

Employing theatrical interactions and audience engagement to enable creative learning experiences in formal and informal learning

Enriching social theatre practices with digital technologies

Abstract. Social theatre is a methodology promoting an inclusive environment for active participation in cultural events with the explicit aim to enable cultural awareness and transformative learning. This paper presents how social theatre can be enriched with the use of digital technologies to promote active participation of audiences before, during and after cultural interventions that are organized within the context of the Caravan Next project. We present a mobile app (cNext App) that enables audiences to search for information for cultural interventions, sharing and reflecting on their experiences when participating in such interventions, thus promoting transformative learning in an informal learning setting. Furthermore, we present the use of special software employing innovative input devices to enable the use of digital marionettes in schools thus promoting project-based digital storytelling learning scenario in primary education.

Keywords: Social theatre, audience engagement, digital storytelling, digital marionettes.

1 Introduction

Extensive work from scholars and practitioners searching for a new “ritualization” of society has documented the fundamental role and heritage of theatre in political action, democratic “negotiation” of the social norms and rules, cultural dialogue and even social therapy. Social theatre [1,2,3] builds on this work to create an inclusive environment for active participation of the society in cultural events with the explicit aim to promote cultural awareness and transformative learning. Within the work reported in this paper we describe in detail how social theatre can be enriched with the use of digital technologies to promote active participation of audiences before, during and after cultural interventions that are organized within the context of the Caravan Next project (part of the Creative Europe programme).

The integration of social theatre practices with digital technologies presents an interesting challenge that could be framed within a wider research agenda on social sciences and humanities that follows a school of thought claiming that human behavior can be understood and analyzed by assuming that all human practices are *performed* so that actions can be seen as a public presentation of *self*. This is the conceptual basis of the methodological breakthrough titled *the performative turn* [4] that entered in cultural studies, social sciences and humanities in late 20th century and greatly influenced disciplines like ethnology, anthropology, sociology, and. The term *turn* indicates an alternative way to look at how members of groups and society at large interact, work, and

share knowledge within the context of groups and societies [5]. The major claim is that people create and recreate meaning and knowledge in social settings through performance. And even more: *The social reality itself is created through the actions of its members*. Thus, the focus is redirected to “the active social construction of reality rather than its representation” [6].

The roots of this approach go back to the 1940s or even earlier and can be attributed to the need to move beyond the prevailing focus on texts or symbolic representations to capture meaning. Performance is, above all, a meaning making bodily practice. Consequently, it is related to the theatre, rituals and other forms of spectacles and social practices. More than that, performance can be related to lifeless mediating objects, such as architectural objects or, in modern days, the digital systems that constitute our hyper-connected societies [7].

Beyond the main premises and the theoretical justification of the validity of performativity, one could attribute the significance of this paradigm to an *inherent* dramatic quality of human experience. Furthermore, it seems to be closely related to the capacity of digital technologies to extend our agencies, thus providing new ground for dramatic interaction (i.e. meaningful bodily and symbolic actions). By attributing to our daily lives a performative quality, the close relationship between drama as an art and drama as a social process is evident. The work reported in this paper explores this relationship, underlines the importance of learning in the interplay between dramatic arts and social reality and points out the similarities with modern learning theories.

The structure of the rest of this paper is the following: Section 2 presents the interplay between social drama and stage drama as a unified learning process. Section 3 presents how this unified learning process is supported with the use of digital technologies in the Caravan Next project. Section 4 presents the domain model of the cNext App and its framework for location-based services. Section 5 elaborates on issues related to the active participation of schools within the overall framework of the project through the use of special digital storytelling software that enables students create their own stories inspired by traditional storytelling techniques with puppets. Section 6 concludes and presents plans for future work.

2 Social drama and stage drama as a unified learning process

Beeman [8] offers a very interesting comparison and in-depth analysis of the relation between theatre and other performative genres: Revolutions, public demonstrations, campaigns, strikes, and other forms of participatory public action all have performative dimensions sharing certain features with the fundamental ritual processes. Such *social dramas* involve a break with normal structures of ongoing life, the entrance of groups of individuals into liminal transitory states, and the reincorporation of the liminalized individuals into a reconstituted social order. Beeman [8] goes on to analyze the interrelationship of stage drama, as a generalization of theatre, and social drama, as an inclusive term to describe all performative genres that aim at changing actual reality, employing a scheme initially proposed by Turner [9]. This scheme is depicted below:

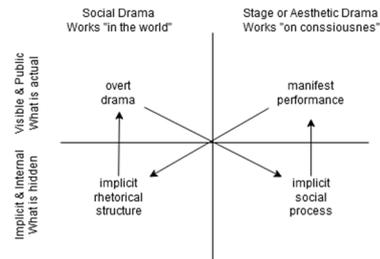


Fig. 1. The interrelationship between social drama and stage or aesthetic drama. Concepts depicted following the ideas of Turner [9].

The two curves above the horizontal line represent what is actual, visible and public while the two curves below the horizontal line what is hidden and virtual, i.e. implicit and internal. The left circle represents *social drama*, i.e. all performative genres related to social life. The right circle represents any genre of cultural performance, any kind of *aesthetic or stage drama*. The interesting point is how these two circles communicate thus creating a process with four distinct feedback directions:

1. Manifest social drama (i.e. visible social and political action) feeds into the hidden space of aesthetic drama influencing both form and content of the latter.
2. The latent space of stage drama feeds into manifest performance. This way, stage drama operates as an active or “magic” mirror meant to do more than entertain being a metacommentary on the major social dramas within the wider sociocultural context such as wars, revolutions, scandals, institutional changes etc.
3. Stage performance, within its own turn, feeds into the latent realm of social drama with its message and its rhetoric and partly account for its ritualization.
4. Finally, life itself stands as a mirror of art, of the stage drama, and the living perform their lives in a way that the protagonists of life are equipped with salient opinions, imageries and ideological perspectives created in stage drama.

The above feedback loop continues not as a cycle but rather as a helix: At each exchange new elements are added and other elements are left behind (forgotten or discarded). Beeman [8] underlines that human beings learn through experience, though all too often they repress painful experience. The deepest experience, he argues, is through drama; not through social drama, or stage drama (or its equivalent) alone, but in the circulatory or oscillatory process of their mutual and incessant modification. Philosophers feed their work into the spiraling process; poets feed poems into it; politicians feed their acts into it; and so on. Thus the result is not an endless cyclical repetitive pattern or a stable cosmology. The cosmology, he underlines, has always been destabilized, and society has always had to make efforts, through both social dramas and esthetic dramas, to restabilize and actually produce cosmos.

It is interesting to see how this conception of reflective social process through which society looks at itself, learns from its experiences and continuously reconstructs or re-invents itself, resembles one of the most widely used models of learning: the learning cycle introduced by Kolb & Fry [10] and further elaborated by Honey & Mumford [11].

This model distinguishes four phases in the learning process of an individual that proceed iteratively as depicted below:



Fig. 2. The four phases of learning according Honey & Mumford [11]. Diagram available online at: <https://www.talentlens.co.uk/develop/peter-honey-learning-style-series>

In detail, the four learning phases (with their drama counterparts) proceed as follows:

1. The process starts from *experiencing reality*, an activity that is preferable by *activist* learners that try to actually do things and have concrete experiences. This is analogous to overt social drama discussed already.
2. The next learning phase is *reviewing and reflecting on the concrete experience*, the preferred mode of learning for *reflectors* that observe (their own or other peoples') actions. This is analogous to the latent realm of stage drama where social experiences are elaborated and give rise to art manifestations.
3. The third phase is *concluding from the experience* providing the means that will subsequently orient the individual in life. This is the preferred mode for *theorists*, i.e. people that build explanatory frameworks trying to find casual relationships and links to previous established norms and concepts in way that resembles what is happening in stage drama manifestations.
4. Finally, the last stage is to *plan the next step* that will feed a new iteration. This is the preferred learning mode for *pragmatists* that try to exploit the knowledge accumulated in order to act in real life in an informed and purposeful manner. This is related to the latent realm of social drama where the art-refined social experience gets back into the social stage to enrich it with new concepts, plans and intentions.

3 Audience engagement using mobile technologies

The unified learning process based on the close interplay between social drama and stage drama is the conceptual baseline of the work done within the context of the Caravan Next project to enrich social theatre with digital technologies for the creation of community-shared knowledge through audience active participation and energetic engagement. Audience' active participation in the reformation and the enrichment of the existing information is ideally achieved via a community-based organization and offers significant added value. This is due to the fact that each person acting as a potential participant and proportionally to his interests desires to participate and/or be informed about cultural events through other people that share the same interests with him. In

particular he/she is interested to listen to their opinions and suggestions, take them into consideration, leave his comments and remarks and if possible participate in the creation of the knowledge and sharing experiences before, during and after an event. During this highly sociable procedure the creation of relationships among people is promoted, the communication is facilitated and the static information provided from official organizations (“cold data”) is augmented by “warm” data provided by the community itself. In particular, the phases of the learning cycle presented in section 2 are supported:

1. *Experiencing*: cNext app promotes active audience participation in cultural events either by following instructions sent, through the app, from event organizers or specialized personnel (i.e. asking to perform specific task or provide some feedback) or to play games employing location-based services provided by the app.
2. *Reviewing and reflecting*: Next, the app allows event participants to share their memories, exchange ideas, discuss and elaborate on them, thus reviewing what they have experienced during social cultural events.
3. *Concluding*: The “warm data” collected by the app are valuable to professionals (organizers, actors, scientists, theorists, etc.) of social community theatre in studying, analyzing and extracting conclusions about social interactions or event in evaluating the impact and the reactions caused by specific theatrical actions.
4. *Planning*: Finally, the cNext app supports the planning phase, not only for social community theatre professionals, (e.g. cultural event organizers) to plan, announce, and promote cultural activities, but also the community itself by informing it about upcoming or happening events in a location aware manner thus allowing individuals to plan their attendance or even to participate in their preparation.

To effectively support all the aforementioned phases an important initial step is the Domain Modeling as a way to describe and model real world entities and the relationships between them. From a system-level requirements point of view, identifying domain entities and their relationships provides an effective basis for understanding and helps practitioners design systems for maintainability, test-ability, and incremental development. In what follows we present the main aspects of the domain model developed in the context of the Caravan Next as the core data infrastructure that supports not only the mobile app, but also other web sites or applications used mainly in planning and promoting cultural events (e.g. the project’s web site), or in supporting organizers and their specialized personnel to communicate with the audience or check their feedback.

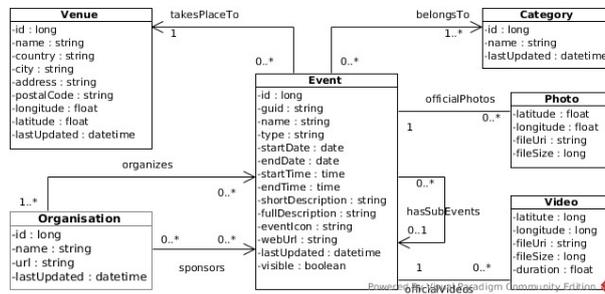


Fig. 3. “Cold Data” of the Caravan Next application model.

Fig. 3 shows the main entities that model the “cold data” of the Caravan Next application domain. Central role in this model has the notion of the event. An Event is a programmed cultural activity that takes place in specific Venue during a particular interval of time. Venues can be either specific indoor places, or outdoor public locations (like a square, a harbor, a street, etc.). Events belong to Categories (e.g. performance, parade, conference, meeting, etc.) and they are typically organized by some Organization (or co-organized by more than one) while can be sponsored by others. Events are described among others with name, description, start time, end time, etc. They can also be complemented with “official” multimedia, photos and/or videos that are provided either as promotional or as commemorative material by the event organizer.

Events in the Caravan Next application model can be quite complex in structure since a specific event can accommodate many sub events. This allows the description of event series; a typical occasion in social community theater where cultural events last for several days and include activities in several venues or even cities.

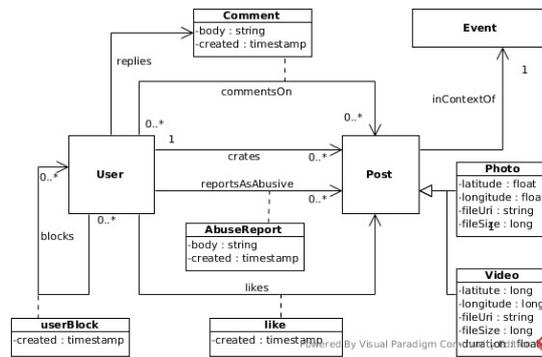


Fig. 4. “Warm Data” of the Caravan Next application model.

Fig. 4 illustrates the main concepts used to model the “warm data” of the Caravan Next application domain. The notion of User represents any person that uses the app or other tools of the Caravan Next infrastructure. Users can be registered directly to the Caravan Next infrastructure, or use some other authentication provider (e.g. Facebook). User-generated content (i.e. warm data) is captured in the form posts, comments, and likes. A Post is a user message published in an online forum or virtual community called the Caravan Next “Wall”. Posts can be simple text messages, videos or photos, or mixed. Posts are about encouraging engagement, action and active participation of the users to cultural events. To this end, posts are always published in the context of some particular event. Social interactions are supported by allowing users to react on posts made by other users. Thus users can start discussions by commenting on posts and/or replying to comments. Finally the notion of Like is used to allow users to express a quick positive reaction on some post (i.e. a text message, a photo, or video).

In social networking where users with different social, cultural and ethical backgrounds or different religious and political sensibilities are communicating, precautions have to be taken so that offensive users and/or content can be identified and blocked by users. Thus, the Caravan Next domain model allows users to report abusive posts, or

event to block other users in the sense that content (posts/comments) from this users will no longer be presented to them.

Fig. 5 shows how the downstream communication (from organizers/professionals to the audience) is performed through push notifications. In the context of some event organizers or specialized personnel can send push notifications to user (audience) devices through dedicated administration tools.

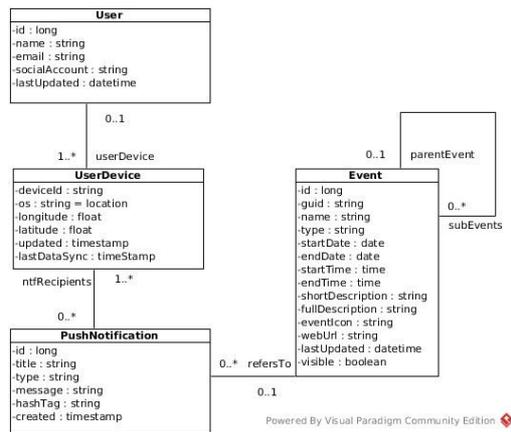


Fig. 5. Downstream communication elements of the Caravan Next application model.

A push notification is actually a message sent from event organizers/actors to the audience either before the event (to increase engagement) or during the event to enable active participation of the audience (e.g. by asking to perform some action or to interact with stage actors, or to answer some question, etc.) to event realization. The group of recipients to which a notification is sent can be formed based on current user location (e.g. only to users that are in the event place), their interest on some specific event, or by selecting specific users.

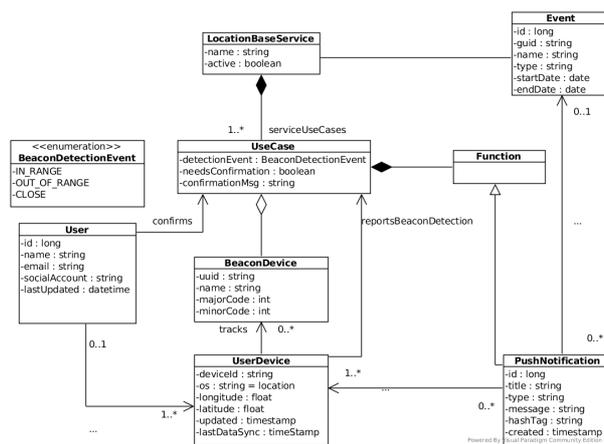


Fig. 6. Modeling of location-based services.

Finally, fig. 6 shows how location-based services are offered with the use of the cNext App. A location-based service in the context of the Caravan Next contains one or more event-driven use cases (i.e. functionality offered to the user) and are achieved with the deployment of a number of beacon devices [12].

When a Service is active, the cNext app is setting the user's device to scan for and track specific beacons that have been deployed in locations near to the event venue (e.g. in a room, in a city square, in the venue entrance etc.) or at specific spots. When a user device finds a beacon device and starts tracking it, three different (detection) events can be fired: a) `IN_RANGE`: the user device came near to the beacon location, b) `OUT_OF_RANGE`: the user device moved away from the beacon location, and c) `CLOSE`: the user device is very close (less than a meter) the beacon location. When such an event is fired, the cNext app knows that the user entered or exited some area (like the venue that an event is taking place), or even that is very close to some specific location spot (e.g. in front of some object monument) that is important to know.

A location-based service may contain more than one use cases each one triggered by a specific detection event (`IN_RANGE`, `CLOSE`, or `OUT_OF_RANGE`) of one or more beacon devices. This framework allows the implementation of quite complex services with just a few beacon devices deployed.

To ensure privacy and user control, a use case of a location-based service can be configured to require user confirmation. In such a case, when a use case is triggered, the very first step is to (describe what the use case is and) ask the user for confirmation who may reject or accept the use case execution. A use case consists of one or more functions that are executed according to the use case scenario. Such a function can be whatever the service designer wants or just a communication message to the user as a push notification.

The aforementioned framework supports a variety of usage scenarios. Two of them are presented next considering their relevance in promoting audience engagement:

- *The Cultural Passport service* is about stimulating audience to increase the participation in cultural events. This is achieved by maintaining for each participant a "cultural passport" that gets a stamp every time the user participates in some cultural event. For each cultural event, the cultural passport service consists of two use cases: (a) check-in (entering the event location) and (b) check-out (leaving the event location). In particular, when entering the event location, the user is asked to confirm his check-in to that event. If the user accepts, his cultural passport will get automatically "stamped" (i.e. filled in with event data -title and date) and emailed to her/his mailbox, and a "certificate of attendance" will be generated and automatically posted to the cNext app Wall let other people know that s/he is attending that event. On the other hand, when leaving from the event location, a good bye message is sent to the user inviting her/him to upcoming events.
- *The Treasure Hunt service* is a technology-driven version of traditional treasure hunt. The general idea is that in the context of a social community theatre event, participants are encouraged to play a treasure hunt game using their mobile phones to follow certain paths. Such a service, requires the deployment of a number of beacon devices at specific location spots and the configuration of appropriate use cases

that will be triggered when a user comes close that spots. The game starts by sending to all participants a quiz message that its solution may guide them to a specific location. Those who solve the quiz and get close to the right spot, are automatically detected and proceed to the next level where a new quiz or further directions are sent to them. At each level, participants may be asked to perform physical (e.g. open the door in your left and enter room X) or virtual actions (e.g. upload a photo of the hidden object that you discovered).

4 Engaging students with digital marionettes

Drama-based artistic forms can be effectively used in formal education to promote learner engagement and creativity. In particular, artistic forms inspired by traditional theatrical practices and enriched with digital technologies have been found to promote engaging learning experiences in a wide range of learning situations ranging from compulsory education [13] to professional training [14]. They can also effectively address learning beyond the typical curriculum such as during school festivals and exhibitions [15]. Based on these findings, the Caravan Next project implemented an extension of the initial software [13-15] employing a LEAP motion controller [16] to control digital puppets with fingers, thus simulating traditional marionettes (Fig. 3). The aim is to enable real-time interaction with digital puppets in cultural events organized by the Caravan Next project as well as to engage local schools in specially designed activities that take place before scheduled cultural events. During these activities students are invited to develop their own digital stories inspired by the theme of the forthcoming events.

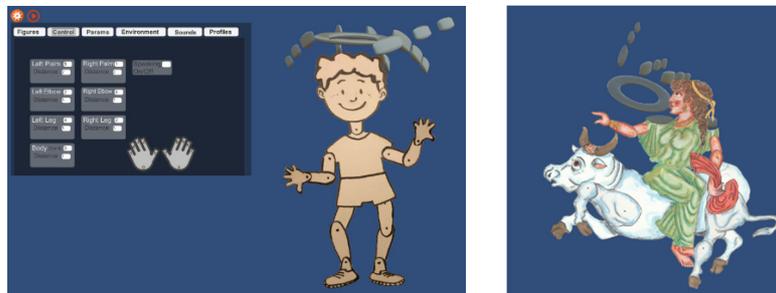


Fig. 7. In the special software to support marionette-like interactions digital puppets are handled with users' fingers via the Leap motion device [16]. The controlling fingers are configurable through the panel shown in the screenshot on the left. Several types of digital puppets are possible as shown in the screenshots.

The software was evaluated during a pilot school project in the 5th Grade of the 19th Primary School of Chania in Crete, Greece, to create a digital story (available at: <https://youtu.be/GqiOaCejFxs>) using a digital marionette inspired by the myth of Europe. This was directly related to the theme of the Caravan Next micro event organized in Heraklion, Crete, Greece, in September 2016. The students were invited to research on the myths of EU countries and prepare a scenario showing mythical Europe traveling in these countries and learning about their corresponding myths. After finalizing their

scenarios, the students were asked to prepare drawing on the myths they have selected that they were subsequently scanned to be used with the digital marionette software as background images. Finally, they used the software to animate the story. After finishing their project, the students and their teacher (21 participants in total) were asked to answer the System Usability Scale (SUS) questionnaire [17].

The analysis revealed that the average rating by the participants is high (78.55%). However, in terms of learnability, the score is rather moderate. In particular, this refers to the results recorded in SUS questionnaire questions that directly address the learnability of the system. To further investigate the learnability issue, a second experiment was designed and conducted to investigate the source of this lower performance in terms of learnability. The hypothesis was that the poor performance in terms of learnability was related to the inherent difficulty in controlling the specific digital marionette (depicted on the right of Fig. 3). During this second experiment students were invited to use a different digital marionette (the one depicted on the left of Fig. 3) that is easier to control. The results of this second experimental round confirmed the overall high score with respect to the usability of the software (total score 78.62%) showing an improvement of learnability score by 11.48% (from a sum of 4.53 to a sum of 5.05 for the two questionnaire questions measuring learnability).

5 Conclusions and Future Work

In this paper we describe and provide details on the use of a mobile app (cNext App) that enables audiences to search for information for cultural interventions, sharing and reflecting on their experiences when participating in such interventions, thus promoting transformative learning in an informal learning setting. We present both a Knowledge Base (KB) which models an information space consisting of events, categories, organizers, places, people, posts and comments, interaction devices and notifications and a mobile application for both Android and iOS devices as interaction means. The main provided services include: browsing/navigation of events by category and/or filtering by time (past, today, upcoming events), creation of multimedia posts and sharing in social media such as FB, association of posts with events, commenting, representation and access of events on interactive map, multilingual GUI, location-based services employing beacon devices for various interaction scenarios.

Furthermore, we present the use of special software (digital marionettes) in schools thus promoting project-based digital storytelling learning scenario in primary education. Both the mobile app and the digital marionette software are enriching the traditional social theatre intervention methodologies in a way that promotes deeper engagement in cultural events of the broad public and give new expressive means that promote creativity and social interactions.

The use of digital technologies renovates theatre tradition by promoting active engagement in cultural events and creative learning in formal learning settings. It enables people to engage deeper with their cultural traditions and raise awareness about other cultures in a way that combines ICT in a creative and educationally significant framework. The proposed approach promotes playful learning scenarios that motivate and

entertain children. It supports an inclusive learning framework that enables teachers to design and implement interdisciplinary projects. The use of digital technologies in school inspired by theatrical tradition, as it was observed, motivates students that may be hyper-active or have a negative attitude towards school. Throughout the story creation process all students exercise group work and construct valuable social knowledge and mutual understanding. Carefully selected themes encourage comprehension of concepts that are hard to understand when traditional teaching approaches are used. The usability evaluation of the software demonstrated high usability scores. Furthermore, it was found that adopting a digital marionette with a simple control model improves the learnability of the software for students that use it for the first time. Further investigations will be done within the context of Erasmus+ projects e-ARTinED and MultiLib to validate the potential of digital arts in formal and informal learning settings [18].

Beyond schools, it should be noted that new learning opportunities are created within informal learning settings as well in the case of cultural events via the use of the cNext App. It has been extensively used in the context of the Caravan Next project where more than 250 event organizers have used the mobile app in more than 250 cultural events in order to promote those events, to develop (and communicate with) their audience, as well as to stimulate the participation of local communities in cultural activities. With the use of the app, event organizers were able to provide location-based services to their audience, as well as to communicate with it, before, during, and after the event. On the other hand, end-users were using the mobile app, to get informed about cultural events, to get help with the various organizational aspects of these events (time, place, directions, etc.), and exchange memories beliefs, and opinions on the themes of such events thus promoting learning through self-reflection and collaboration.

Although further analysis is needed with a focus on the mobile app usage in cultural interventions mainly with respect to its usability and learnability, there is qualitative evidence from its actual use in several events that it promotes and enhances audience active participation and opens up new learning opportunities within an informal learning framework. This is closely related to activities employing the location-based services of the platform as well and can extend previous research results [19] to blend social theatre activities with learning activities in museums, archaeological sites, nature parks etc.

Acknowledgments

The work reported in this paper is implemented in the Caravan Next (Creative Europe 559286) project. Further use of the digital marionette software in schools is implemented in the e-ARTinED (Erasmus+ ID 2015-1-SE01-KA201-012267) and the MultiLib (Erasmus+ ID 2016-1-SE01-KA201-022101) projects.

The authors thank Nikos Blazakis for supporting this work by developing the original version of the marionette depicting the myth of Europe. They also thank Mrs Alik Vitoriou, teachers in the 19th Primary School of Chania, Crete, Greece and her students for participating in the evaluation of the digital marionette software.

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