of the authoring environment, and at the same time develop games located in the research structures or in the surrounding spaces.

In order to teach the multidisciplinary approach required for the game design activity, professionals from each sector involved were chosen for teaching; professional skills included experts in game studies, storytelling, multimedia production, social studies, up to informatic sciences. As learners, 38 applicants were selected in order to form six groups of six to seven members, including different skills; in this way a minimum level of competences in required skills was achieved in each group. This was possible thanks to the presence of candidates with very diverse professional and academic backgrounds.
The whole science school lasted six days of full immersion activities, organized in alternating lectures in the mornings, and material production and game development sessions in the afternoons; except for the multimedia production, all the activities took place in a common space, to induce and facilitate dialogue and cross fertilization of ideas between the various groups. In the production and development phases, each group was supported by two teachers and two tutors, selected for their different skills.

After a brief introduction to the structure of the “Scientific School”, morning lectures involved an overview of video game design principles (specifically aiming to explain “point-and-click” games language), prototyping, approaches to a game jam, and teamworking. Storytelling and cultural heritage communication through digital media were the main topics, tackled from various perspectives in order to meet the scope of the workshop. Lecturers included professors from different Universities, professionals in game design and video making, and entrepreneurs.

With the willingness to create colloquial moments, lunch times and coffee breaks were organized in dedicated locals next to the classrooms; these were essential opportunities to create links between people who did not know each other before the school, both within and between the groups.

The school also planned a final event with a public presentation of the six developed prototypes including comments and debates between guests, learners, teachers, and professionals. The presentation highlighted the extreme variety of mechanics used in the games, with some attempts to rework the genre set by the development platform; in some cases, the very concept of first person was questioned, providing interesting hints on possible new viewpoints to be used. Another important aspect is that, although in some cases in a more or less veiled way, all the prototypes respected the requirement to represent the spaces provided for the school, offering quite a few original points of view. In addition, questionnaires were distributed and filled in during the final event, the data from which could be used as a basis for future quantitative analyses of learners’ results and expectations.

5.1.1 Resulting Prototypes

The emphasis on storytelling and communication of heritage during the lectures set the conditions for a series of resulting video game prototypes that aimed to involve the players with a compelling narrative. All the projects were in fact distinguished by a story strongly connected to the environment - mostly the rural area surrounding Sardegna Ricerche’s structures.

As the class involved a good number of established professionals, the prototypes also included high quality artworks or audio-visual hybrid productions. The limitations imposed by technologies and scope apparently led the participants to search for a strong visual identity for their video games, with some interesting results that integrated mechanics and aesthetics into effective design.

The prototype Polaris Inc. (Figure 3a) is a good example of this trend: the students combined a simple grayscale artstyle with pictures, obtaining an interesting effect that merged perfectly with the ironic narrative of the game. In this project, the player was asked to help a sassy spy in stealing the secret of eternal life from fictional laboratories set in Sardegna Ricerche’s structures, while interacting with the security system.

5.2 Video Game Design and Production Workshop

The second example is a workshop held from February to March 2021 with the collaboration of the Institute “Enrico Fermi” of Ozieri, Italy. Ozieri is a small town located in a rural context on the Sardinian mountains. The “Enrico Fermi” Institute focuses on teaching tech and includes software programming in its formative offer.

Expected outcomes and formative objectives focused on the application of game design for communicating cultural and environmental heritage, while giving the students the instruments for becoming self-sufficient in the workflow process of creating video games.

The workshop involved 16 participants, all students from 13 to 15 years old, selected as volunteers from two different classes. Given the number of participants, it was decided to split them into four teams of four people each.

With regards to teachers, three of them were involved from the “Enrico Fermi” Institute, while the team of tutors was selected to cover as much as possible the multidisciplinary fields of knowledge required for the workshop. Alongside a coordinator and game designer, there was a storytelling consultant, two architects,
one of which was also an expert of the Pac-Pac platform, and a technician who was entitled to solve any given bug that could emerge during the course.

The workshop was structured to overcome the difficulties related to the Covid-19 pandemic, and therefore all communication, including lectures, was migrated on an online platform. In order to not interfere with the regular curricular activities, the schedule of the workshop involved five weekly lectures of two hours each. All the remaining activity was handled through Microsoft Teams, with constant communication by chat and file exchange between the tutors and the students.

Lectures involved a brief introduction to video game design and teamwork, notions of storytelling, and environmental narrative. A tutorial for properly using the Pac-Pac platform was also part of the didactic program. Given the scope of the workshop, and the age of participants, every topic was simplified in order to not overburden the students with too many technical notions.

This approach allowed students to be extremely free on their workflow while assuring continuous monitoring by all the tutors at once. Although the local teachers noted a lack of commitment by the participants in the first phase of the workshop, as time passed students showed more and more interest in what they were doing and in the video game prototypes they were producing.

The resulting four prototypes showed that the involved students were able to properly produce a playable version of their original concept idea in the given time. They also could implement an interesting variety of mechanics, although the themes that emerged from the prototypes showed that a shared cultural background influenced them all.

### 5.2.1 Resulting Prototypes

Interestingly enough, the students tended to focus on dark and gloomy narratives for their games, while trying to involve the urban environment as much as possible. They mostly did not have much previous knowledge of audio-visual production, therefore a consistent intervention by tutors has been necessary through the whole creative process.

The lack of a cinematic-production skillset has been reflected on the amount of effort all students put into their respective projects, as they tried very hard to make appealing video games despite such technical shortcomings. Simple puzzles and mechanics were at the core of almost every project, with a certain inclination to re-using familiar or popular video game elements.

A prototype by the title of *The Unknown Priest* (Figure 3b) perfectly shows how the students aimed to replicate previous ludic experiences: inspired by *Dark Souls III* (From Software, 2016) they tried to mock the fighting mechanics of a third-person adventure game in the Pac-Pac system, which is optimized for point-and-click games only. The result was an interesting mix between the dynamics of *Dark Souls* and environmental storytelling, a trial-and-error experimental project.

![Figure 3. Screenshots from two prototypes produced; (a) on the left, *Polaris Inc.* from scientific school, and (b) on the right, *The Unknown Priest* from the workshop](image)

### 6. CONCLUSIONS

Two learning events were analysed in order to test the potentials offered by Pac-Pac Authoring Environment, a still unreleased tool, designed as support for communication and teaching of cultural heritage. The events, chosen for their differences (Table 1), have offered the opportunity to compare the outcomes achieved by learners with different skills and backgrounds, when dealing with an unknown tool.
Table 1. Comparison of the main features of the two events analyse

<table>
<thead>
<tr>
<th>Main features</th>
<th>Scientific School</th>
<th>Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of students</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td>Categories of learners</td>
<td>Undergraduates and professionals</td>
<td>High school students</td>
</tr>
<tr>
<td>Categories of teachers</td>
<td>Academics and professionals</td>
<td>Academics</td>
</tr>
<tr>
<td>Fruition mode</td>
<td>In attendance</td>
<td>Online</td>
</tr>
<tr>
<td>Time schedule</td>
<td>One week</td>
<td>Six weeks</td>
</tr>
<tr>
<td>Expected outcomes</td>
<td>Full playable demos</td>
<td>Full playable demos</td>
</tr>
<tr>
<td>Formative objectives</td>
<td>Use of game design for heritage</td>
<td>Use of game design for heritage</td>
</tr>
</tbody>
</table>

Despite these differences, in both cases full-working prototypes were obtained; this seems to prove a minimum level of knowledge of the software was reached by the participants. Furthermore, even if the tool was designed for a very specific genre of video games, a wide amount of mechanics declinations have been used in all the demos produced.

This is particularly interesting if it is considered that in the case of the workshop, all the learners belong to a group with a shared cultural and social background; moreover, the members of this group had many more opportunities and time to share their ideas with each other, since they live in the same town and attend lessons in the same two classrooms. In spite of this, the variety of the final products is quite comparable to that obtained by the learners’ groups of the scientific school, which was composed of extremely heterogeneous learners who, to a large extent, did not even know each other before the school.

In conclusion, the Pac-Pac Authoring Environment showed to be an intuitive user-friendly tool that allows inexperienced users to design and develop digital games. The easy-to-learn nature of the software allows users to focus on other aspects of game creation, such as media production or story writing.

The next stage of the research will involve the organisation and investigation of further case studies to carry out quantitative analyses as well as extending the qualitative ones.

REFERENCES


