

Interfaces for children to (re)create their schoolyards - Education for Sustainable Development

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Introduction

The ongoing Decade of Education for Sustainable Development (DESD) aims at integrating principles, values and practices of sustainable development in educational approaches [Tilbury and Wortman, 2004]. Fundamental ingredients of DESD include networking and collaboration; enhanced environmental topics in teaching and learning and new educational opportunities and tools [Tilbury *et al.*, 2005]. The research presented in this paper intends to contribute for the DESD goals by creating and exploring ICT tools that engage children in collecting information to assess and monitor their school environment.

The current availability of mobile technologies allows children to become producers of multisensory geographic information [Silva *et al.*, 2009]. Multisensory information can be defined as information acquired by various human senses in embodied situated experiences [Silva *et al.*, 2008]. Multisensory geographic information refers to specific locations and explicitly links cognitive, emotional, and physical experiences. Gadgets such as mobile phones or netbooks equipped with GPS can be used by children, within meaningful learning activities, to collect and register such type of data.

Schoolyards are the school spaces more territorialised by children [Thomson, 2005] and they are also the preferred ones. Children can easily be engaged in learning activities that identify existing environmental problems and opportunities in schoolyards [Silva, 2009]. The exploration of these spaces supported by ICT tools can be a way to promote the integration of the education for sustainable development principles in the curricula.

In the research project "School (Re)creation: using ICT to develop new learnscapes in the schoolyard", children are engaged in assessing and monitoring environmental conditions of their schoolyards. Such activities involve the use of environmental quality sensor data associated with multisensory geographic information. The integration of these data makes possible to combine the affordances of quantitative and qualitative information, allowing for new ways of learning [Silva *et al.*, 2009]. ICT tools that enable the integration and visualization of the data are explored. Such tools involve the use of the virtual globes and 3D models to create virtual learnscapes and the use of QR codes to annotate physically the schoolyards and augment them with virtual information [Nold, 2009].

Children as creators of multisensory geographic information

Children easily produce multisensory information as they like different forms of expression, such as sounds, visuals and movement, and find multisensory experiences more entertaining and more engaging. Examples in the literature show that kids and teachers when create geographic

information, related to issues such as local heritage, develop a perception of belonging to a local community (Silva *et al*, 2008).

ICT contributions to support children in their task of collecting multisensory geographic information within environmental education in primary school have been studied in SchoolSenses@Internet project (Marcelino *et al*, 2007). The use of GPS enabled mobile phones and laptops, allowed children to collaboratively create meaningful environmental multimedia multisensory messages and publish them using Google Earth. A series of workshops involving children and teachers analysed the affordances of such gadgets and applications like Google Earth (GE).

The results showed that GE was considered a usable interface for children to publish their multisensory messages. It was also confirmed that the use of geographic multisensory information in environmental simulations promoted the exploration and the understanding of the simulated processes.

Interfaces for collaborative (re)creation of learnscapes

The School (Re)creation project builds on such results and intends to propose interfaces for ICT tools to allow children to create virtual representations of their world producing learnscapes. Through the use of ICT, children from elementary schools, may be able to assess their schoolyards and to produce changes in order to reduce their ecological footprint.

The design of interfaces for the collective building of learnscapes imply to investigate the following topics: (1) production of multisensory geo-referenced information together with sensors data in mobile phones and netbooks; (2) exploration of GE in mobile phones and netbooks by children; (3) creation and use of real (e.g. sensorial and sensors data) and virtual data (e.g. 3D models, drawings and sketches) as GE annotations in netbooks; (4) deployment of physical tags that annotate schoolyards (such as QR codes) and allow to collaboratively augment the information available. A library (Senses@3D library) of real and imaginary objects and SketchUp templates (background layers) support the participatory design of the real and virtual dimensions of the learnscapes.

Can these interfaces for the collective building of learnscapes contribute to expand children's perception and interaction in the physical world? Which combination of modalities results in a better understanding and intervention towards sustainable development? These are some of the research questions to be addressed within the broader topic of using children as information producers.

Conclusions

Geo-referenced multisensory data is an engaging way to motivate children and teachers in learning basic environmental concepts. The use of simulation, multimedia and geographic information tools to explore, communicate and geo-reference information acquired by the various senses – including sensations such as heat, pressure, vibration, pain, and slip – is a relevant issue to be addressed in primary school contexts.

The development of Interfaces for collaborative (re)creation of learnscapes may contribute to the assessment of the environmental quality of schoolyards and to support the creation and use of context aware tags. These physical annotations are created to improve the schools' sustainability, whilst also contributing to scaffold the learning of environmental complexity using a tangible experimentation approach.

Acknowledgements

This research was partially funded by POSC/EIA/56954/2004.

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