Guest Editorial: Innovative Technologies for the Seamless Integration of Formal and Informal Learning

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As multiple devices with advanced computing and networking capacities are now prevailing in our lives, teachers and researchers are seeking for new types of learning methods trying to integrate formal, informal and non-formal learning. These approaches provide the opportunity to expose everybody to learning occasions in a number of environments - tangible or virtual - where we can take advantage of these new technologies.

Looking at the wide set of new learning opportunities from the point of view of the professionals, the speed of change and the increased demand of flexibility in being able to build knowledge and to adapt themselves to new forms of collaboration and work, the capability of successfully exploiting the increasing variety and accessibility of learning occasions and resources, becomes a crucial issue.

Along with this, there is the ever growing interest in the use of social media and applications in order to realise bottom-up, participative alternatives to the traditional teaching/learning approach.

These are the promises of the use of innovative technologies for innovating learning/teaching approaches. But every promise involves some kind of risk. Mixing virtual and real environments could hamper the creativity of the children. The excessive availability of web resources could engender the syndrome of “lost in cyber space” in the learners, young and adults. To introduce a new technology in a formal setting could result without sense for the target users if social aspects are not properly considered.

All this is the basis of the growing attention for rethinking the current view of e-learning, as far as the educational models and the corresponding technical solutions are concerned. This special issue focuses on surveying some current research activities in such a multifaceted scenario.

We are sad for missing before its launch our colleague Paola Forcheri, unfortunately killed by a cruel illness, who proposed the theme of the issue.

24 papers were submitted to this Special Issue, each characterised by a specific mix of pedagogical approaches, technologies taken into consideration, learning/teaching objectives and by the personal views of the Authors about terms like integration, innovation, formal and informal. It is interesting to note the distribution of the papers per Country: we had 3 papers from Malaysia, 1 from Turkey, 2 from Nigeria, 2 from Taiwan, 1 from Greece, 2 from Brazil, 2 from USA, 1 from United Arab Emirates, 2 from Algeria, 2 from Kuwait, 1 from Jordan and 6 from Italy. We would only underline that the interest for the topic seems to be diffused all around the world.

We have to express our gratitude to the reviewers who carried out a great work (great both for the amount and for the quality) in doing their twofold double blind review, that resulted in 10 papers accepted.

We attempted to clusterize the 10 papers that actually compose this special issue according to different keys (technologies, objectives, pedagogical issue, and case studies vs. design or vision papers) and finally we decided to group them according to the target users, because of the null subjectivity of this classification.

The reader will find first the 5 papers addressing technologies for schools (Pereira et all., Di Blas and Paolini, Nury Kara et all., Ardito et all., Hayashi and Baranauskas), then the 3 papers considering young people (Al Nashad and Gunn, Then-Chi Huang and Chia-Chen Chen, Dettori and Torsani) and finally the 2 papers dealing with adult users (Manganello et all, Chaoui and Laskri)
In the first paper “Social Software and Educational Technology: Informal, Formal and Technical Values”, Roberto Pereira, Maria Cecilia C. Baranauskas e Sergio Roberto P. Da Silva focus on peoples’ values issue to inform the design of social software. The value issue is suggested to enforce the usual technical issue like privacy, reputation, and identity. Social software is meant as a technology usable to bridge the gap between informal and formal learning, i.e. to promote social interaction in learning contexts. Grounding their arguments on Organizational Semiotics and the Building Blocks of Culture, they suggest considering 28 values within the Value Pie.

In the second paper “Beyond the School’s Boundaries: PoliCultura, a Large-Scale Digital Storytelling Initiative”, Nicoletta Di Blas and Paolo Paolini discuss the effect of technologies in supporting students and teachers to go beyond the school boundaries, both in space and time, with respect to their mutual interaction and to the access to the external world. They consider the case of PoliCultura, a large-scale (20,000 users) digital storytelling initiative at the borders between formal and informal education, in which students and teachers collaboratively create a multimedia story. In order to accomplish this task, they interview experts, visit local institutions, involve their families and the community at large, cooperate through social media with remote peers, working at school as well as from home. Their analysis is aimed to provide evidence that, in doing so, students not only get engaged but they achieve substantial educational benefits.

The third paper “Investigating the Activities of Children toward a Smart Storytelling Toy”, by Nuri Kara, Cansu Cigdem Aydın, and Kursat Cagiltay, presents StoryTech, a smart storytelling toy that features a virtual space, including computer-based graphics and characters, and a real space, where the pupils have plush toys, background cards, and a communication interface. The paper also provides information on the attributes, design, and development process of StoryTech. When children put real objects on the receiver panel, the computer program shows proper backgrounds and characters on the screen and encourages children to produce their own stories. The results of an empirical research involving 90 children are given to indicate that StoryTech contributed to narrative activities of children and had a positive impact on their creativity.

By the fourth paper, “Integrating traditional learning and games on large displays: an experimental study”, by Carmelo. Ardito, Rosa Lanzilotti, Maria Francesca Costabile and Giuseppe Desolda, we are driven to analyse the effects of a new educational format, inspired by the Discovery Learning technique, which integrates educational games, designed to be played on large multi-touch displays, with other types of formal and informal learning. The format comprehends 1) attending the lesson(s) in the classroom (symbolic representation), 2) acting in a real context (active representation), and 3) interacting with the multi-touch display to manipulate images (iconic representation). Six classes of a primary school were involved in the study. The results showed that the proposed educational format was effective, in particular with respect to the inclusion. Games on these novel multi-touch systems engage pupils very much, stimulate their collaboration and help consolidating knowledge.

In the fifth paper “Affectibility in Educational Technologies: a Socio-Technical Perspective for Design”, by Elaine C. S. Hayashi and Maria Cecilia C. Baranauskas, a large-scale experience of introduction of the XO educational laptop at an elementary public school in the city of Campinas, in São Paulo, Brazil, involving more than 500 people is presented. The research was conducted to address questions such as: How could a new technology be introduced in schools in a way that it makes sense to the users? Could it contribute to more integrated learning scenarios? Particular attention was given to new perspectives on understanding learning practices mediated by technology and to the role of the concept of ‘Affectibility’ in the design of educational systems.

Data were collected from participatory Workshops, informal interviews and pictographic questionnaire. The results suggest that it is possible to combine school’s formal and informal practices into meaningful learning. The activities helped teachers and students realize that the use of technology can be recreated, influenced by their own feelings, values and culture.

The following three papers refer to high school and university students.

“Lecture Capture in Engineering Classes: Bridging Gaps and Enhancing Learning” by Hasan Al Nashash and Cindy Gunn explores the use of lecture capture and webcasting in Engineering classes to promote formal and informal learning of the students by providing them with the opportunity to enhance autonomously their understanding of the course content. The study was conducted from the point of view of the students. They were asked to provide feedback on what they perceive the benefits and the drawbacks of lecture capture to be. It appears that the students consider lecture capture an effective tool to help them succeed in the course. The videos available at every time
allowed students to bridge the gap between what they have understood in the formal class setting and what they are able to better understand after reviewing the videos in a relaxed environment. In addition, most of the students indicated that the availability of the videos did not encourage them to skip or miss any classes. The main drawback was associated with technical difficulties which resulted in some wasted time.

The paper “Animating Civic Education: Developing a Knowledge Navigation System using Blogging and Topic Map Technology”, by Tien-Chi Huang, Chia-Chen Chen, presents an attempt to integrate educational blog articles and to use the wealth of information inherent in the development of a blogging system with knowledge navigation demand for both formal and informal learning in civic education in high schools. In the system, Topic Maps (TM) technology was implemented to represent informal learning content in a formal curriculum structure. The study proposes the use of Semantic Web to assist in Knowledge navigation as a seamless model for teachers and system developers to represent informal learning content that adheres to the formal knowledge structure. Analysis on the field indicates that students approved the effectiveness of combining the blogging system and individual Topic Maps (iTM) function. In other words, the system derived from the design framework helps students learn citizenship courses in an innovative manner.

Giuliana Dettori and Simone Torsani with the paper “Enriching Formal Language Learning with an Informal Social Component”, provide an insight on the use of data mining and social bookmarking to build up an easy-to-use tool for enhancing formal language learning with an informal component. This is able to help the learners reach relevant Internet pages they can freely use to complement their learning activity. Thanks to this facility, each lesson is enriched, at run time, with a number of links automatically retrieved from social bookmarking sites. The learners also have at disposal a micro-evaluation system allowing them to share within the environment their like or dislike of the visited web sites, giving their fellow learners indirect guidance for fruitful web exploitation. The analysis of the retrieved bookmarks for different kinds of learning contents showed that suitable links were actually retrieved by this facility. Moreover, a pilot experimentation revealed that students actually feel inclined to make use of this facility and appreciate both the proposed links and the possibility to receive advice from their peers by means of the micro-evaluation system. This suggests that the added facility actually constitutes an opportunity of informal learning suitably connected with formal one.

The last two paper deal with an adult target population.

The paper “PKS: an Ontology-based Learning Construct for Lifelong Learners”, by Flavio Manganello, Carla Falsetti, Luca Spalazzi, and Tommaso Leo, addresses adult lifelong learners, i.e. persons interested in learning or compelled to learn during their working life but not able to, or not interested in participating in formal learning. These learners are considered motivated and self-aware enough to self-direct their learning, are presumed to be novices with respect to the needed knowledge and have a limited technological uptake. In the paper their main differences from regular learners, in particular, for the use of social media to improve learning skills, are outlined. Andragogy is assumed as the reference pedagogical model. A Service-Oriented Architecture, named Personal Knowledge Space (PKS), is proposed to support such lifelong learners in selecting, organizing, and retrieving information; in streamlining interaction processes among learners, services and resources and finally in empowering control and trust of personal relationships born during the learning processes. This way, formal and informal learning resources are collected and organized to build up significant knowledge. The PKS is mainly based on the exploitation of semantic tools (ontologies) and web services. Use cases describing the PKS architecture and one scenario of PKS use are presented.

The last paper in the issue is “Proposition and Organization of an Adaptive Learning Domain based on Fusion from the Web” by Mohammed Chaoui and Mohamed Tayeb Laskri. It addresses the objective of making easier for the teachers the recovery of web resources (informal resources) in order to build up adaptive learning resources to be offered on e-learning platforms for the purpose of formal learning. They proposed a Fusion of Web resources approach to this problem and one Artificial Intelligence based tool to organize resources to an Adaptive Learning Domain into e-learning platform. The focus was firstly on searching tools and filtering methods to extract the most relevant educational Web resources and structuring them to create courses, secondly on adaptation of extracted Web resources. The Authors outline a new process of fusion in creation and in adaptation to learner’s profiles. The process neither asks much time nor much effort from the authors to create courses. The process provides also direct way to the needed Web resources. Courses can be updated directly from the Web by reuse of the previously extracted and selected resources. The results of the tool evaluation give high performance in comparison with different methods of course's creation.