

Pinocchio 2.0: A recording methodology for vertical educational robotics experiences

Linda Giannini [1], Emanuele Micheli [2], Carlo Nati [3] Fiorella Operto [2], Fausto Ferreira [4]

[1] Teacher - ambassador eTwinning, Latina, Italy
calip@mbox.panservice.it

[2] School of Robotics, Genoa, Italy
micheli@scuoladirobotica.it
operto@scuoladirobotica.it

[3] teacher, working group for development of Scientific and Tecnological, Latina, Italy
carlo.nati@istruzione.it

[4] CNR-IEIIT, Genoa, Italy
fausto.ferreira@ieiit.cnr.it

Abstract. In Europe, Educational robotics is gaining popularity. However, at least to our knowledge, none of these interesting projects had the benefit of: a) a well designed recording methodology; b) a well designed dissemination strategy; d) a steady continuity. Continuity is the key word. In the last five years, School of Robotics in cooperation with a network of several Italian schools, from kindergarten to upper-schools and to university enabled thousands of students to learn in an innovative way through educational robotics (ER). Through these years, we have witnessed – and contributed to – a considerable number of successful educational experiences. In this paper, authors outline the different tools on hand in the Web 2.0 employed by the Pinocchio 2.0, along with the methodology of continuity devised for the development of new projects.

Keywords:

Educational robotics, educational continuity, Web 2.0.

Introduction

In the last five years, School of Robotics, in cooperation with a network of several Italian schools, from kindergarten education to upper-schools and to university enabled thousands of students to learn in an innovative way through educational robotics (ER). Through these years, we have witnessed – and contributed to – a considerable number of successful educational experiences.

Some years ago, a network of Italian teachers and educational experts has uploaded records from all these different educational robotics experiences in a newly developed Content Management System called Pinocchio 2.0. Pinocchio is a fictional character that first appeared in 1881, in *The Adventures of Pinocchio* by Carlo Collodi. Carved from a piece of pine by a woodcarver, he was created as a wooden puppet, but dreamt of becoming a real boy. Pinocchio is the Italian name for Pine Eye. For an Italian kid, this fictional puppet recalls the idea of the robot, that is an artificial entity mechanically animated.

Pinocchio 2.0 is a Multimedia Content Management housing and displaying of records from the Italian educational projects inspired by ER, and stores material from several subjects (language and literature, language's analysis, artistic education).

These records pertain to fables, narrations, stories, robotics projects, robotics kits design, handbooks, and many of the educational activities envisaging in some way the role of reproducible elements, and little interactive artifacts: the idea of the robot.

The project "ancestor" of Pinocchio 2.0 began some years ago and was carried out by the same (although, less numerous) network of teachers. Afterwards, with the development of the Web 2.0, teachers and students could upload their records in it: Pictures, drawings, free software, designs, multi-path stories, suggestions, songs, movies, memories, curiosities, games and links. Now, Pinocchio 2.0. takes in, along with the wooden marionette, other fictions characters that inspired several ER projects: E.T.A. Hoffman's *Coppelia*¹ (the mechanical doll that is the primadonna in a famous ballet), and some of the characters of *The*

Narnia Saga². All are common legacy of the imaginary world of Italian (and most of the world's) students, from nursery to University.

Pinocchio 2.0 files many records of students' creativity, both artistic and techno-scientific works. It aims to becoming the cradle of many new ER projects. Actually, the fantasy universe of fables and tales encompasses kids and university students – and adult too!

In fact, Pinocchio 2.0 could become one of the most creative incubators boosting the development of educational robotics activities, and new methodological paths. In this sense, the value of continuity is fundamental to bring projects to fruition, ensuring some positive changes in the future educational methodology.

Pinocchio 2.0 works like a *fil rouge* connecting several educational projects of the school in the community. It is a kind of a *robot* that, livening up thanks – this time - not to ICT technologies but through children's imagination, started to teach and to be used by children as a tele-machine. In our community, Pinocchio embodies every subject and/or object that is designed and shared by many community's partner – be it shared in vivo or via any telecommunication media.

Pinocchio Community's partner are:

- Children
- Teens
- Teachers
- Parents
- Experts

These partners act as *Geppetto* (in the novel, Geppetto is Pinocchio' foster parent), because they design and implement, alone or in a team-work, an idea, an artistic artifact, a story, a video-clip, a robot. Pinocchio 2.0 is a project gathering partner from kindergarten to college: a Vertical program in technology, art and design, and communication.

The first, key Pinocchio 2.0' aim is the assessment of learning rising from the educational use of one of more collaborative *environment/s*, the real ones and the digital. Besides the more traditional intervention, Pinocchio 2.0 made us of some educational paths mediated by ICT technologies.

These tools accounted for:

- Students' needs for expressing and communicating;
- The previous project's results, in order to built on past educational experiences;
- The national Guidelines for every schooling program;
- The training and educational opportunities offered by multi-mediality;
- The cooperation with colleagues working in Italian and European schools.

The educational aims are:

- To know, mastering and juxtaposing different communication level, personal and social;
- To know, mastering and comparing communication media, at personal and social level.

The didactic aims are:

- Data collection, processing and interpreting;
- Representing situation, issues and proposing solutions;
- Developing intentional and creative communication skills;
- Tell the paths' results to outside observers.
- Interrelation and behavioral aims are:
 - Understanding the meaning of belonging to a virtual community;
 - Developing the ability of team-working, especially the one at local and at virtual level;
 - Promoting multi-media didactic, and the use of different languages and codes;
 - By way of the use of multi-media, promoting knowledge, socialization, and the development of logical and operational abilities
 - Redefine the key patterns of the literacy process on the basis of the new requirements of technological evolution;
 - Overcoming the fragmented knowledge, accepting complexity;

- Casting down the geographical gates through electronic data transmission.

There working levels are:

- Getting in touch, relating and reciprocal exchange, and collaboration among adults;
- Getting in touch, relating and reciprocal exchange, and collaboration between adults and students;
- Getting in touch, relating and reciprocal exchange, and collaboration among students.

This whole process, through:

- Face leaning (when possible, in the same school);
- Asynchronous learning (mediated by ICT technologies and by on-line recording)

Pinocchio 2.0 is a project housing several other projects whose common denominator is the fantastic and scientific literature (fables, stories, narration, designs) produced by boys and girls and inspired by their ongoing activities on educational robotics. Narrating coincides with sharing, which in turn means finding tools suitable not only to any students' age class, but also to each context. Each tool has its own pros and cons.

Through these years, a large number of Italian students have worked on representing and narrating "robotics" stories while engaged in ER projects. This double-use opened up a path where educational robotics not only works as end but as mean to stimulate in young people the habit of learning and sharing. For teachers and students, the knowledge and the communication are values that conjugate only when are located in a continuous process.

From 2005, when School of Robotics began a steady collaboration with 23 Italian schools, the status of educational robotics in Italy has changed, gaining an official accreditation at several private and public (like the Italian Ministry of Education) institutions. Also at European level, we were witnessing that, in several European Nations, ER gained popularity: however, at least to our knowledge, none of these interesting projects had the benefit of:

- a) a well designed recording methodology;
- b) a well designed dissemination strategy;
- c) a steady continuity.

Often it happens that those are considered Pilot projects, operating only in very specific social environments. Continuity should be the true key world, from now on.

Pinocchio 2.0's main features are:

Continuity with previous projects, uninterrupted cooperation with partners of macro/micro paths;

Flexibility: every partner can intervene according her/his teaching style and learning pace;

Opening to the external world: Besides our Rumenian partner, whom we knew already, all the other eTwinning partners subscribed in August and September, 2010, and more are going to come;

Activities: face meeting, e-mails, chat, forum Robot@Scuola, mailing-list, and other ways of synchronous/asynchronous communication, all these media are building bridges and networks. Social network, wiki, blog, podcast, YouTube video-clips are some of the tools where imagination and creativity match with technoscience and robotics, through songs, clips, recalls, games, links, statics and dynamics images, pictures, drawings, free software, "diverging stories" and much more.

In this paper, authors outline the different tools on hand in the Web 2.0 employed by the Pinocchio 2.0, along with the methodology of continuity devised for the development of new projects.

Sharing tools

To maintain the needed educational continuity, an ER project should be vertical, which means that it has to inspire and influence the whole schooling period. To sustain this continuance, the projects housed by Pinocchio 2.0 are focusing on an uninterrupted sharing of the projects' records loaded and available through the Web 2.0.

*eTwinning*³ space showed to be little useful for sharing material, because Project's partners are preferring to keep more direct contacts, via e-mail. However, it was useful to the project's dissemination feeding the grow of partners' number.

*Facebook*⁴: There, the members group Pinocchio 2.0 gathers up to 475 members which, every day, add in it records and documents related to the ER projects (videos, drawings, and updates of their projects); allow to external people to find records and material useful for educational processes. We wrote the "Cooperation Call" forwarded last Summer in several languages – eight. Today, October 28, 2010, Pinocchio2.0 members are 315. Pinocchio 2.0 is posted in eTwinning <http://www.facebook.com/group.php?gid=6157989057&ref=mf>

*Skype and Messenger chat*⁵: Some schools that joined Pinocchio 2.0 are using Skype and Messenger video conference on a weekly basis, to share ideas and project's results with other colleagues. Also School of Robotics holds Skype conference with many Italian classes, enabling teachers and students (from nursery on) to follow the development of some robotics prototypes in our laboratory. Through these meetings, teachers and students feel that they take part in a broad group of people.



The five-years girl from Latina is talking to Emanuele Micheli (School of Robotics), via chat.

The Blog⁶: The blog of the project is Rob&ide, and houses the news coming from the member schools and from people (roboticists, teachers, educational experts).

The blog allows the collaboration between different schools and partners located all over Italy.

The School of Robotics and the Robot@Scuola schoolnetwork;

- Hospital Schools;
- eTwinning Schools
- Parents
- Students, from kindergarten to college

Online drawings⁷: through some online software like the ones loaded in <http://www.descrittiva.it/calip/O102/lavagna.htm> students can cooperate in common drawings, even if they are not in the same location nor in the same school. This is a mean to enable very young kids (3-4-5 years old) to get close to technology in a collaborative and non-invasive way.

[video 01] Here Daria, Valeria, and Eleonora [5 years old] are drawing on Emanuele's pc using the shared on-line blackboard. In the meantime, their mates, in the same class room, are playing with other on line games and with more traditional ones [video 02]. Then, all the kids are interviewing one another, and sing.

The image contains two screenshots from a video player. The left screenshot shows three young girls sitting at a desk with a computer. One girl is pointing at the screen. The right screenshot shows a group of children sitting around a table, looking at something on the table. Both screenshots have a video player interface at the bottom with a progress bar and control buttons.



Here some occasions for creative and co-constructed: from patch to machine. 3-4-5 years old kids help each other and self-organize the space around them, choosing their games, and retracing in their own way Pinocchio's tale and that of their own life.



Disegni on line con Sketchcast

<http://blog.edidablog.it/blogs//index.php?blog=275&m=20101016>

Active worlds⁸

Active Worlds can be defined a system of tri-dimensional virtual worlds (Italian, Spanish, Russian, English, and American worlds) where some people have the responsibility that all the activities are carried out correctly; these supervisors are called Public Speakers, and are recognized by bold writing. Worlds can be traveled by users in the form of "AVATARS".

Avatars are characters divided in categories, such as: men, women, animals, objects, and each user can choose the one he/she prefers. These characters have a nickname that can be chosen at the program start, and have the peculiarity of being animated. Avatars can walk, run, fly, dance, fall, etc. Due to this fact, we can say that the worlds of the chat mentioned above are "active".

The users of active worlds can be citizen or tourists. Tourists can only access a part of the options of the chat system and do not have all the privileges: they cannot send telegrams, create a contact list of friends and join them wherever they are, modify the avatar and create buildings....

All these privileges can be obtained paying a yearly subscription fee, in this way becoming citizens. Our experience has been carried out in this context.

For years [since 1997] the students interact in 3D and chat between the avatars who can choose no Pinocchio. So child / children have the opportunity of meeting in active worlds and to reinvent the adventures of the puppet / boy avatar

http://www.descrittiva.it/calip/1011/percorso_mondi.htm Pinocchio makes its appearance in the virtual worlds in 2002, during the relative paths to Narnia [es. log of one of the many chat http://www.descrittiva.it/calip/0203/edu_unisa.htm]



Pinocchio 2.0 nei mondi virtuali 3D



Video: both the blog Rob&ide and School of Robotics have opened up their Youtube channels for sharing information, where we load up also videos recorded by the teachers during their lessons.

Letters: it is not disdained the traditional method of using letters to share opinions and impressions related to robotics.

From Web 2.0 to educational continuity

All these methodological paths, started in several different ways through the years, are updated and enriched by the shared news loaded on the Web 2.0.

Many hypothetical ideas are becoming reality in these common space, as a manifold learning environment: sharing means meetings in presence, emails, chat, the forum Robot@Scuola, mailing-list and other media synchronous/asynchronous that constitute bridges and networks. Social networks, wikis, blogs, podcasts or Youtube are some of the areas where fantasy and creativity links up to science, ICT and robotics. Moreover: suggestions, songs, movies, memories, curiosities, games, informative links, virtual images, photos, drawings, free software, multipath stories and many other materials can be added. Anyone can participate by joining the Facebook group of Pinocchio 2.0 or through the blog Rob&ide. The project is tuned on the spirit of the Web 2.0; the Internet is used "to do", but specially "to do together". Students link up to Pinocchio 2.0. not only to check out for information, or to witness about their work, not only to simply exchange information: every member involved finds the way to "do together", to share and co-design. "Because the resources (..) are inside us, in our own powers and will of collaborating, of being present, of living." (P. Beneventi) Thanks to the Web 2.0 the students feel involved in a broad project regardless of their scholastic grade, schools and teachers. The confidence in the continuity and steadiness of the records' storage allows student to participate with a greater commitment and passion to the achievements, step by step, knowing that a path will be traced and kept, thanks to their study and dedication. The projects housed by Pinocchio 2.0 offer the chance of trespassing the school's borders, the grade, and the teachers, acquiring a different reality through the online documentation.

Sharing elements

The documentation is constantly shared online through:

Edidablog - Web-X Blog:

Rob&Ide <http://blog.edidablog.it/blogs/index.php?blog=275>

Round-up post scholastic year 2009/10

<http://www.descrittiva.it/calip/1011/ArchivioROBeIDE2009-2010.pdf>

- Round-up post scholastic year 2010/11

<http://www.descrittiva.it/calip/1011/ArchivioROBeIDE2010-2011.pdf>

Facebook

<http://www.facebook.com/group.php?gid=139204519436108&ref=mf>

School of Robotics official website

<http://www.scuoladirobotica.eu/>

eTwinning portal

<http://www.etwinning.net/>

as well as through seminars, workshops, conferences and training courses.

Examples of educational continuity. Some case studies

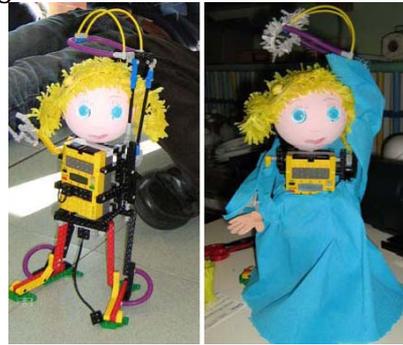
In Italy, we could list several examples of classes operating the continuity between different schooling grades. The collaborations among classes make the students feel to be part of an overall organic and organized project. Some cases from the experiences coordinated by School of Robotics:

Middle-school class tutoring kids of a primary class

In the "Istituto Comprensivo di Gambolò", "Istituto comprensivo don Milani di Latina" (it is a school compound where classes from nursery to middle school are located, and centrally managed), Art School in Latina since 2003-2004 teachers employ robotics as educational tool. Four years ago, however, teachers introduced a vertical methodology, involving students of different ages. There, nursery kindergarten kids meet periodically students of older grades to design together new robots. These, in turn, were used to start new activities among kids: narration, artifacts, drawings inspired to fables (Pinocchio or Coppelia).

At the same time, middle-school students and those of the art school design, program, and operate robots, which successively the nursery kid dress up like fables' characters.

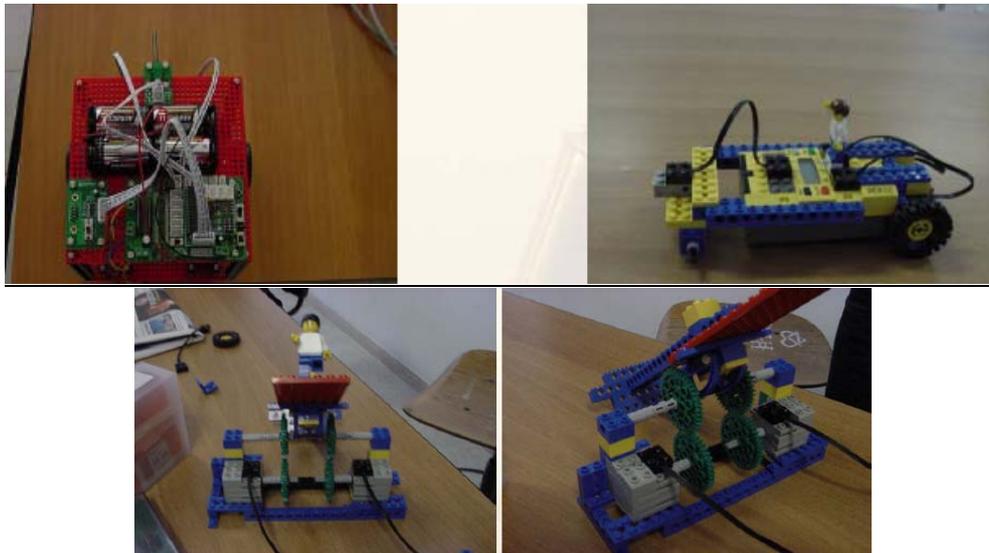
The youngest kids (4-5 years old) dream about extraordinary robots, able to perform strange movements and actions. The older students, who serve as kid's tutors, have to carefully take into account the "requirements" of the little ones, and assess on the basis of their one knowledge, the real robot's design.



Coppelia, istituto comprensivo di Gambolo'



Coppelia, Istituto comprensivo don Milani di Latina
<http://www.descrittiva.it/calip/0708/coppelia-post.pdf>



Liceo artistico di Latina [prof. Carlo Nati]:
 dal disegno geometrico, la progettazione intuitiva di un ponte robotizzato
<http://www.descrittiva.it/calip/0708/robocupULTIMO.pdf>

A very important educational step occurs during the meeting between the tutor students and kids, in which the robot's design is presented, along with the accounts holding for the spread between the kids' requirements and the real design. Here, the tutor students (middle school e liceo artistico) explain to the younger ones how they tried to adhere to the latest's design, working from their hypothesis to the real robot's development.

Therefore, students of different ages develop important social and interpersonal skills, along with a strong sense of reality and honest thinking. All together, kids and middle-school students try to understand each other, working on the same project, which is going to be presented as a common enterprise.

Schools in Hospital

Schools in Hospital [Savona's, the Genoa Giannina Gaslini, and Milan Niguarda] share our paths through the same blog. Documents made by the students (inside and outside of the hospital wards) are shared. The students, therefore, like many "Geppetto" create artifacts similar to those you can see in the post-October <http://blog.edidablog.it/blogs//index.php?blog=275&m=201010>

The sharing takes place through postal parcels as one for Slovakia <http://blog.edidablog.it/blogs//index.php?blog=275&m=20101008>

Upper-school students tutoring a middle school's class

At Udine "Istituto Superiore Bearzi" we are carrying on an ER project training teachers and students of different types of school. There, students' training concerns both designing and programming of robotics kits (adopting the interdisciplinary methodology), and also a course of tutoring their younger student colleagues (middle class). In fact, the following project's phase concern this tutoring course.

Middle-class student tutoring a primary school's class

At Lucca on the "Istituto Da Vinci Chelini" the students organize an event in which schools from different age levels collaborate to create a Robotics event with interest for all the city. In this way, it is possible to bring out remarkable collaborations among students of different ages that exchange ideas and projects, achievements and future perspectives. In this case, robotics assumes an important orientation role to the younger students.

University's students tutoring all the other

Thanks to the recent collaboration between School of Robotics and the Professor and students of the university course "Design and Robotics" at the Faculty of Architecture (University of Genoa, Italy), some students of Design are working on children's robotics products. The project's aim is, starting from children's creativity, developing new product design, graphic design, communication design and design in robotics engineering.

Conclusions

The CMS called Pinocchio 2.0 houses the records from many Italian project of Educational Robotics. It promotes information exchange and collaboration among students of different grades and levels, enabling students to be part of a broad group of experiences.

This brings us to the known philosophy of the Open Source; Sharing on the web, sharing the web itself, along the concept of the word Ubuntu "I am if we are".

This concept of learning not as a single individual but as a community of practice offer to students a mean to tackle in a better way the study difficulties and to manifest more easily their multiple intelligences.

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¹ Coppelia, anno 2007 – alcuni riferimenti sitografici relativi al progetto: <http://www.descrittiva.it/calip/0708/coppelia-post.pdf>

<http://www.descrittiva.it/calip/0708/video/coppelia-carnevale.wmv>

<http://www.descrittiva.it/calip/0708/coppelia-robot/coppelia-robot.html>

² Narnia, anni 2002-2004 – alcuni riferimenti sitografici relativi al progetto <http://www.descrittiva.it/calip/0203/narnia.htm>

http://www.descrittiva.it/calip/0203/narnia_aw.htm

<http://www.descrittiva.it/calip/0304/narnia.htm>

http://www.descrittiva.it/calip/0304/percorso_mondi.htm

³ *eTwinning è il gemellaggio elettronico tra scuole europee, un nuovo strumento per creare partenariati pedagogici innovativi grazie all'applicazione delle Tecnologie dell'Informazione e della Comunicazione (TIC). Questo il sito ufficiale*

<http://etwinning.indire.it/> Il progetto Pinocchio 2.0 ha ricevuto il 27/10/2010 il quality label nazionale

http://www.descrittiva.it/calip/1011/etw_qualitylabel_244_it.pdf

⁴ Pinocchio 2.0 su Facebook <http://www.facebook.com/group.php?gid=139204519436108&ref=mf>

⁵ Skype and Messenger – alcuni riferimenti sitografici relative al progetto:

<http://www.descrittiva.it/calip/0910/video/barcawedolatina01.mov>

<http://www.descrittiva.it/calip/0910/video/barcawedolatina2010-02-19at14-37.mov>

<http://www.descrittiva.it/calip/0910/video/barcawedolatina2010-02-19at15-02.mov>

⁶ Blog Rob&Ide del progetto Pinocchio 2.0 <http://blog.edidablog.it/blogs/index.php?blog=275>

⁷ Lavagne on line come – alcuni riferimenti alla documentazione on line

<http://blog.edidablog.it/blogs//index.php?blog=275&m=20101016>

⁸ Real Children Learn in Virtual Worlds http://www.descrittiva.it/calip/Bambini_reali_mondi_virtuali_Giannini.PDF