Introductory notes to the workshop "Teaching with robotics: didactic approaches and experiences"

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Over the last two decades interest in educational utilization of robotics at all school levels has increased. Educational robotics is introduced as a powerful, flexible teaching/learning tool stimulating learners to control the behavior of tangible models using specific programming languages (graphical and textual) and involving them actively in facing authentic problem-solving challenges.

The European project "Teacher Education on Robotics-Enhanced Constructivist Pedagogical Methods - TERECoP" (2006-2009) is being activated in the field of educational robotics with the participation of 8 European educational institutions from 6 European countries (www.terecop.eu), aiming at the development of a design and implementation framework for activities advisable mainly for secondary school education related to programmable robotic constructions and based on learning methodologies inspired from constructivism and constructionism theory.

Believing that the role of teacher is crucial for the successful introduction of robotics in classrooms, the project activities include also the training of prospective and in-service teachers on the use of robotics technologies (LegoMindstorms Education NXT) through courses implemented in each of the six participating countries, the evaluation of the training courses and the dissemination of the educational results at a European level. Finally the TERECoP project aspires to develop a community of practice between researchers, teacher trainers and teachers that will facilitate and sustain teachers' professional development in the use of robotic tools in classrooms.

In the frame of its dissemination activities, the TERECoP project organized the workshop "Teaching with robotics: didactic approaches and experiences" hosted by the SIMPAR2008 (Simulation, Modeling and Programming for Autonomous Robots) conference held in Venice, Italy, 3-6 November 2008. The papers presented in this workshop address a wide range of both theoretical and practical aspects of educational robotics.

Some critical theoretical aspects behind the educational use of robotics are discussed and analysed by Kynigos (*Black-and-white-box perspectives to distributed control and constructionism in learning with robotics*) with respect to potential of control technology to generate constructivist learning processes and to address learning domains such as science and mathematics.

Doyle (*Sketch for a Scientific Foundation for Constructionism: with a note of some difficulties*) outlines a model that offers the potential to provide a scientific foundation for the constructionist approach and also offers a possible explanation of the tenacity of the instructionist approach.

Experiences from implementation of various educational robotics activities are reported in other papers related to different school and academic levels extended from kindergarten to computer science education.

Pekarova (*Using a Programmable Toy at Preschool Age: Why and how*) examines the new dimension that Robotic toys bring to role-play activities in kindergarten.

Fiorini et al. (*It Takes a Village... to do Science Education*) describe the efforts undertaken by a small community of concerned teachers to boost science education in the school district of Verona (Italy) by promoting constructivism with the help of various configurations of robotic devices.

Frangou et al. focus on the design of robotics enhanced activities (*Representative examples of implementing educational robotics in school based on the constructivist approach*) and present six examples created for and used in the teachers' training seminars organized in the context of the TERECoP project.

De Michele et al. (*A Piedmont SchoolNet for a K-12 Mini-Robots Programming Project: Experiences in Primary Schools*) present a project originated and carried out by primary school teachers to promote Papert's constructionism in a cooperative environment setting up a model of minirobot programming experiences.

Micheli et al. (*Semantic and epistemological continuity in educational robots' programming languages*) analyse some new open-source software for the programming of educational robotic kits which can accompany the student from pre-school age to high school.

Arlegui et al. (*Robotics, Computer Science curricula and Interdisciplinary activities*) present some interesting examples on how to use robotics in order to foster learning of complex computer science concepts.

Experiences from non-formal education are reported as well including game playing educational activities (Atmatzidou et al., *The use of LEGO Mindstorms in elementary and secondary education: game as a way of triggering learning*) and national competitions in robotics in Spain (Jardón et al., *CEABOT: Nationwide Little humanoid robots competition; rules, experiences and new challenges*) and in Slovakia (Petrovic and Balogh, *Educational Robotics Initiatives in Slovakia*).

Finally, two papers deal with teacher training in educational robotics. Papanikolaou et al. (*Teachers as designers of robotics-enhanced projects: the TERECoP course in Greece*) report experiences and evaluation results from the training course organised by the TERECoP project in Greece. Karatrantou and Panagiotakopoulos (*Algorithm, Pseudo-Code and Lego Mindstorms Programming*) present a pilot study which investigated the way prospective primary school teachers handled the process of converting an algorithm - pseudo-code to a program working with the Robolab programming environment.

This workshop aspires to bring closer researchers, academic and school staff working in the field of educational robotics and to contribute to the further development of the dialogue in this field especially under the light of constructionism, not only within the TERECoP project partnership but within the broader European and international community of educational robotics. This dialogue will hopefully continue and the TERECoP partnership is willing to organise and participate in new relevant initiatives in the future.

We would like to thank the organisers of the *International Conference on Simulation, Modeling, and Programming for Autonomous Robots* (SIMPAR2008)

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The chairs

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