Creative collaborative experiences with interactive shadow theater
Esperienze creative e collaborative con il teatro d'ombre

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ABSTRACT
Storytelling is a very common educational practice that is used in every level of education. It has a positive impact in children's learning and creativity. Often the educational use of storytelling is based on national storytelling traditions such as Shadow Theater which is very popular in many countries including Greece. In this research we present eShadow, a storytelling tool inspired by the Greek traditional shadow theater and how it has been used in a number of Adult Learning Pilot Programmes (ALPPs) implemented within the context of the ALICE project in Greece.
In these ALPPs, intra-family communication scenarios were investigated as well as scenarios related to enabling children develop their own digital stories using eShadow. Furthermore, eShadow was used in a live interactive performance event combining Music and Digital Shadow Theatre. The evidence gathered during the implementation of these ALPPs confirms that such kind of approaches can indeed enhance intergenerational bonding and create an engaging learning space for children to develop important key skills. Our findings illustrate that eShadow is very easy to use, attracts the interest of both children and teachers and has a positive impact on the development of children's creativity.

Lo storytelling è una pratica molto comune in ambito formative ed educativo, utilizzata ad ogni livello di istruzione. Ha un impatto positivo sull'apprendimento e la creatività dei bambini. Spesso l'uso didattico dello storytelling si basa su espressioni narrative ben conosciute a livello nazionale, qual è il caso del teatro delle ombre, molto popolare in molti paesi tra cui la Grecia. In questa ricerca presentiamo i risultati dell'implementazione di uno strumento digitale, "eShadow", ispirato al tradizionale teatro delle ombre greco, nel contesto di un certo numero di attività pilota per la formazione degli adulti (Adult Learning Pilot Programmes, ALPPS) attuate nel contesto del progetto ALICE, in Grecia.
In questi ALPPS, gli scenari di comunicazione intra-familiari sono stati studiati così come scenari che consentono ai bambini di sviluppare le proprie abilità per il lavoro con lo strumento digitale eShadow. Inoltre, eShadow è stato utilizzato in evento interattivo che univa presentazioni di Musica e Teatro con la presenza di teatro delle ombre "digitale". Le prove raccolte nel corso di questi ALPPS conferma l'ipotesi degli autori che questo tipo di approcci può infatti migliorare i legami intergenerazionali e consente di sviluppare importanti competenze chiave sia negli adulti che nei bambini. I nostri risultati mostrano che eShadow è molto facile da usare, attira l'interesse di bambini e insegnanti e ha un positivo impatto sullo sviluppo della creatività dei bambini.

KEYWORDS
Education, shadow theater, creative languages, intergenerational learning, games
Formazione, teatro d'ombre, linguaggi creativi, apprendimento intergenerazionale, giochi.

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Introduction: Storytelling and intergenerational learning in the digital age

Storytelling is a very common educational practice that is used in every level of education. In particular the use of storytelling in children education can have important impact in children's learning and help them develop their creativity skills. Furthermore, in many countries world-wide do exist storytelling traditions that address not only children but adults as well. Due to their inherent intergenerational character, those traditions can offer a firm culturally-situated ground for intergenerational interventions such as the ones targeted by the ALICE project.

One of these storytelling traditions that is deeply rooted mainly in Eastern cultures is Shadow Theater. The diversity of possibilities provided by playing with shadows (for example when children play with hand-shadows) has impressed humans throughout history. This fact is what made traditional Shadow Theater so popular in many countries and over time. [F. Lu, F. Tian]. Traditional Shadow Theater remains very popular even after the invasion of cinema, television and, lately, the Internet in many in many countries around the world like Greece, China, Taiwan, France, India, Turkey, Malaysia and other. More specifically in Greece, Shadow Theater is a very popular form of entertainment. For older generations Shadow Theater was the only form of entertainment available to them. That was a time before cinema and television became available to the general public. Furthermore, Traditional Shadow Theater is a common link across generations: Children in Greece still watch traditional shadow theater plays, learn about Shadow Theater in school and also play with shadow theater puppets.

Starting from these important facts, we have been exploring for the last four years the possibility to develop digital tools inspired by the Greek Shadow Theater tradition with the aim to offer an infrastructure that will allow the set up of engaging learning spaces for both children and adults. The result of these investigations is eShadow, a digital storytelling tool that can be used from both adults and children in order to create, record, share and watch digital shadow theater plays. It provides alternative methods for controlling the virtual puppets either through mouse or through a motion sensing controller and enables real-time collaboration over the Internet (e.g. between grandparents and grandchildren living in diverse geographical locations). With eShadow new possibilities emerge: The enactment of intra-family communication scenarios that promote intergenerational bonding and playful learning. Such kind of new opportunities for intergeneration bonding that overcomes the physical separation of children and their grandparents is important for children's development and contributes to the well being of the elderly as well.

1. Shadow Theater in education

The impact that Shadow Theater has on children, allowed for its use as a learning tool. Especially in primary education it is used as an alternative way of playing and learning. One basic criterion for selecting it as a learning tool is that children relate to its main character Karagkiozis in many ways.

Karagkiozis has the ability to motivate children and expand their creativity. Children find their own ways of mimicking plays, create their own improvised dialogues, express their emotions and create their own stories with unique characters. Additionally children get familiar with the research process and with collecting and using information about different shadow theater plays. Traditional plays were written in difficult times for Greece. They all contain historical infor-

mation about life and many sarcastic elements about the conquerors/authorities of those times.

Another aspect of the plays that has not yet been analyzed is music. Every play has a musical theme that is, in many cases, unique. Each shadow theater performer used local traditional musical themes for his plays. By examining the music from different plays, children can learn about musical tradition across the whole country.

When creating their own plays, children work in groups. Each group is assigned to a different task of the play creation process. The most common assets of a play are: scenario of the play, dialogues, music, characters and sceneries. Children cooperate in order to create the scenario and dialogues, find the appropriate music for each part of the play and draw the figures or sceneries. With the active participation in the above process, children are engaged in a collaborative fun process that allows them to express their creativity.

Except from the creation of a play, watching one is another activity that offers collaborative learning experiences for both children and adults. Many traditional plays have educational characteristics. The most common topics that they address are: equality (gender and social equality), environmental protection, people with special needs and many other social issues that are common to every society.

2. eShadow and the ALICE project

eShadow is an on-going project about an electronic shadow theater application inspired by Greek traditional shadow theater. The main goals of eShadow are:

- To adapt traditional shadow theater in modern times.
- To preserve traditional art as much as possible and make traditional shadow theater more popular.
- To create a learning tool for both children and adults.

With eShadow users can create, record, share and watch digital shadow theater plays. It provides alternative methods for controlling the virtual puppets either through mouse or through a motion sensing controller. eShadow also offers the ability to video chat for enhancing collaborative creation and watching of plays. Besides it can accommodate virtual puppets inspired by fairy tales or children narratives, legends or historical figures as well.

It supports intra-family communication scenarios that promote intergenerational bonding and playful learning. For example, a child, who lives in the United States of America, could present a shadow play story to his/her grandparents in Greece. The grandparents are able to watch and encourage him/her or even try to cooperate with him/her by controlling other virtual puppets on-line. They also have the ability to watch and communicate with their grandchild through the video chat facility which is embedded in eShadow. Such kind of new opportunities for intergeneration bonding that overcomes the physical separation of children and their grandparents is important for children's development and contributes to the well-being of the elderly [R. Vutborg, J. Kjeldskov].

The bottom line is that eShadow provides an engaging educational environment that promotes creativity and establishes a bridge between generations where adults and children can collaborate, create their own stories or use classic shadow theater scenarios in order to create their own shadow theater plays.

The project "Adults Learning for Intergenerational Creative Experiences" (ALICE) focuses on the idea of Intergenerational Learning as key to reinforce the role of adults (grandparents, parents, volunteers) as educators. New opportunities for intergenerational learning need to be based on new languages: creative languages, beyond just transmitting information from one generation to another.

The combination of the creative languages, used in ALICE, with eShadow creates a plethora of possibilities. These possibilities were further explored within the context of other activities implemented within the context of the ALICE Adults Learning Pilot Programmes (ALPP) in Greece.

The stakeholders that participated in the Greek ALPPs and used eShadow were mostly elementary schools. In the elementary school curriculum there are learning modules in several courses devoted to Greek traditional shadow theater and storytelling. By instructing teachers and parents to use a new storytelling tool, children are benefited by:

- Providing a new way for children to express their creativity and learn
- Teachers can make related classes much more interesting and engaging for children
- Children learn to use games in a safe way in the school environment

The aim of the implemented ALPPs was to offer new experiences and tools that could help children create and visualize stories. eShadow is very easy to use and learn by both teachers and children. The workflow that has been developed consists of creating a story, creating figures and sceneries and digitizing the story.

Teachers were encouraged to guide their students through the creation of a story based on the children's interests. After the creation of the story they developed a corresponding script with dialogues. The script had a specific plot and characters. The final step was to visualize the story with eShadow and produce the video of the play.

The participating children were able to better understand how Shadow Theater plays are structured, how they are performed and also create their own play. In parallel, they exercised their creativity by developing their own figures and sceneries as well as their own scenario. Another skill targeted by this activity, was the ability to cooperate within a group: all scenarios and plays were created cooperatively.

1.1. *Sessions with eShadow*

The first ALPP sessions that used eShadow were held in Athens in the context of the exhibition titled "The Triumph of Shadows". The participants were members of the EcoFans Club. The EcoFans Club is a program designed to raise and promote environmental awareness and consciousness through an educational process combining ecology and English language learning. The EcoFans Club main group consists of students attending the Hellenic America Union English Language program, their parents, friends and other people that wish to participate in the EcoFans activities.

From these sessions one shadow theater play was produced by the children with the support of their teachers. The play is available on the link: http://www.youtube.com/watch?v=VB_jn0WkG1Y.

The next two sessions of this ALPP were implemented with children and

adults with special needs. The participants of the first session were children with physical disabilities. Totally six children and six teachers participated in this session. The outline of the session was the following:

- The participants are welcomed to the session and a brief introduction is made
- The participants watch a play that has been created in cooperation with a professional shadow theater performer
- The participants are instructed on the use of eShadow and create their own shadow theater play

The participants of the second session were adults with mental disabilities. Six adults and six trainers (each adult had his/her own trainer) participated in this session.



Fig. 1: Children with special needs at the ALPP session



Fig. 2: Adults with special needs at the ALPP session

Within the context of the exhibition, a panel discussion was organized on December 1st, 2012. The panel brought together artists, performers, and academics to discuss about the history and the art of Greek Shadow Theater and its modern versions. During this event, eShadow was presented along with information

about its use in ALICE intergenerational activities as well as a short presentation of all the Greek planned ALPPs.

The final sessions that explored the use of eShadow targeted teachers, parents and children. eShadow was presented in local events targeting schools and several teachers were interested in eShadow and were trained to use it for creating digital stories with their students.

One of these sessions took place in a primary school and the aim was to enhance the co-operation among children and between children and adults. Furthermore it aimed to familiarize children with Greek traditional shadow theater through eShadow as well as to trigger their imagination. The importance of this aim, for the people engaged, was to have better understanding with each other and then realize that with co-operation between generations can have surprisingly better results due to combination of each generations strong points! The result was an actual Greek traditional shadow theater play which was created with eShadow and is entitled "Karagiozis and the IMF". This play is available here: http://www.youtube.com/watch?v=JXP-3ruCrvc

This shadow play was a part of students' creations exhibition that took place the other ALPP where it was available for watching by children and adults as you can see in the following image.



Fig. 3: Students watching a play created with eShadow during the sessions in Chania

1.2. *Evaluation and evidence*

The evaluation of the ALPPs that explored the use of eShadow was mainly done by evidence that were produced during the sessions of the ALPPs. Debriefing was done immediately after the sessions, in order to document feedback from the participants while we took into account the conversations that were taking place during the sessions. The evidence that were produced from the sessions are:

- The script of the play that was discussed and produced from the participants during the information phase of the session
- The figures and sceneries that were produced from the participants during the lab phase.
- The scenes of the shadow theater play that were produced from the participants during the lab phase

– Photos taken during the sessions
– Notes that were taken by the trainer during the discussions in different phases of the session
– The Learning map that was discussed with the participants during or after the session
– An ALICE blog post that described the session/sessions

The play that the EcoFans group created already has over 600 views and it can be found on the following link: http://www.youtube.com/watch?v=VB_jn0WkG1Y

More information and photos for this action can be found on the EcoFans official website: http://www.hau.gr/?i=environmental_education.en.ecofans-past-events.2961

1.3. *Publicity, impact and reflection*

The exhibition received considerable visibility in Greek mass media. The following addresses point to some indicative articles in major Greek news sites, magazines and newspapers:

– http://www.elculture.gr/exhibitions/thriamvos-skion-2012-428004
– http://news.pathfinder.gr/greece/news/828260.html
– http://tinyurl.com/bvzfzzo
– http://www.tanea.gr/news/culture/article/4769865/?iid=2
– The exhibition was attended by 1900 people in total. Here are some more detailed statistics:
– Number of people attending the exhibition: 1900 people
– Exhibition (11/12 – 12/15/2012): 1308 people (Opening: 70 people + 1238 during exhibition)
– "Shadows in light" panel discussion (12/1): 40 people
– Screenings (12/3 & 12/4/12): 40 people
– Traditional shadow theater performances: (11/14, 11/23, 12/10 & 12/11): 140 people
– Educational program: 341 children and 24 teachers.
– 12 adults from a center for people with mental disabilities

1.4. *Impact on adults and children*

Depending on their role, adults participating in this ALPP benefited in a different ways:

– Adults that are parents benefited by exploring new ways of playing and coming closer to their children. Many parents do not know how to approach their children in the digital world and this ALPP by combining tradition with the digital world provides a common ground for both parents and children.
– Teachers were familiarized with a new tool for digital storytelling. Such a tool suitable for use in the classroom by teachers did not exist. By instructing teachers to use a new storytelling tool that revolutionizes Shadow Theater we expect them and children to benefit by making related classes much more interesting and engaging for their students and acquire extra digital competences. In Greece many teachers are not very familiar with computers so this is a good skill to learn.

Children benefited most from the sessions of this ALPP. In particular, they were able to:

- Develop cooperative skills
- Express their creativity and learn in a playful way
- Learn about environmental issues (the play that was created by the EcoFans group is about environmental protection)
- Develop digital skills and competences

1.5. *Reflection on the ALPP implementation*

The implementation of the sessions of the ALPPs proved to be a big challenge. It took a lot of planning and organizing in order to coordinate all the sessions with the exhibition in Athens. The most promising fact of all was the great feedback that we received almost from all the participants. Especially the feedback from teachers that we talked to after the sessions was great and even they were sometimes surprised with the attention that the children gave to the sessions. Furthermore the children's reactions when they saw their own puppets move and after viewing their first recorded scene were enthusiastic.

2. Exploiting eShadow in a live online educational event

eShadow was used in "ΑΚΡΙΤΩΝ ΜΟΥΣΙΚΗ (Akriton Mousiki)" which was a live interactive performance audiovisual event combining Music and Digital Shadow Theatre and took place on April 2013. Akriton Mousiki was part of Distance learning Music Agoge (DMA) and it was its fifth implementation.

Akriton Mousiki was a more ambitious implementation of DMA in two ways:

1. It was the first time in the program that 5 Greek remote areas were connected at the same time.
2. It was the first time that real time music visualization was used and it was achieved through eShadow.

3. Distance learning Music Agoge (DMA)

Distance learning Music Agoge (DMA) is a pilot project attempting to set the foundations for the exploitation of teleconference and live streaming capabilities used as tools for supporting music education in Greek remote areas. It was funded by the e-services action of the Operational Program Information Society (O.P.I.S./ES 6875) and it operates under the auspices of Ellinogermaniki Agogi Private School, the Department of Research & Development and the School's Music Department. DMA is the first project of it's kind in Greece.

- Satisfying it's short-term objective the project already broadcasts online low and medium scale music events of specific interest especially from remote places without advanced ICT infrastracture (first successful event : May 2010 via mobile broadband).
- Medium-term objective is to have remote communities collaborating towards

the development of a live online music event. This objective seeks to help remote sites to exchange cultural content through music activities as a result of a training process that combines creative music-technology and music-teaching. Blending teleconference and live streaming tools towards this task is part of this current objective. Two such trilateral (multiple-site) links have already been accomplished:
  - the first in June 2010 (between Western Achaia, Boeotia, Crete)
  - the second in January 2011 (between Attica, Boeotia, Western Achaia).
- In March 2013 in collaboration with Stord Haugesund University-Norway and the "Write A Science Opera" project, DMA achieves the second interstate effort and the first cross-country-link ("linkcast") towards the creation of a live-performance educational event in the history of European Music Education. The event linked Greece, Norway and Cyprus.
- Long-term objective is to develop and promote advanced and innovative videoconference capabilities used as tools that can link together remote communities in areas were access to music educational practice is scarce or impossible.

4. Building an advanced objective… Akriton Mousiki

Up to this current stage the project is adopting the digital environment of the Adobe Connect Pro v7.5 platform to both the needs of distance learning courses and the needs of multicasting music events. For the distance learning courses it is essential to mention that no virtual web-platform is capable of replacing actual and in person face-to-face lessons.

The ultimate objective of this project is not to substitute traditional teaching methods but to encourage users to start building a relation with music not only as listeners but as active performers from the area in which they live. Peer to peer videoconference combined with diverse streaming capabilities, that allow links with more-than-two users simultaneously, enhanced by diverse audiovisual content can only be a part of music-instrument teaching using ICT.

At the moment higher education in music performance to individuals cannot be established through streaming media but can be significantly enhanced mostly in territories where specialized music tuition is impossible. Other webcast platforms are also tested towards this task as long as physical body action is captured and transmitted through live video image. In this direction the capabilities of connections (links) and direct multimedia streaming (live webcasting) are combined and tested in low-infrastructure-conditions that constantly vary according to the actions which the program covers. The term "Linkcast" may describe the above effort.

The experience gained day by day builds the foundation for the future development of a live & interactive network of remote web-channels available to the world of music-education in Europe.

5. eShadow and Akriton Mousiki

"ΑΚΡΙΤΩΝ ΜΟΥΣΙΚΗ (Akriton Mousiki)" was a live interactive performance audiovisual event combining Music and Digital Shadow Theatre. The performance was inspired by Greek Acritan heritage and included the collaborative prepara-

tion, co-creation and realization of an online event between multiple distant schools linked together via videoconference. During the linkcast (webcasted videoconference) pupils from four acritic schools presented a virtual-stage role-playing educational activity by moving digital figures (e-shadow platform) accompanied with shared live Music performance.

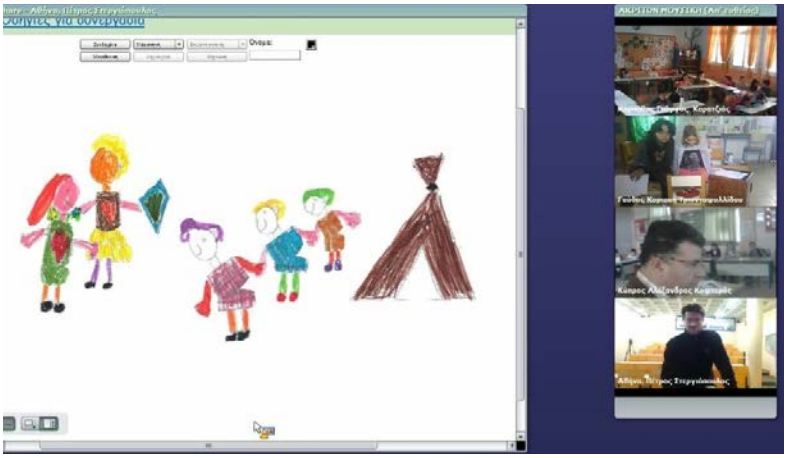


Fig. 4: Adobe Connect Pro, screenshot. Cyprus and Gavdos perform a scene from the play. Karpathos and Athens are watching

The blueprint of the linkcast scenario was derived from the "Let Us Share The Music" activity recognized as good practice from the Pedagogical Institute Good-Practices Database. The scenario involved pupils from Gavdos, Karpathos, Kastelorizo and Cyprus. An early version of the scenario was as follows:

1. The school in Gavdos begins the event by presenting the Acritic heritage in general.
2. A music theme from classical music inspired by the acritic tradition is performed in Athens.
3. The school in Cyprus continues with the acritic song of Digenis Akritas. At the same time pupils from Crete move figures of «Digenis in the Marble Threshing Fields".
4. Karpathos presents "sirmatika" (traditional songs from Karpathos) and excerpts from the song of Armouris. At the same time pupils from Cyprus move e-shadow figures inspired by the song. [Samuel Baud-Bovy, Chansons du Dodecanese, t. 2, Societé d'Édition "Les Belles Lettres", Paris 1938 / Samuel Baud-Bovy,"La chanson d' Armouris et sa tradition orale", Byzantion, v. 13 (1938)]
5. The school in Crete presents Kypridimos from the scene of joust contest with Erotokritos (epic poem by Vicenzos Kornaros).The school in Gavdos move figures from this scene.
6. The linkcast closes with classical Music from Athens.

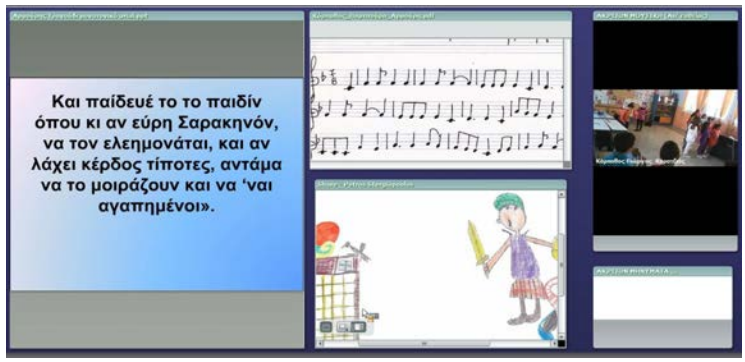


Fig. 5: Karpathos during a rehearsal

The final scenario scenario was based upon the educational needs of every site that took part on the event following the phases of the good practice. This scenario consisted of four aspects of interaction: the flow of sites succeeding each other (1st column) and three columns representing a sequence of online events:

- Yellow column: the flow of the e-shadow theatre events
- Purple column: the flow of Powerpoint events
- Cyan column: the flow of audio events

This final scenario included advanced interaction between five remote sites through live physical-instrument music performance and digital images movement. Part of the dialogues performed by the students were arranged and prepared specifically for the event and they were based upon the Byzantine epos of Digenis Akritas digitized by the University of Crete "Anemi" Database.



Fig. 6: Kastelorizo during a rehearsal

The planning of this event involved, trials, studying – finalization of the final scenario and rehearsals with teachers and students emulating as much as possible the duration of the final event.

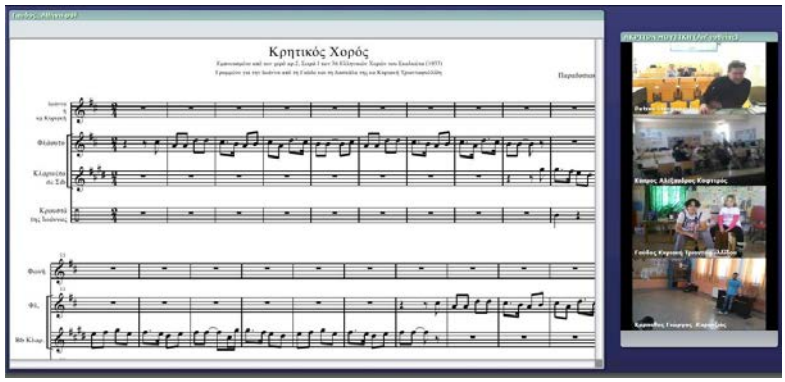


Fig. 7: Gavdos and Athens performing a sequence of music themes live. Karpathos turns the pages of the sheet music

For the Digital Shadow Theatre part of the event, children were asked to draw their own acritan figures in order to be used in eShadow. So the scanned children's drawings, with the use of an image editing program, were converted into two part figures and then imported to eShadow. When children saw their drawings moving like actual puppets, they were very excited, as their teachers stated. All the training of the teachers was accomplished through video-conference since physical presence was not possible.

6. Music as a performance art

With music being a universal language and live performance being the most crucial part of music as an art, live audiovisual web-streaming and teleconference capabilities can expand our concepts for both music education and define our every day connection with music as an Art. Communities such as professional soloists, music teachers and music trainees can obtain ways of becoming "music protagonists" by creating audiovisual live-links across Europe or even worldwide.

A clear and open ICT-in-music window within Europe must not be limited to the current digital communication practices whose usefulness has not yet been focused upon the needs of both the formal and informal music education. Satisfying the key feature of Music as an Art, which is: "being conducted on a specific place and time", video conferencing and live multimedia streaming can profoundly support and enhance music performance, along with music education. Music, as an art of time, requires the co-existence of the listener (receiver) and the artist (transmitter) at the same place and time in order to become reality. This characteristic could also be reflected in the relationship between a teacher and a student during the music education process.

This necessity, which has so far been satisfied mainly by automatic web tools (on-demand internet web2 applications or stored resources of audiovisual content) can now expand to blended synchronous and asynchronous communication methods that engage true and actual live human tuition and collaboration.

The participation of many remote users who are able to co-create a cultural event fulfills the basic and primordial characteristic of music creation that is the "Sympraxis" (=cooperation) of different people and cultures in order to create Music.

Conclusions and future work

eShadow leverages on the rich tradition of Shadow Theater to create an engaging storytelling environment to promote intergenerational learning and creativity. It builds upon a storytelling tradition that is very popular among all generations in Greece and directly related to intergenerational activities.

The findings from the ALPPs that used eShadow are absolutely aligned with the goals and purpose of the ALICE project. These findings confirm that digital storytelling supported by eShadow can be combined with many of the creative languages that the ALICE project targets.

Further activities, beyond the lifetime of the ALICE project, are already underway: Within the context of the Open Discovery Space project (http://www.opendiscoveryspace.eu/) local schools use eShadow to develop educational stories in mathematics that could be used as teaching resources. eShadow is also used within the context of local safer internet contests where students are invited to develop their own stories addressing internet safety. Finally, a pilot study in selected pre-primary schools has started on October 2013 with the aim to explore innovative ways to address multiliteracies in kindergarten.

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