



WCCE 2013

10th IFIP World Conference on Computers in Education
Toruń, Poland; July 1-7, 2013



learning
while we are connected

Volume 3: Book of abstracts
Editors: Nicholas Reynolds
Mary Webb
Maciej M. Sysło
Valentina Dagienė

Toruń 2013

Strona redakcyjna (editorial/publisher page)

Table of Contents

Editor's preface

Welcome from the International Program Committee

Invited presentations

Siemens, G. , Learning in Social and Technological Networks	1
Resnick, M. , Mother's Day, Warrior Cats, and Digital Fluency: Stories from the Scratch Community	2
Cargill, M., Sanchez, D.M. , The Flipped High School	9
Duch, W. , Brains and Education: Towards Neurocognitive Phenomics	12

Sponsors' presentations

Rizvi, S. , The Incomplete Guide to Delivering Education Outcomes	25
Davis, J. , The Technology of Mobile Learning	27

Abstracts

Changing pedagogy	1
Emerging tools for education	40
Digital pedagogy	87
Developing computational thinking	98
Attracting students to study science	116
Re-engineering teacher education	145
Cooperative learning environments	170
Researching ICT in education	189
Learning through games and simulation	236
e-inclusion and e-participation	253
Virtual schooling	278
Restructuring education systems	282
Late abstracts	313
Practical workshops	316
Author Index	320

Editor's preface

This volume presents abstracts of all papers accepted for publication for

10th World Conference on Computers in Education

learning while we are connected

Each paper has been assigned a 2 or 3 letter acronym that indicates the type of presentation. These are: PNL – panel, FRP – full research paper, FPP – full practice paper, WS – workshop, WG – working group, PO – poster, DC – doctoral consortium, SP – short paper, SYM – symposium, PWS – practical workshop, SS – speed sharing.

The papers are arranged thematically and cover the 12 conference themes:

1. **Changing pedagogy:** formative assessment, teacher role, student role, e-assessment, shared pedagogy, e-pedagogy
2. **Emerging tools for education:** wiki, blog, social networking, micro-blog, Web 2.0, Web 3.0, mobile technologies
3. **Digital pedagogy:** collaborative, adaptive, personalised, AI, learner centred, e-participation
4. **Developing computational thinking:** learning programming, programming environments, visualisation of algorithms, modelling, simulation, informatics/computing curricula, understanding computing, taxonomy of computing
5. **Attracting students to study sciences:** interactive learning, collaborative investigations, team work, virtual laboratories, online experiments
6. **Re-engineering teacher education:** new teacher roles, professional development, pre-service education, peer learning, practices research
7. **Cooperative learning communities:** online, social networking
8. **Researching ICT in education:** new research approaches, new methods, innovative strategies, new models, complex systems, inquiry learning
9. **Learning through games and simulation:** online gaming, contests, competitions, serious games, science simulations
10. **e-inclusion and e-participation:** special educational needs, gender issues
11. **Virtual schooling:** learning objects, distance learning, curriculum integration, mentoring, evaluation issues, teacher collaboration, PLE, lifelong learning
12. **Restructuring education systems, management of Complexity:** policy, e-safety, re-structuring classrooms, learning spaces, change theories

Within these twelve themes we can see a very wide representation of all manners of research and practice that constitute our dynamic and challenging discipline.

The term 'discipline' is used here very deliberately. It will be argued in this conference (there is no doubt) that the conference is not about the discipline of computers in education or even that such a discipline exists. That this volume actually represents the many varied disciplines of maths, science, language, history, geography, and so on. That it represents life-long learning, access and equity, game playing, robotics, 21st Century skills, programming, and just about any facet of our human educational existence. The abstracts contained herein further support these arguments.

In this case, however, the term 'discipline' refers to the body of knowledge and practice that constitutes the ways in which we think about, articulate, interact, research, educate and learn; everything we do with computers.

This conference is the World Conference on Computers in Education while there has been some apparent movement away from the term 'computer', (often replaced with talk about tools such as tablets, smartphones, netbooks and IWBs, or with terms such as ICT, Digital Technologies and so on) the computer in its many forms has probably more impact in our daily lives and learning than ever before.

Learning While We Are Connected is our conference name. The abstracts presented here represent the teaching, thinking, research, and practice of people from all over the world. The act of bringing these people together in academic and professional collaboration and collegiality will hopefully create new connections and strengthen those that already exist.

Each abstract has undergone a peer review process that involved review by at least two reviewers. Full papers (presented in full in separate volumes) were subjected to a blind peer review process. I wish to thank all reviewers for their commitment to the academic process, without them we would not have a conference at all.

I would like to give special thanks to the editorial team for their very hard work in putting this and the other conference volumes together. In particular I recognize the work of Mary Webb, Maciej M. Sysło, Valentina Dagienė and Mary Reynolds.

A note about language

The English language is rich, complex and dynamic. Considering that more people speak English as an additional language than those who speak it as their first language, it is little wonder that the variations, nuances, syntax and structure varies significantly across nations. This is an international conference; its strength is its capacity to be truly representative and inclusive. The International Program Committee and the Editorial team made a decision about language that we believe enabled the rich and varied, and truly international flavour, of these proceedings: Our decision was about substance over style and content over presentation.

In these volumes one might find a turn of phrase or a sentence structure that might not fit with some rules of grammar. We make no apology for that. Meaning is made and research and practice are shared. This is what is important. No standards were lowered in the review process but no individual was barred from these proceedings because of perceived inadequacies in their use of a foreign language. Of this we are proud.

Nicholas Reynolds
Editor

International Program Committee and Editorial Review Board

Valentina Dagienė, Chair,
Vilnius University, Lithuania

Maciej M. Sysło, Co-Chair
Nicolaus Copernicus University, Toruń, Poland

Márta Turcsányi-Szabó, Vice-Chair
Eötvös Loránd University, Budapest, Hungary

Sindre Røsvik, Vice-Chair
Education Director, Municipality of Giske, Norway

Nicholas Reynolds, Editor in Chief, Publications Chair
Melbourne Graduate School of Education, The University of Melbourne, Australia

Mary Webb, Co-Editor
King's College, London, Great Britain

Ana Amelia Carvalho
University of Coimbra, Portugal

Leslie Conery
ISTE, Eugene, USA

Bernard Cornu
Open and Distance Learning Institute, Poitiers, France

Raymond Morel
IFIP, UNESCO, Switzerland

Arthur Tatnall
Victoria University, Melbourne, Australia

Local Organizing Committee

Maciej M. Sysło, UMK, Toruń – chair

Anna Beata Kwiatkowska, UMK, Toruń – co-chair

Maria Berndt-Schreiber, UMK, Toruń

Michał Dudkiewicz, UMK, Toruń

Anna Grabowska, Gdańsk

Barbara Kędzierska, Kraków

Andrzej Polewczyński, UMK, Toruń

Krzysztof Skowronek, UMK, Toruń

These volumes edited by

Nicholas Reynolds, Mary Webb, Valentina Dagienė and Maciej M. Sysło

Welcome from IPC

Welcome to

10th World Conference on Computers in Education learning while we are connected

organized under the auspices of Bronisław Komorowski, the President of Poland, and hosted by the historic Nicolaus Copernicus University of Toruń (Poland).

This 10th WCCE brings this IFIP conference once more back to Europe after the last conferences that were held in Africa and South America:

- 1st WCCE 1970 – Amsterdam, Netherlands
- 2nd WCCE 1975 – Marseille, France
- 3rd WCCE 1981 – Lausanne, Switzerland
- 4th WCCE 1985 – Norfolk, USA
- 5th WCCE 1990 – Sydney, Australia
- 6th WCCE 1995 – Birmingham, UK
- 7th WCCE 2001 – Copenhagen, Denmark
- 8th WCCE 2005 – Cape Town, Africa
- 9th WCCE 2009 – Bento Gonçalves, Brazil

IFIP was founded in 1960, under the auspices of UNESCO, and is an umbrella organization for societies working for information processing, ICT or digital technologies as it would have been labelled today. The aim is twofold: to support ICT developments within the member countries and to encourage international cooperation and research. It is a non-profit organization run by its more than 2500 volunteer members.

IFIP's mission is: *“to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.”* The flagship event is WCCE held every 4th year but as important are the open conferences and working conferences organized every year in different countries. Presentations and reports from the events are published in books and journals as well as online.

IFIP strives to focus on hot and relevant topics of contemporary education and “learning while we are connected” continues this tradition. The title embraces new ways of learning and future possibilities enabled by Internet technologies and mobile solutions across formal and informal settings. It includes ways of enhancing traditional learning as well as virtual schools and e-universities that remove barriers of time and place.

Nevertheless, meeting face to face is important for providing unique opportunities for networking and socializing beyond what digital networks can offer. IFIP facilitates lasting personal and professional networks by offering participation in Working Groups relevant to different interests and specializations. Participants of WCCE 2013 will experience much more than a scene for presentation as there will be

a variety of sessions to enable everyone to contribute including workshops, professional groups and tutorials. And during the breaks: discussions and networking including coffee or tea. The concept of *learning while we are connected* emphasizes that your participation makes a difference both to yourself and others – if you are connected.

We are confident that WCCE 2013 will represent some kind of turning point for anyone ready for it. The conference will enlighten and explore different perspectives of the different themes, covering all levels of formal education as well as informal learning arenas, societal aspects and challenges that are faced by all countries. By being connected with mobile devices during the conference extra value is added for you and your fellow participants. And last but not least, increase benefits by starting out prepared on the 1 July – get a head start by planning your participation by reflecting on the questions you want to ask or find answers to. Plan the workshops or professional groups you will join by noting some points you will raise and you will make each session a real educational meeting place.

Valentina Dagienė, Chair
Maciej M. Sysło, Co-Chair
Márta Turcsányi-Szabó, Vice-Chair
Sindre Røsvik, Vice-Chair
For IPC of WCCE

We acknowledge the significant contribution made by the following people and organisations:

Nicolas Copernicus University (UMK w Toruniu)
Faculty of Mathematics and Computer Science (WMiI, UMK w Toruniu)
Polish Information Processing Society (PTI)
International Federation for Information Processing (IFIP)

Our Partners:

The Ministry of Science and Higher Education (MNiSzW)
The Marshal of the Kujawsko-Pomorskie Voivodeship
President of Toruń

Our Platinum Sponsor: Pearson
Our Gold Sponsors: Intel, Microsoft
Our Silver Sponsor: NASK
Our Sponsor: GWO

Without their support this conference would not have been possible.

Thank you to all.

Valentina Dagienė, IPC
Maciej M. Sysło, IPC & LOC
Anna Beata Kwiatkowska, LOC