

Digital Storytelling: a learning perspective

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Abstract

Storytelling is a shared pedagogical experience, expressed in several ways as lifelong learning experiences. A digital version of traditional storytelling could combine together a fundamental tool in human culture with a great range of digital experiences, potentially involving all senses of sight, smell, touch and taste. This would give learners an active and primary role, increasing their engagement and motivation in the learning process. In our work, we combine specific aspects of these two tools, technology and storytelling, to promote unique experiences with the aim of strengthening different learning processes. The great flexibility of our outcomes is made possible by Situated Psychological Agent Framework (SPAF), an agent-based model that reproduces psychological phenomenon basing on agents' interactions. Furthermore, this short paper shows two different uses of storytelling – EULALIA and STop Projects – blended with technology and tangible objects, in two completely different settings.

Keywords 1

Storytelling, digital, learning, language, lifestyle, visual metaphor.

1. Introduction

Storytelling has always been a pedagogical strategy and a fundamental tool in human culture, supporting language acquisition, helping sharing meanings with the community and giving sense to reality [1,2,3,4]. Storytelling involves several psychological processes: language expression, semantic and episodic memory, expectations about actions consequences, empathy activation. Since 1970s, the storytelling potential has made it a central tool in psychological research [5].

Storytelling can be defined as a shared pedagogical experience, expressed in several kinds of lifelong learning experiences: since early childhood, people meet it very frequently in speeches, anecdotes, autobiographies, tales and games. This great familiarity with storytelling makes it a powerful pedagogical approach, that can be used to enhance different kinds of learning outcomes for learners of all ages [6].

A digital version of traditional storytelling could combine together a traditional and fundamental tool in human culture with a great range of experiences digitally driven, potentially involving all senses of sight, smell, touch and taste. This would help us giving learners an active and primary role, thus increasing their engagement and motivation in the learning process.

Starting from a constructive perspective, we can consider learning as a complex process, embracing experiences and interactions as means to collect knowledge from various sources [7]. In the specific teacher-learner interaction, the tutor takes the supportive role of a co-constructor, while learner has an active role in their own learning process, making a meaningful connection with the acquired knowledge [8,9,10,11,12,13]. So, the constructivist approach allows learners to plan and supervise their own learning, encouraging the generalization of knowledge to other environments and stimulating collaboration.

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Digital storytelling can support a constructivist learning approach, as it combines traditional storytelling with digital media and technological tools, setting the stage for innovative learning practice in several contexts.

2. Storytelling in Situated Psychological Agents Framework Methodology (SPAF)

In our work, we combine specific aspects of two tools, technology and storytelling, to promote unique experiences with the aim of strengthening different learning processes. The great flexibility of our outcomes is made possible by Situated Psychological Agent Framework (SPAF) [14,15], a methodology designed to empower psychological or pedagogical settings through the use of specific technology systems. SPAF is an agent-based model, so in the first place it consists in analysis and exploration of real-life contexts to detect their structural and functional features, including all the agents acting in them and their mutual interactions. The aim of this methodology is to model psychological phenomenon basing on agents' interactions, in order to detect specific aspects to improve with technological tools. Therefore, once the setting is delineated in all its complexity, the next step is to recognize a particular interaction and supplement it with an ad-hoc designed tool, which could reproduce or model natural systems to strengthen the process we are interested in.

Considering interactive storytelling as our setting of interest, we can easily detect its main elements according to SPAF methodology [14]:

- Narrator: an agent supporting the listener during the learning experience, reading the story and stimulating a meaningful interaction with the listeners.
- Listener/learner: one or more agents situated in the learning scene, who actively participate to the interaction guided by the narrator, selecting autonomously their own actions, thus affecting the learning scenario.
- Story: the narrative framework in which the learning experience is developed.



Figure 1: The main elements of a Storytelling setting: in the left oval there is the Narrator; in the right oval there is the Listener; in the rectangle under them there is the Story.

To empower this specific educational setting, the narrator's functions could be implemented by an Artificial Tutoring System that interacts with the human listener through a smartphone or any other device. The tool implementation is made possible by the middleware Smart Technologies to Enhance Learning and Teaching (STELT) [16,17], which allows the development of learning scenarios and the construction of their underlying logic. This authoring system is also suitable for user with low programming skills, as psychologist and pedagogical tutors could be, and allows the construction of learning analytics about the learners and the adaptive tutor's modules. Moreover, using STELT augmented reality system become easy to implement, thus offering the opportunity to create an immersive learning experience involving Tangible User Interfaces: basing on RFID/NFC technology, physical materials become smart objects inserted in the learning environment, which becomes a process potentially involving all learner senses [17].

3. Language learning with digital storytelling: Eulalia

Learning is a process strongly linked to human experience, suitably internalized and transformed. To become part of the knowledge of an individual, in fact, it is essential that concepts and notions are anchored to situations of everyday life [18]: only through the concrete link with reality there can be a real and lasting learning. In other words, learning is a deeply contextual experience that feeds on the exchanges between the learner and the surrounding environment, giving life to subjective narratives full of meaning [19].

Given the importance of the link with concrete reality, the EULALIA project was born with the aim of creating an ad hoc environment to facilitate the learning of a foreign language. In fact, EULALIA is currently aimed at students who join to Erasmus+ projects, moving to study abroad in countries of which they do not know the language or the customs and traditions.

EULALIA's main goal is "education rather than entertainment"[20] and it is pursued through a serious game that combines training with elements of gamification and embodied knowing to motivate and engage students [21].

The result is a technology-enhanced learning tool that provides the learner with a narrative framework, in which they have to make choices and solve problems in a multimodal and multisensory way. EULALIA offers a new original way of learning the language, simulating the interactive exchange with the context in the most natural way possible. For this purpose, students can also count on the help of language teachers to conceive, design and implement Open Educational Resources (OERs) to be implemented as a mobile APP and to be used in interaction with various digital or physical materials (for example a painting, a conceptual or geographical map). In this way, the students themselves are involved in the creation of scenarios starting from narratives based on their own needs and interests.

Eventually, by putting themselves out there, students can improve their Language Learning Strategies (LLS) and gain greater awareness.

Although the goal is ambitious, it is pursued in a simple and immediate way. The learners interact with digital or physical materials, supported by an artificial narrator. The learners have an active and primary role, exploring the map to discover the story and learn about a new country; the artificial narrator engage their attention by telling anecdotes or asking questions. Through the use of real tangible objects and of all five senses, the learner will try to satisfy the storyteller's request and continue the interaction. For example, the user can search for a place on the map using his smartphone or find a particular smell using his sense of smell (Figure 2). Everything is made possible by NFC technology and STELT.

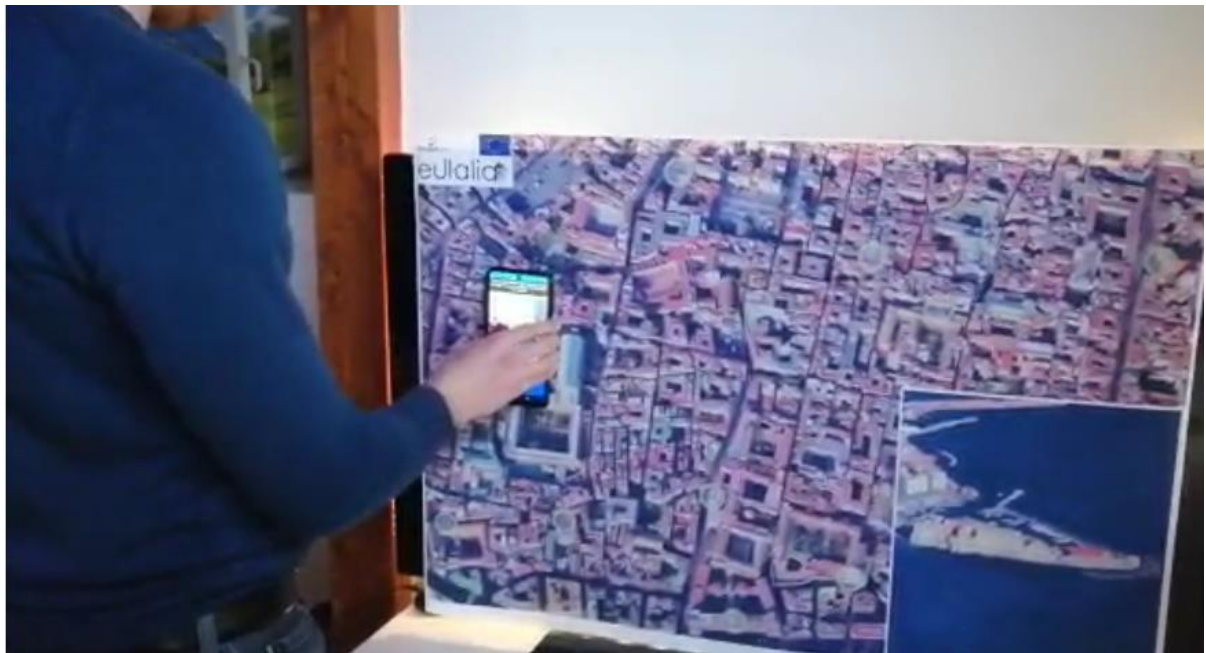
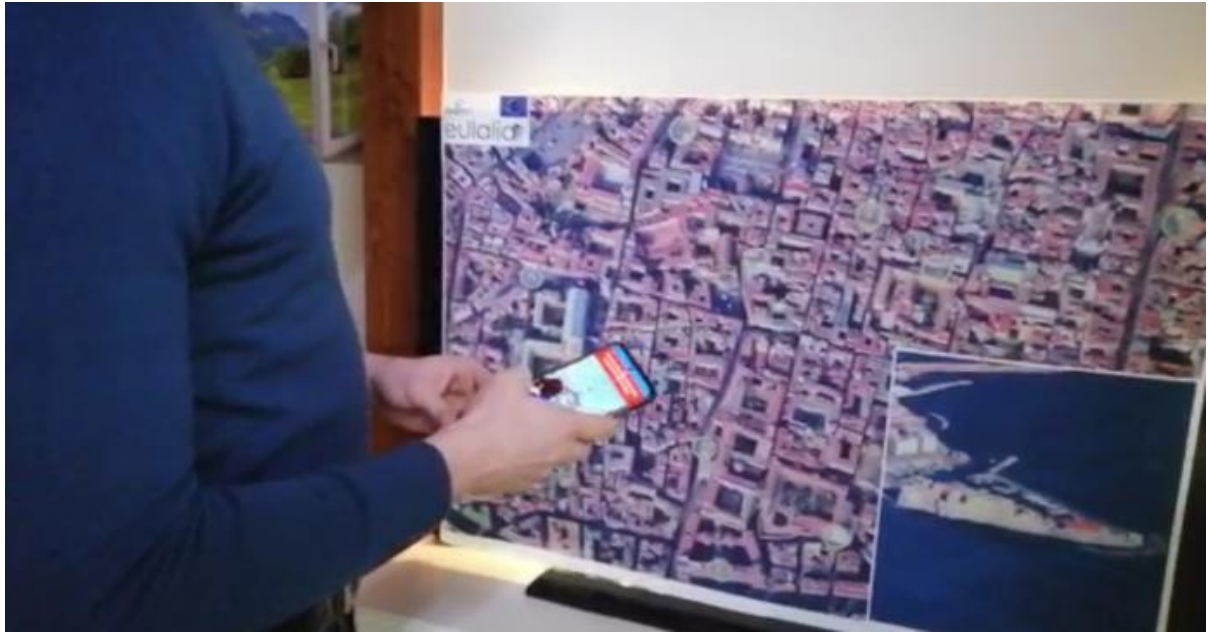


Figure 2: Two moments of the exploration of the map by a user: in the photo above the user explores the map with his mobile phone; in the photo below the user receives feedback from the artificial tutor.

4. Visual metaphors through a digital experience: Stop Obesity Project

Stop [22] is a project aimed at facing the challenge of obesity through a digital methodology, facilitating the acquisition of healthy habits, replacing unhealthy ones. STop is, in fact, the acronym of «STop Obesity Platform» and consists in an integrate system with an online platform and an app based on gamification, to support and monitor obese people in the path of changing their lifestyle, under the supervision of Healthcare Professionals. The platform's main aim is to collect data on obese people's habits in four main areas: diet, hydration, walking and exercise; secondly it enables health professionals' access to them.

In this paragraph we will focus on the app, which has the main goal to support the increase of self-awareness and self-knowledge in People with Obesity (PwO), considered as the first target of the project.

Storytelling has the primary role in focusing the user attention about the changing process on the consequences of unhealthy habits not on the body image but on body strength, health, and wellness. This is made possible creating a visual metaphor to represent the body as a place to live in and to take care of. Since metaphors can have a graphic representation [23], the storytelling framework of a digital tool can surely base on this kind of narrative, using images with a deep meaning and a link to the main goal of the app.

The first aim of the app is to offer a visual representation of the habits' tracking made by the platform. Therefore, basing on the allegory of The Portrait of Dorian Gray [24], the data about the user's habits in diet, hydration and daily exercise are visually represented in a changing painting; every week a new interactive painting will be unlocked, even if the user doesn't achieve all his/her goals.



Figure 4: User's Art Gallery: every week a new interactive painting will be unlocked, even if the user doesn't achieve all his/her goals.

While the Dorian Gray's portrait shows the direct effect of age and experiences directly on his painted image, in Stop App what is visual represented is the user's effort to start and maintain new healthy habits. These direct consequences are showed in a changing natural landscape, leaning on the metaphor of the body as the most important place to live in. This choice was made to help the PwO differentiate their changing process toward a new healthy life from the expectations about their body image and the related unrealistic standards promoted by western society.

People with obesity, compared with normal weight individuals, have a higher body dissatisfaction [25,26], such as negative perceptions and feelings about their own body [27,28]. This is the reason why the Stop App focus on the daily cares their bodies need to be healthy, instead.

There are three elements of the painting which constantly change together with the collected data variations: flora, fauna and weather events. The player's results in each one of the collected areas will cause a change on the various elements of the painting (i.e., user's eating habits will affect the flora in the picture). During each of the 8 weeks, the players complete a new personalized painting. Furthermore, as the paintings will represent the distinctive specific path of each player, every one of them will have a unique Art Gallery.



Figure 5: The user's habits change the characteristics of the picture. Moreover, if the “plus” sign is present, the trend is better than the previous day; if instead there is the “minus” sign it means that the user has had less healthy habits and some elements will disappear from the picture.

5. Conclusions

This short paper shows two different uses of storytelling, blended with technology and tangible objects, in two completely different settings. The aim is to show how the great flexibility of storytelling itself and its long tradition in literature can be empowered with modern tools within the design of psychological and educational interventions. Thanks to the use of SPAF Methodology it is possible to blend together aspects classically considered at the extreme poles: tradition and technology, digital and tangible world, artificial and human agents.

The accessibility of both the tools and the procedures to make them real are guaranteed by a middleware designed ad hoc (STELT), to create a meaningful and concrete connection between professionals from humanistic, scientific and technical fields.

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