ACTA DIDACTICA NAPOCENSIA
Volume 3, Number 2, 2010

EDITORIAL

Zsolt Lavicza, Csaba Sárvári

This issue of Acta Didactica Napocensia contains papers originally presented at the **Second Central and Eastern European Conference on Computer Algebra and Dynamic Geometry Systems in Mathematics Education (CADGME-2009)** which took place in RISC, Linz (Castle of Hagenberg), Austria in June 2009. In common with the first CADGME conference, the second event created a forum for Central and Eastern European colleagues, and for all interested academics from around the globe, to exchange ideas and nurture collaboration.

In the first paper, which consists of four parts, **Paul Andrews** emphasizes that mathematics education researchers must acknowledge that, no matter how their work is framed, that social phenomena are located in a particular culture, which is not always visible to a reader so that it should be made explicit. In the first part, Dr Andrews examines three key models of culture and their significance for education. In the second, he further highlights the impact culture has on expectations from children by critiquing various models of curriculum. The third part examines how culture influences the particularities of four European mathematics curricula, while the fourth part explores culturally located differences in mathematics teaching. In doing so, a plea to researchers is framed: Culture permeates all aspects of educational endeavour and should be acknowledged more explicitly than it is.

The Coach software is an activity-based, open computer environment for learning and doing mathematics, science, and technology in an inquiry approach, developed in the last twenty-five years at the AMSTEL Institute at the University of Amsterdam. It offers a versatile set of integrated tools for data collection, data analysis, modelling and simulation, and for multimedia authoring of activities. In their paper, **André Heck** and **Ton Ellermeijer** present the STOLE concept that underpins the design and implementation of systems like Coach. It is an example of how members from the physics education research community converged to design tools for doing investigative work and achieved integration of tools. Special attention was paid to the mathematical requirements of such a learning environment and to computer support of various representations of one and the same phenomenon or scientific concept. They also discuss one of the most complicating factors in the implementation of an integrated learning environment for mathematics and science, namely that mathematical concepts are not always used the same in these fields. Differences between the use of variables, functions, and graphs in mathematics and physics are briefly discussed, and consequences for the design of a general-purpose learning environment are addressed.

In their article **Maxim Hendriks, Cezary Kaliszyk, Femke van Raamsdonk** and **Freek Wiedijk** describe the system ProofWeb developed for teaching logic to undergraduate computer science students. The system is based on the higher order proof assistant Coq, and is made available to students through an interactive web interface. Part of this system is a large database of logic problems. This database will also contain solutions for students. The system makes the full power of Coq available to the students, but simultaneously presents logic problems in a way that is customary to undergraduate logic courses. Both styles of presenting natural deduction proofs (Gentzen-style `tree view' and Fitch-style `box view') are supported.

In many countries, mathematics is among the least popular school subjects. Educators invest considerable time searching for methods that could change this unfortunate situation. **Jozef Hvorecký** a lecturer at a School of Management discusses the issue as a managerial problem. First, the popularity of mathematics is analyzed as a marketing problem. Marketing theories recommend increasing the market choice as a way of attracting more customers. His first goal is therefore to expand the variety of problems offered for students. To do so, he considers Knowledge Management concepts to demonstrate an imbalance between tacit and explicit knowledge in traditional courses. Currently used educational

Published: 1 June 2010.

methodologies favour the latter one. Examples of the approaches that might increase learners' tacit knowledge are his second goal.

In their article **Ulrich Kortenkamp** and **Christian Dohrmann** describe long-standing user interface issues with Dynamic Geometry Software and common approaches to address them. They describe first prototypes of multi-touch-capable DGS. They also give some hints on the educational benefits of proper user interface design.

In their article **Jürgen Richter-Gebert** and **Ulrich Kortenkamp** demonstrate how the combination of a system for dynamic geometry with a freely programmable scripting environment can be advantageously used in teaching and research. They explain the reasons behind various design decisions made while designing the language *CindyScript* and give examples of how easy and understandable code can be used in mathematics education. The interactive geometry software Cinderella offers an easy-to-use programming interface. It can be used to implement application specific feedback by the author of learning units.

In his paper **Andreas Fest** presents two exemplary learning units implementing two kinds of interactive feedback: feedback on demand and immediate feedback. The presented units come from discrete mathematics and from the theory of line reflections and congruencies in geometry. The units are implemented in a process-oriented design. Various directly given or hidden hints help the students to understand the mathematical principles behind the given problems. This tool analyses student's solution processes automatically and generates additional feedback on demand. The second learning environment can also be used in conjunction with recording user actions. This allows additional feedback given later by the teacher whenever the automatic feedback system fails in analyzing the users' learning processes.

In his paper, **Mazen Shahin** presents the methodology and pedagogy of Elementary Mathematical Modeling as a one-semester course in the liberal arts college. He focuses on elementary models in finance and business. The main mathematical tools in this course are difference equations and matrix algebra. They also integrate computer technology and cooperative learning into this inquiry-based learning course where students work in small groups on carefully designed activities and utilize available software to support problem solving and understanding of real life situations. He emphasizes the use of graphical and numerical techniques, rather than theoretical techniques, to investigate and analyze the behaviour of the solutions of the difference equations.

In their paper **Gerry Stahl**, **Murat Perit Çakir, Stephen Weimar, Baba Kofi Weusijana** and **Jimmy Xiantong Ou** write about the Virtual Math Teams (VMT) Project. The Math Forum is an online resource centre for pre-algebra, algebra, geometry and pre-calculus. Its Virtual Math Teams (VMT) service provides an integrated web-based environment for small teams of people to discuss maths and to work collaboratively on maths problems or explore interesting mathematical micro-worlds together. The VMT Project studies the online maths discourse that takes place during sessions of virtual maths teams working on open-ended problem-solving tasks. In particular, it investigates methods of group cognition that are employed by teams in this setting. The VMT environment currently integrates social networking, synchronous text chat, a shared whiteboard for drawing, web browsers and an asynchronous wiki for exchanging findings within the larger community. A simple version of MathML is supported in the whiteboard, chat and wiki for displaying mathematical expressions. The VMT Project is currently integrating the dynamic mathematics application, GeoGebra, into its collaboration environment.

Authors

Zsolt Lavicza is an Associate Lecturer at the Faculty of Education, University of Cambridge. His primary research interests involve the integration of technologies into mathematics teaching and quantitative research methods. He is co-founder of the CADGME conference series with Csaba Sárvári.

Csaba Sárvári is an Associate Professor, Department of Mathematics, Pollack Mihály Faculty of Engineering, University of Pécs (Hungary). His main research interests are Computer Algebra Systems (CAS) in mathematics education and number theory. He has written many papers and organised conferences on CAS in mathematics teaching. He is co-founder of the CADGME conference series with Zsolt Lavicza.