FOSTERING COLLABORATIVE CREATIVITY IN LEARNING ABOUT URBAN SUSTAINABILITY THROUGH DIGITAL STORYTELLING

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Abstract

In this paper we suggest that there is a rich learning potential in addressing complex and elusive interdisciplinary concepts and issues, such as that of urban sustainability, with the use of learning approaches and digital media that foster collaborative creativity in the design of tangible digital artifacts. We identify such potential in digital storytelling and describe the research design of a small qualitative study we conducted to explore our assumptions. Our research focus was on how collaborative creativity evolved within small groups of University students constructing digital stories on urban sustainability. We treated the digital stories as "improvable boundary objects", i.e. material entities created, modified and negotiated by participants in their effort to construct joint meaning and understanding on the complex and multifaceted ideas around sustainability in the city. Data collected were analysed in terms of how the groups collaborated to reach their final products, and on the function of improvable boundary objects throughout this process. The digital stories resulting from this endeavour appear diverse in terms of format and in terms of the practices they embed. This, in turn, indicates different functions of improvable objects as triggers for both collaborative learning and creativity in learning about sustainability.

Keywords *collaborative creativity, urban sustainability, digital storytelling, improvable boundary objects*

1. Introduction

There are many conceptual and theoretical overlaps between "creativity" and "collaborative learning". Both concepts refer to shared meaning-making and knowledge-construction processes and the borders between them are frequently blurred. Although we are in a need for a more robust theoretical groundwork to understand collaborative creativity [1], creativity and effective learning seem to be the two parts of a symbiotic relationship [2]. In this paper we argue that there is a rich learning potential in addressing complex and elusive interdisciplinary concepts and issues, such as that of urban sustainability, with the use of learning approaches and digital media that allow and foster collaborative creativity in the design of tangible digital artifacts which are treated as "*improvable boundary objects*". We suggest that such potential is offered by digital storytelling.

The qualitative study reported here was conducted with 3 small groups of Greek undergraduate students, participating in a workshop aiming at the collaborative creation of digital stories. Following the theme of urban sustainability, participants had to blend and negotiate their personal ideas and suggestions for sustainability with their experience and visions of living in the city of Athens. Our research focus was on collaborative creativity within the groups both as a process and

as a product, and how the digital story functioned as an "*improvable boundary object*" to structure their learning on the idea of living sustainably in the city.

1.1. On collaborative creativity

Recent developments in the study of creativity emphasize the collaborative and participative character of most creative processes. According to Sawyer and DeZutter [3] most creative outcomes develop in the context of collaborative processes or result from efficient group work. Although the field is still young but dynamically evolving [1], the existing literature allows us to constructively define collaborative creativity as the joint, intentional and participative communicative processes between members of a group or a community that take place within a particular socio-cultural context, are related to a specific domain, can be aided by a range of mediating tools, and ending up in the co-production, exchange and negotiation of new or alternative ideas, products or interpretations of an object or reality. Collaborative creativity has to rely on the identification and implementation of strategies of collaborative working and learning, the reconciliation of differing views, the negotiation of solutions and the collective production of outcomes such as ideas, artefacts or more elaborated ways of viewing reality [4].

Constructionism puts distinct emphasis on learners' creative performance, expressed by active exploration, construction and modification of digital artefacts [5; 6]. Digital media and tools can be used by learners to construct "meaningful objects" as the tangible outputs of their discursive, meaning-making processes while they interact with them and the learning context; they are at the same time representations of their ideas and understandings of the "world" [7]. Equal importance is attributed to the creative tool (the microworld), the creative product (the artefact) and the creative process of learning, since a symbiotic and synergetic relationship is identified among the three: the microworld is designed to evolve along with the knowledge its users develop while they tinker with it and the artefacts they create [8]. Particular emphasis is also placed on the context within which constructionist activities as processes and products occur [9].

The role of the teachers in orchestrating learning situations for collaborative creativity among students is very important, though quite demanding; not only because of the competency they have to demonstrate in selecting and employing appropriate teaching techniques, but also because they are expected to balance structure and flexibility in pedagogical design and teaching [10] by taking into account the challenges of the task, the features and affordances of the learning environment and the skills and needs of the students. However, it is strongly argued that their role has to be further buttressed by technologies supporting collaboration and enhancing learning processes enabling creative thinking. Digital tools and environments that allow learners to use them in personally meaningful ways, to collaboratively think with and discuss over them, to smoothly move from inquiry to playful activity, imaginative expression and bricolage are important coordinates of a context fostering collaborative creativity [11, 12].

1.2. Collaborative creativity as a prerequisite for learning about and for urban sustainability

Sustainability is among the key topics of most education curricula worldwide. Designing and providing a multitude of learning experiences with a focus on sustainability is acknowledged as a prerequisite for youth generations to develop a deep understanding of environmental problems, a critical stance towards current societal practices and an empowewed disposition to deal with unsustainability and bring change in their life and the world [13, 14]. This applies very acurrately to

urban living which is placed at the centre of many current sustainability debates. The fact that contemporary big cities are becoming less and less liveable for their inhabitants stresses the need to address urban sustainability on a collective level and by taking into account the people's ways of viewing it.

However, teaching and learning about sustainability issues is at the same time a janus pedagogical challenge [8]. An inherent difficulty stems from the fact that sustainability is an indisputably complex, elusive and ambiguous concept per se. There are so many suggestions of what sustainable societies should look like and what are the necessary changes for bringing sustainability into action that renders the whole endeavour of defining it very hard [15]. On the other hand, this "*appealing vagueness*" assigned to the concept [16] turns it into a "*boundary object*" [17], i.e. a "plastic" enough entity to be interpreted and employed by more that one groups or communities in ways that make sense to them, and at the same time a robust enough construction that manifests a common identity across all groups and communities. This fact gives sustainability a distinct pedagogical strength by inviting learners to get involved in collective designs of meaning-construction and perspective-sharing to expand the "boundaries" of their understanding of and experiencing the world. This is very close to what some would identify as the essence of collaborative creative thinking and learning [18]. The same applies to what "living sustainably in a city" involves. Multiple perspectives and priorities come to the fore, making urban sustainability quite obscure and distant as a societal vision. Nevertheless, it is quite important that urban sustainability becomes a core axis of today's and future generations' collective attempt to define and attain sustainability at the more proximate level of people's everyday life. To this end creative thinking is acknowledged as a necessary ability to enable young people to envision and shape their living environments [19]. "*Creating space for alternative thinking and the emergence of new ideas*" are prerequisites for the pursuit of a more sustainable world, which can be nurtured under conditions of social learning" [20].

Education has therefore to identify and put forth appropriate learning approaches that lead to a creative appropriation of knowledge for students to develop a more integrated understanding of sustainability [21]. It has also to foster collaborative creativity by facilitating personal expression, collaboration, reflection and imaginative thinking. As higher education plays an important role in addressing these challenges, it is crucial to identify and explore new learning approaches and tools. We argue that digital storytelling, both as a pedagogical practice and as an expressive means, can nurture collaboration and creativity within the context of learning about and for urban sustainability in higher education.

1.3. Digital storytelling as a tool for fostering collaborative creativity

Levine & Alexander [22] define digital storytelling as the practice of telling a story through the use of digital media. In technical terms, digital storytelling is mostly supported by short videos including images and/or video clips, soundtrack music and/or narration, but also by media slideshows, interactive presentations, hypertext embedded in Web 2.0 tools such as blogs, podcasts e.t.c. In the classic model of digital storytelling, pioneered by the Center for Digital Storytelling in Berkeley, California, digital stories are narrated in the storyteller's own voice. They are produced by using inexpensive, readily available software with a focus on compressing the elements of the film into a short piece only a few minutes long [23].

There is a broadness of educational uses and applications of digital storytelling and a variety of mediation mechanisms provided by new technology. In higher education only, the practice of digital storytelling spreads across a broad range of disciplines, from history and literacy/ESL studies, to knowledge management, business and leadership, community planning, psychology, gender studies, social and cultural history and much more [24]. Nevertheless, there are very few applications of digital storytelling in the service of interdisciplinary domain learning such as in the context of sustainability.

When more than one persons are involved in the practice of digital storytelling then we refer to either "*group storytelling*" [24], or "*collaborative storytelling*" [25, 26]. Santoro & Brezillon [27] define group storytelling as a collective sense-building activity, during which many individuals contribute their ideas and interpretations on a shared repertoire of experiences. Gabriel and Connell [25] refer to co-created stories, stories which are created simultaneously as different people interact and add specific elements to the narrative; thus, the person who introduces a dilemma or a choice into the plot is not the one who has to decide its outcome. Finally, echoeing the constructionist view of Seymour Papert, Freidus & Hlubinka [26] view storytelling as the collective creation of a "*meta-story*" from individual stories constructed in parallel. Along this line of thought, stories become "*objects to think with*", i.e, constructs which evoke negotiation and dialogue. Their quality ameliorates as the dialogue progresses, and as successive versions are presented and exposed to an in vitro audience, i.e. the other groups within the community.

When digital storytelling becomes a collaborative endeavour, the stories produced can be viewed as "*conceptual artifacts*" [28], embodying, reflecting, and communicating collective ideas and representations. We actually see them as "*boundary objects*" [17], that is, as artefacts which emerge or are given meaning by two or more members of the same or diverse groups or communities and become objects over which meanings are exchanged and consolidated so that their very existence makes sense to both sides of the border. At the same time, if we view digital stories as material entities, malleable and negotiable as they are progressively shaped, their function can be that of "*improvable objects*", being both the center of collaborative activity, and the communicational tools which shape a common language within a learning community [7, 29].

2. The study context

2.1. General focus and assumptions of the study

The study reported in this paper adopts a constructionist approach taking its point of departure in the assumption that both creativity and effective learning flourish in contexts of collective negotiation of shared constructions [5]. This idea was articulated with young children in mind, and was mostly exploited in science, mathematics and technology. Nevertheless, it has been left largely unaddressed in domains which work on interdisciplinary complex concepts and issues related to contemporary realities such as those dealt within the context of education for sustainability [8].

Our focus of interest in on the design of tangible, meaningful material entities (the digital stories), as the end-products of specific domain learning processes [7] leading to the generation of meanings on the idea of "living sustainably in the city". These material entities, malleable and negotiable as they are progressively shaped, are considered and studied as "*improvable boundary objects*", functioning both as the centre of a collaborative activity, and as communicational tools, shaping a common language within the learning community [28].

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2.2. Context and design of the study

The study was designed and conducted by the Environmental Education Lab[1] in collaboration with the Educational Technology Lab[2] of the Department of Pedagogy of the National and Kapodistrian University of Athens (NKUA), in Greece. It started early April and lasted until mid-June 2013. Eleven (11) pre-graduate students (8 females and 3 males) in their third and fourth/final year in the Department of Pedagogy took part in the study. They were attending the course 'Environmental Education' during which they were enrolled in an optional workshop on the use of digital storytelling on the topic of urban sustainability. The students were allocated to groups of 3 to 4. All groups worked towards creating a digital story on urban sustainability, or, as it was communicated to them, 'living sustainably in our city'. The instructions that were given were that their digital stories should: a) organically integrate all individual members' ideas on sustainability, b) be short (up to 3 minutes), c) be made with inexpensive, readily available technology (for this, Windows Movie Maker was selected as a low cost and user friendly).

The sessions were structured around: a) progressive discussion and negotiation of ideas on urban sustainability, and b) the digital literacies needed to create digital stories, such as the synthetic skills needed for the composition of a multimodal construct: mutlimedia authoring, including sound, video and image processing. The objects, digital and non-digital, used by the groups were: a) photographs taken by participants, to be used as primary material for a first draft of the digital story, 2) concept maps, as representations of the group's ideas on urban sustainability, 3) story scripts, in the form of written texts, 4) a 'collaboration wish list', including basic principles on group collaboration, defined by the groups themselves, and 5) digital video files, as drafts of the digital story in progress. Each session included either the initial drafting, or the improvement / negotiation of one or more of the above objects. These objects, thus, evolved in parallel to participants' ideas and provided different ways of representing jointly negotiated meanings on the theme of urban sustainability, at different stages of synthesis.

2.3. Data collected and research questions

The data collected were of two types: a) data on what was orally exchanged, and b) data on what was constructed. For (a), data included transcripts from all sessions, focus group interviews, online discussion and researchers' observation reports. For (b), data included the successive versions of the digital stories produced. The unit of analysis for (a) was the 'idea' on urban sustainability, and for (b) the versions of the digital stories. The research questions addressed in this paper are the following:

(1) To what extent was mutual engagement and collaboration developed within the 3 groups as they were collectively constructing their digital story on the idea of living sustainably in the city?
(2) What was the function of improvable objects, both with regards to the final product (the digital story) and the collaborative process?

3. Findings and discussion

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[1] http://eel.ppp.uoa.gr

[2] http://etl.ppp.uoa.gr

3.1. Group 1

The digital story created by Group 1 (*figure 1*) is about a flower growing in some place of a big noisy city, with no sun and water, and suffering from pollution caused by exhaust fumes and the people's littering behaviour and neglect. Some hope appears when a bunch of children adopt it to save it and it lives happily ever after, along with its newfound friends.

In technical terms, this digital story is an interesting amalgam of still graphics, photo-collage and animated graphics. There is a soundtrack and no narration, the latter substituted by successive text legends appearing middle screen, between each graphic, illustrating the evolution of the plot. The story is conceptually divided into two units: one including graphics in black and white, to accentuate the ambience of the flower-hero's time of misfortune, and one including graphics in vivid colours, to depict the flower-hero's twist of fate (*figure 1*, top and bottom succession of scenes). The characters, as well as the name of the city are not specified. An equally abstract script, consisting of laconic and relatively few phrases reinforces this vague context.

Figure 1: Selected frames from the digital story of Group 1

On a first glance, the story appears over-simplistic. However, the group's collaborative process in devising and displaying a satisfactorily 'creative' story to their standards and faithful enough in representing their idea of sustainability in its full meaning and complexity, is quite interesting. Actually, the group's history of the construction of their digital story embodies their experimentation with a range of technological tools and domain ideas on the concept of sustainability in an effort to attain their desired final product. The group produced two totally different digital stories. The first one was the result of their effort to combine the photos they had taken from their city in a coherent set, which they tried then to articulate them in a video on a script about a homeless man, who is given a second chance in life through appropriate measures taken by the state and the concern of some supportive citizens. This try, however, didn't satisfy them, as they thought it covered only the 'social' aspect of sustainability. An important factor also contributing to the rejection of this first draft was the group's frustration with the affordances of Movie Maker as a tool.

In their second effort the group started using animation software and developed a new script which led them to the final version with the flower. They spent many hours using professional image editing software, to make different still frames that would give the impression of a moving graphic. They finally came up with two animated frames and complemented the story with still graphics of similar aesthetic style. The above reported struggle with the constraints and trade-offs of the available technology affected the function of the improvable objects used by the group.

The history of the group's interaction sheds more light into the group's collaborative creativity. Two of the members, a boy and a girl, experienced a greater degree of involvement in the task and in sharing their ideas on sustainability and in constructing the digital story. This may be due both to personality traits (they were more self-confident and extrovert) and to a greater degree of media literacy, which was acknowledged by the group. Collaboration was not always balanced within the group, however no explicit incidents of mistrust or conflict were witnessed and the group expressed satisfaction for their cooperation.

3.2. Group 2

The digital story of Group 2 (*figure 2*) takes place in the city of Athens, where, on a beautiful morning, Alexandra, living in Pireaus, with her toddler son, Orestis, decides to join her cousin and her toddler daughter, Charis, at a playground park located in the area of Zografou. Their route to Zografou appears full of obstacles for a mother carrying a pram, an image deteriorating by broken pavements and litter thrown all over. Fortunately, the park is in a much better condition, despite some garbage thrown carelessly on the ground. The mothers discuss on the state of some areas of the city, but are compensated by their childrens' joyous play at the park.

In technical terms, this digital story is a multimedia synthesis including photographs taken by the group members, a soundtrack synchronised with narration and three videos recorded using Google Earth, and inserted in between the photographs. There are two creative practices invented by the Group 2 and reflected in their digital story: the first is the use of Google Earth as a device to indicate movement from place to place. The second is the use of role-playing. As the group's story progressed in their script, they realised that they needed real persons in their photographs. As getting consent to take pictures of mothers and children is a delicate issue, they decided to impersonate the characters of the story themselves.
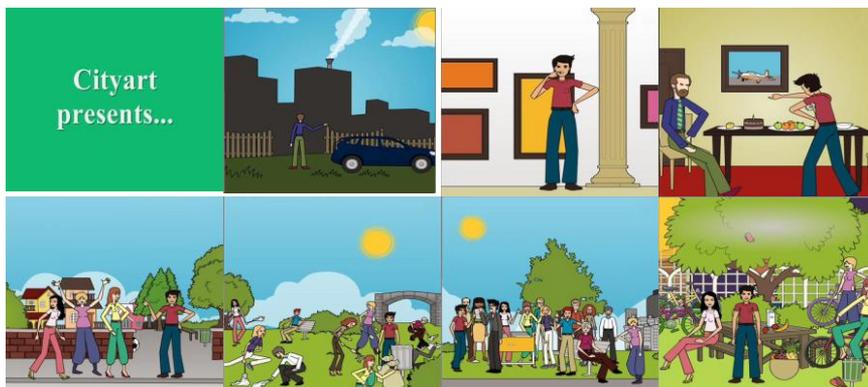

Figure 2: Selected frames from the digital story of Group 2

The function of the video as an improvable object in this case is quite transparent: the media to represent the story posed constraints (inadequacy of photos on the first draft) and the group invented a way to solve the problem (second and final draft) through role-play and through the use of an extra digital aid, Google Earth. With regards to the story script, its function as an improvable object is equally important in this case. The group presented a first draft in a timely fashion and continued to evolve it, both online through the forum, and in separate meetings arranged in between the workshop sessions. They also tried to offer a balanced representation of sustainability in the city by consciously identifying and projecting various dimensions of it, highlighting different problems everyday people are facing in a big city while equally focusing on the bright side of urban life.

Collaborative creativity within the group is characterised by a shared vivid interest in the task and a sense of complementarity. Mutual engagement seems to have resulted from the degree of negotiation of ideas at all levels, but also from the members' openess to alternative ideas and suggestions. Every decision was made mutually, after articulating and sharing all proposed alternatives. There were arguments and counter-arguments of course, but no issue was left unresolved.

3.3. Group 3

This group created a digital story about a young student coming from a well-off family and very much concerned about sustainability issues (*figure 3*). Vassilis was also a member of an environmental NGO. When his father, owner of a small factory in Elefsina (an industrial area on the outskirts of Athens with many archaeological sites), announces his decision to build another industrial plant right next to the archaeological sites, already suffering from corrosion caused by the air pollution, Vassilis has a strong argument with him. His father though puts him in a dilemma, arguing in favour of more profit for the family, increased productivity, and the creation of new jobs for the locals. The solution for Vassilis comes quite effortlessly, since father's plans are cancelled off because of the economic crisis striking Greece. Vassilis then, with his friends from the environmental NGO undertake the reforestation of the area next to his father's factory.

Figure 3: Selected frames from the digital story of Group 3

In technical terms, this digital story is a homogenous multimedia synthesis using the graphic element of comics (with no speech bubbles) and a soundtrack synchronized by narration (from three successive narrators' voices). It comes out from their decision to use an online comic maker (Pixton), after experimenting with other alternatives. Their first draft was a video made with their own photos. However, they were not very satisfied, as they had already begun to shape the story of Vassilis, which needed real actors and settings. A first idea supported mostly by one of the members (a girl) was to use a video of themselves acting out the story, and then edit the video with professional software. The group rejected this idea as overly ambitious and time consuming, and proposed the use of Pixton as an alternative. After some turbulence and disagreement, the members agreed on this solution, and worked on their final draft in a rather cooperative, than collaborative fashion. They assigned each member to work on a number of frames online in Pixton. This was an asynchronous activity that led to the pre-final draft. Then they made final, commonly agreed changes and synchronised the sound and narration.

A very interesting use of the photographs, not initially planned by the researchers to be used as improvable objects, has been observed in the work of this group: though the first draft was rejected, the second and final draft with the comic illustrations was based on the sites of the photos. In fact, the group included two of them in their final video, after applying some effects to them to fit with the aesthetics of the comic illustrations. The group was also loyal to their initial script. The second and third drafts of the script are abbreviated versions of the initial text.

An impression of a satisfying level of collaboration within the group was initially given. However, midway through the project, some observed incidents of misunderstandings and communication failure disturbed the flow of collaboration. These can be attributed, on a first level, to a member's persistent character and tenacity on an idea the other members didn't seem to embrace (the video shooting). On a second level, there seem to have been previous conflict among two of the group members, before embarking on this collaborative endeavour. It is important to mention, though, that all members expressed and supported their ideas, despite tension and disagreement at times.

The group's idea of sustainability also evolved from initially adopting a purely naturalistic approach to further proceeding to a more socially and economically balanced view of current reality. Nevertheless, the group did not avoid applying some simplistic and overoptimistic views on addressing complex dilemmas and issues.

4. Concluding remarks

Fostering collaborative creativity for the construction of digital stories on urban sustainability has proven to be a demanding venture, entailing, for researchers/ educators, the use of techniques for inciting and maintaining inspiration, supporting collaboration as well as the invention of mechanisms to shed light into the practices employed and the artifacts produced. What is striking about the outputs of the process is the variety of digital tools used to the end of constructing the digital stories and the diversity of techniques employed by participants to grapple with the constraints and trade-offs of available digital resources and time limits. In terms of meaning generation, several ideas were exchanged in the process of the groups' endeavours to get into a deeper understanding of the complex and elusive concept of urban sustainability as a prerequisite to devise their story scripts and decide on several technical and aesthetic features of their created artifacts. The concept of improvable boundary objects has been a useful conceptual tool. First, it helped us organise a coherent set of well-defined milestones for participants. Second, it allowed us to document the evolution of ideas embedded in specific objects or artifacts. For participants collaboration has been both a struggle and a joy, as all groups reached their final goal. Further research could shed more light on the ways specific ideas on urban sustainability evolve, as improvable objects change shape and nature.

Acknowledgements

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