IFIP Working Conference
Addressing educational challenges: the role of ICT

Book of Abstracts

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Conference organisers

The conference has been organised by the International Federation of Information Processing (IFIP) Working Groups (WG) 3.1, 3.3, 3.5 & 3.8.

IFIP Working Groups provide researchers and educationalists with an international forum where ideas, practical educational experiences, research and policy can be presented and discussed. Through this, educationalists can develop appropriate pedagogy, effective learning environments and teacher education programmes.

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The Kenya Government’s effort to enable teachers to use ICTs in teaching and learning

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Abstract
The uptake of Information Communication Technologies (ICTs) by teachers is now a subject that many researchers are pondering on. Teachers have been identified as the principal drivers in the integration of ICTs in teaching and learning. However, literature identifies several factors that have been pointed out as either encouraging or discouraging teachers from successfully using ICTs in their teaching. As to whether or not these factors are relevant in the Kenyan context as the government hastens to equip schools with ICTs, is the salient question that lingers on in this paper.

In this paper therefore the effort that the Kenya government has made to equip schools with ICTs has been mentioned. Most importantly the paper pays close attention to the factors that were most effective in enabling and encouraging the uptake of ICT by teachers. It also briefly makes mention of the barriers that discourage this uptake of ICTs by teachers while carefully weaving in the discussion the reactions and observations from various teachers about ICTs in teaching and learning.

Keywords
ICT, Kenya, integration, enabling factors, ICT Champion.

Biography
Enos Kiforo Ang’ondi is a high school teacher, District ICT Champion, and part-time lecturer at Mt Kenya and St Paul's Universities as well as a Professional Development Teacher affiliated to The Aga Khan University Institute for Educational Development, Eastern Africa. As a Professional Development Teacher Enos has worked on many teacher training programmes sponsored by the Aga Khan University and Aga Khan Academy Mombasa.
Position paper: programming can deepen understanding across disciplines

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Abstract
Computer programs can be used to support learning in various subjects: In particular, computer simulations can be used to explain science subjects such as Physics, Chemistry, and Biology (as well as wider subject areas such as Economics, Geography and Music). Educational simulation programs are often used as a black-box: Students are given the program to play with and are told about the principles underlying the simulation, but they are given no opportunity to relate the computer program to the knowledge being taught. The subject of Computing, in contrast to ICT, enables students to read, understand and modify program code and algorithms. These skills can be used, in conjunction with open-source simulations, to allow students to directly read and understand (and potentially modify) the key parts of the simulation programs that they are using. We believe that this use of programming skills can allow for a deeper and more direct understanding of the subjects under investigation, using Computing to support learning in the same way that Mathematics supports the learning of subjects such as Physics.

Keywords
Greenfoot, simulation, education, programming

Biographies

Neil Brown is a Research Associate in the Computing Education Research Group, in the School of Computing at the University of Kent. He works on the Greenfoot project as one of the lead developers, and is a working member of the Computing At School (CAS) group.

Michael Kölling is a Professor of Computer Science in the Computing Education Research Group, in the School of Computing at the University of Kent. He is responsible for the creation of the popular BlueJ and Greenfoot learner’s development environments, and is a Distinguished Member of the ACM and a working member of the CAS group.
Communities of inquiry: developing digital literacies in teachers and students

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Abstract

Teachers’ and students’ classroom work is increasingly described as knowledge work conducted in a rapidly changing globalised, digital world. To enable teachers to effectively support students in the shifting contexts created by constantly emerging new technologies, teacher professional learning has gained prominence as a priority area in education (Yates, 2007).

Within the gaze of this spotlight, recent research into teacher professional learning has found that teachers who undertake professional development activities do not necessarily change their practice, however positive their learning experience (Parliament of Victoria Education and Training Committee, 2009). In order to support contemporary teachers’ work, professional learning needs to be more strongly grounded in the contexts and identities of teachers, while engaging them in theoretical discourse concerning the nexus between new technologies and their pedagogical content areas.

This paper reports on research into teacher and student learning of digital literacies within the context of an innovative project undertaken by a university and an educational authority. The professional learning project was designed to enable practising teachers to engage their students with digital literacies. The project seeks to offer innovative, differentiated professional learning by combining the concept of a collaborative learning community with structures of distributed leadership and processes of inquiry learning. Through participation in the project teachers have the additional opportunity of studying Masters of Education units aligned with the project.

The mixed methods research explored teacher and student learning through online surveys which sought both qualitative and quantitative data. Case studies were also collected through teacher interviews, student focus groups, classroom and teaching team observations and collection of classroom artefacts including planning documents and work samples. This paper focuses on one of the case study school teams and their efforts to develop their students’ capacities to critically read multimodal texts.

Initial findings indicate that teacher agency, knowledge creation and commitment to sustained pedagogical change were fostered through inter- and intra-school communities of inquiry. Purposeful development of digital tools, within the context of teacher inquiry, collaboration and distributed leadership, led to increased and discerning use of these tools by teachers. As a result students had greater school-based access to digital tools and teachers and students worked collaboratively to develop their digital literacies.

Keywords

Digital literacies, teacher learning, communities of inquiry
Biography

Anne Cloonan is Disciplinary Coordinator of Language and Literacy Education at Deakin University, Australia. Anne’s research explores teacher and student learning as they intersect with emerging technologies and language and literacy education. Recent project partners include State and Catholic Education Departments and the Organisation for Economic Development and Cooperation.
A professional development programme to support ICT-enhanced interactive teaching in Zambia

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Abstract
The OER4schools project devised and evaluated a programme of school-based continuing professional development (CPD) in low-resourced primary schools in Zambia. The project introduced portable computing technologies (netbooks, tablets, projectors and calculators), digital Open Educational Resources and support for interactive forms of pedagogy for mathematics and science teaching. The programme was conducted in partnership with Zambian institutions and adapted for the particular cultural context of sub-Saharan Africa, where large classes, poorly qualified teachers and rote learning methods are typically found. It was created to meet the needs of teachers for support in engaging students more actively and collaboratively in the learning process and in exploiting the potential of ICTs to assist that process.

Participants included four ICT-literate teachers who had taken part in our earlier studies; they taught Grades 3 and 7 in a peri-urban, community school and a rural, government school. Both schools were poorly resourced and served under-privileged communities. The process of implementing and evaluating the programme of school-based CPD comprised three stages: (1) remote communication between teachers and researchers, focused on curriculum requirements and associated lesson plans; (2) an intensive field work period involving lesson observation and video recording, interviews, a cycle of joint lesson planning and reflection including sourcing digital resources; (3) a further visit for professional filming of interactive lessons, with the ultimate aim of creating a multimedia professional learning resource.

The study elicited a set of guiding principles for CPD in this and similar contexts. These included giving teachers ample opportunities to reflect upon and discuss their own lessons and to pinpoint areas for development before making suggestions; providing a lesson plan template; full support of the head teacher; creating a safe and respectful environment where new strategies could be trialled. Facilitating and constraining organisational, physical and pedagogical factors were identified, including taking a participatory approach at all levels. The findings have implications for school teachers and leaders, teacher educators and policymakers, and they are embodied in the evolving multimedia professional learning resource for in-service and pre-service teacher education.

Keywords
Teacher education, new pedagogies, strategies to engage learners
Biographies

Andrew C Cross is currently a research assistant at Microsoft Research Labs India in the Technology for Emerging Markets group. He received his MPhil from the University of Cambridge in Engineering for Sustainable Development where his dissertation was on interactive lesson planning and teacher professional development in Zambian primary schools using ICT.

Sara Hennessy is a Senior Lecturer in Teacher Development and Pedagogical Innovation in the Faculty of Education at University of Cambridge, and a member of the Centre for Commonwealth Education there. Her work investigates the role of ICT in enhancing teaching and learning in African schools and teacher education.

Bjoern Hassler is a Senior Research Associate in the Centre for Commonwealth Education and Faculty of Education at University of Cambridge. He is interested in the interplay between of Open Educational Resources, ICT and pedagogy. He is leading the "ORBIT" project, that seeks to produce an Open Resource Bank on Interactive Teaching for teacher education and development, focusing on ICT use in mathematics and science education.
Implementing a serious vocabulary game for primary school underachievers

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**Abstract**
This paper describes the use and evaluation of the serious game Word Score, a serious game designed to increase the vocabulary of pupils in upper primary school in the Netherlands. Word Score was used during a national project called Educational Time Extension, in which class time is extended outside school hours with the aim of increasing learning results of under-performing pupils. The study showed that the use of Word Score can be used effectively during Educational Time Extension. The vocabulary of the pupils who played the game significantly increased. The experiences of both pupils and teachers were very positive. The pupils liked to play Word Score and the teachers were very enthusiastic about the game and the results of the pupils.

**Keywords**
Serious games, vocabulary education, primary education, underachievement
Biographies

**Petra Fisser** is Assistant Professor in the Department of Curriculum Design and Educational Innovation, University of Twente, University of Twente, Enschede, The Netherlands. Her research focuses on supporting schools and teachers during the implementation and integration of ICT in education, and in Technological Pedagogical Content Knowledge.

**Joke Voogt** is Associate Professor in the Department of Curriculum Design and Educational Innovation, University of Twente, Enschede, The Netherlands. She is editor of the International Handbook of Information Technology in Primary and Secondary Education (2008). Her research focuses on professional learning of teachers on ICT integration and the integration of ICT in the curriculum.

**Mila Bom** is a Master Student at the University of Twente’s Educational Science and Technology Master Program. She specializes in Curriculum, Instruction and Media Applications.
A student’s learning e-portfolio in study of ICT subjects at technical secondary schools

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Abstract
The paper presents a case study carried out with a group of Czech technical secondary school students (age 17-18) the aim of which was to study if it is practicable and appropriate to implement student’s e-portfolio based on the Mahara system into their school work, how the students can apply it in their teamwork projects, if a student’s e-portfolio can be benefit for his/her school work and self-evaluation and in which ways students deal with his/her e-portfolio at home in preparation for school. The case study was focused on feedback and reflection integration into a student’s e-portfolio and on students’ understanding of assessment and reflection.

Keywords
E-portfolio, assessment, learning, reflection, Mahara

Biographies
Viktor Fuglík graduated from the faculty of Education at Charles University in Prague in the study programme of Pedagogy and Technical and Information Education. He works for the Department of Information Technology and Technical Education at the Faculty of Education. His research activities including his PhD. thesis is focused on e-portfolio as a progressive and effective tool for assessment and learning.

Miroslava Černochová graduated from the Faculty of Mathematics and Physics at Charles University in Prague. She now works in the Faculty of Education where she is responsible for courses focused on ICT applications in teaching and Learning. In 2003-2006 she was invited as an expert to be a member of the Czech Ministry of Education consultative body for the realisation of the Governmental Information Policy in Education (GIPE).
Global perspectives on information and communications technology and educational assessment

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Abstract
A global discussion about the role of ICT in educational assessment was initiated with the publication of the International Handbook of Information Technology in Primary and Secondary Education (Voogt & Knezek, 2008). The discussion has continued in subsequent international EDUsummIT conferences organized by the handbook’s authors, with support from publishers, and international technology leadership and research organizations, including UNESCO (Voogt & Knezek, 2011).

A consensus has emerged in these meetings regarding the importance of the role of ICT for assessment: assessment exists in a complex dynamic relationship with curriculum, pedagogy, and the needs and demands of the world outside of schools (Webb and Jones 2011 (in preparation))(Forkosh-Baruch, Gibson, Schulz-Zander, & Webb, 2009). Furthermore, the role of ICT in the future of learning and assessment will impact dramatically on both the formal and informal settings where skills such as collaboration, creativity, critical thinking, and communication are acquired and required (USDOE, 2010). In order to measure the complex, higher order outcomes empowered by technology enriched learning experiences, there is a need for alternative assessment approaches and instruments that surpass the limitations of current assessment systems and approaches and are designed on new understandings of the impact of ICT on learning, assessment and society at large (Voogt & Knezek, 2011).

Here we will present three overarching issues relating to the role of ICT in assessment: 1) the nature of assessment, by which we mean the essential qualities or characteristics by which assessment is recognized, 2) the effects of technological advances on both learning and assessment processes, and 3) what should be assessed, which will include the epistemological challenges of gathering evidence of a broad range of knowledge and thinking based on a learner’s actions and products created in digital learning environments or otherwise enhanced by ICT learning experiences.

Keywords
Assessment, computerised assessments, personalisation, formative assessment
Biographies

Mary Webb is Senior Lecturer in Information Technology in Education at King’s College London and Chair of IP Working Group 3.3 on Research into educational applications of information technologies. Her current research interests include pedagogy with information technology, professional development of teachers in the use of ICT, use of computer-mediated-communication for Teacher Education and formative assessment. She is co-author of ICT Inside the Black Box.

David Gibson is a researcher, learning scientist and technology innovator. His research focuses on complex systems, the future of learning, and using technology to personalize. He created simSchool, a classroom flight simulator for preparing educators, and eFolio an online performance-based assessment system.

Alona Forkosh-Baruch is senior lecture at Levinsky College of Education as well as a researcher and lecturer at Tel-Aviv University, Israel. She is also Head of ICT at Levinsky College of Education and Coordinator of Heads of ICT Forum at MOFET Institute. Her current research interests focus on ICT in teacher training, innovative ICT practices in education, social networks in educational contexts and teaching-learning-assessment in the information age.
Professional learning session model for high impact technology integration in a developing country’s district

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Abstract
The vision of the Kenyan Nation has demanded technology integration in teaching and learning. The education structure such as resources, student population and the examination system has offered challenges to the current professional model. The interaction with school leaders through a leadership and management courses has identified a potential of creating awareness for the school leader with the hope that as supervisors they would offer assistance to the teachers.

A pilot session was done with 80% of schools in the district. 15 schools were sampled and taken through the modelled Professional Learning Sessions (PLS) to explore their responses to the structure as well as identify ways of customizing the model for high impact. Through individual and focus interviews, artefact analysis and observation, data was collected and analysed.

The model realized was that of inclusion for all stakeholders, long term with contextualized content and follow-up which included observation and action planning.

Keywords
Professional learning, technology integration, models

Biography
Anthony Gioko is a Programmes Coordinator at the Professional Development Centre Aga Khan Academy, Mombasa. Gioko has interests in Educational Technology, Educational Leadership and Management, Teacher Leadership, Education for Sustainable Development and Science Teaching. He is a Doctoral Student on Management with a specialization in Project Management.
Innovative technologies for an engaging classroom (iTEC): evaluation findings from the first cycle of piloting across 17 European countries

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Abstract

Innovative Technologies for an Engaging Classroom (iTEC) is a 4-year pan-European FP7-funded project. The project is developing innovative educational scenarios and technological tools for supporting teaching and learning. These are being piloted, over 5 cycles, in secondary schools (and a few primary schools) in more than 1000 classrooms from 17 different countries. By adopting user-centred design processes, working closely with teachers and 15 Ministries of Education, iTEC seeks to identify educational scenarios, technological tools and learning activities that have the potential to be mainstreamed across Europe. In Cycle 1 (September 2011 – January 2012) participating teachers were offered a choice of two educational scenarios. The first involved using technology to collect data outside the classroom and then analysing it. The second involved holding a video-conference with an outside expert and conducting follow-up correspondence. This paper presents findings in relation to benefits, enablers and barriers to pedagogical and technical innovation illustrated by case study vignettes, taking into account cultural differences across the participating countries. The number of countries, schools and teachers involved in iTEC is significant. With the changing socio-technical landscape such as the growth in use of social media tools there is still much to be gleaned from research of this nature.

Keywords
Pan-European, innovative technologies, scenario piloting, pedagogical innovation

Biography

Maureen Haldane is Senior Learning and Teaching Fellow at the Institute of Education, Manchester Metropolitan University and is a research-active practitioner concerned with supporting innovation and good practice in the use of technology to enhance learning and teaching. Within the EU funded iTEC Project, she is joint leader of the evaluation of the pan-European piloting of innovative educational scenarios.

Cathy Lewin is a Senior Research Fellow and Director of the CREATE research group. Her research interests concern young people and ICT, in relation to both formal and informal learning. She has conducted research for Becta, DCSF, ESRC and European Schoolnet including Gridclub, ImpaCT2, ICT TestBed, and the Primary Schools Whiteboard Expansion Project. She is currently co-leading the evaluation work package of iTEC, a high profile FP7-funded European research project.
Towards inclusive pedagogy with ICT

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Abstract
ICT pedagogy is arguably still a work in progress. This applies equally to ICT pedagogy in relation to learners who may be marginalised or excluded or otherwise positioned as ‘hard-to-reach’. Within the field of inclusive education, there has been a turn from specialist pedagogies for particular categories of special educational need or disability; towards developing inclusive pedagogies that enable teachers to engage with all learners. Within research on ICT in education, there has arguably been a ‘social turn’ towards critical perspectives on context and on learning as socially situated. These developments point to a need for greater collaboration and cross-fertilisation between these slightly disparate fields. It is argued that there is a need for further studies of inclusive pedagogy which incorporate a focus on ICT.

Keywords
Social inclusion, new pedagogies, strategies to engage learners.

Biography
Peter Hick is Senior Lecturer in Inclusive Education at the Institute of Education, Manchester Metropolitan University. He is Programme Leader for MA (Inclusive Education & SEN); and Co-Leader of the Centre for Social Justice in the City at the Education and Social Research Institute. He has been involved in a number of research projects on inclusive education and ICT.
ICT in education, does it work? ICT action school development at the Helen Parkhurst Dalton School

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Abstract
ICT in education promises breath-taking perspectives for a new way of teaching and learning, for equipping learners with the so called 21st century skills and for making education more efficient and more effective. In three papers (Hogenbirk & Braak, 2008; Hogenbirk & Braak, 2009; Hogenbirk & Braak, 2011) a description is given of an action plan for the improvement of ICT usage at the Helen Parkhurst Dalton School for secondary education. This is a school for secondary education that belongs to a board for primary and secondary education. There are some 2000 students in the school. The school's philosophy is based on the Dalton Educational System, consisting of three principles:

1. responsibility and accountability for the learning,
2. independence and (self)reflection,
3. relationship and collaboration.

At the start of the action period in 2007 the way in which ICT was used in education was assessed in a review performed by a group of European inspectors. The review was based on a framework consisting of 8 themes and 20 indicators (Oel, undated). This assessment formed the basis for a continuous development in the school for promoting and improving the usage of ICT. This was done by addressing the observed weaknesses with special measures and formulating yearly action plans for next steps to be taken.

Four main points were addressed with critical remarks: (1) the coherence in the ICT policy; (2) the use of ICT in teaching; (3) the measurement of gains in learner achievement through ICT and (4) new ICT developments.

In 2009 an intermediate evaluation was made and a new vision of school development was developed. In this vision there was considerable emphasis on extending the role of ICT. Concrete plans for the future were made. During 2011 and 2012 the implementation of the new vision has proceeded at full speed. In this presentation I will try to assess the full impact of this for teachers and learners, including the quality of the teaching and learning process. I will do this by comparing the assessment made in 2007 with a self-evaluation, based on the same framework, which has been made this year (2012).

In the presentation I will describe the challenges and difficulties that affect an innovation of this scale. This innovation has changed the way in which teachers teach and the way in which students learn. Can we convince the world that we are on the right track? Or must we admit that traditional ways of teaching and learning are still more effective?
Biography

Pieter Hogenbirk has been Rector of the Helen Parkhurst Dalton School since January 2008. He is also head of the ICT Steering Committee of the co-ordinating School Board. Before becoming Rector he spent eight years as an inspector of education with special responsibilities in the field of ICT in education. He is chair of IFIP Working Group 3.1 and has been involved in a number of Dutch, European (eTwinning) and Unesco projects.
Rising to the challenge: linking classroom learning and ICT

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Abstract
Creativity is one of many terms that have been used to try and explain connections between cognitive processes and educational applications of ICT. While not necessarily the first, Papert and many of the early users of Logo saw the possibility of engaging the minds of learners with and through the new computer technology. Technology has advanced amazingly since then, however classroom practices do not appear to have been refined or developed to the same extent. Consequently in 2012 there is still debate about whether ICT should be an integral part of mainstream classroom practice, curriculum development and teacher education.

There is a lot of software available that enables students and teachers to apply their creative thinking through various modes of multimedia in order to write stories, produce reports, and make presentations. In these types of software, students are representing ideas, facts and concepts through combinations of written and oral text, moving and still images, colour and sound. Some examples of this type of use by Australian primary school children will be presented. Although by definition language, art and technology have to be involved, the focus will be on mathematics.

Keywords
Motivation, engagement, digital literacy

Biography
Anthony [Tony] Jones is a Senior Fellow of the Graduate School of Education at the University of Melbourne, Australia. He has taught in both primary and secondary schools, and has been involved in initial teacher education and teacher development for more than three decades. He began using computers with a Year 10 Mathematics class in 1968, and has continued teaching with ICT since then.
Facebook as an informal platform to support students in learning English as a second language

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Abstract
This paper describes how a social networking site (SNS), has been used as an alternative platform by a group of English as a second language (ESL) learners to learn the language. Inspired by the “Community of Inquiry” (Garrison & Anderson, 2003) framework, a Facebook ‘group’ was created by the researcher to support the English language learning of a class of first-year Malaysian polytechnic students, outside formal class hours. The Facebook interactions (via ‘wall’ and ‘chat’) between the researcher and participants (teacher and students), classroom observations, interviews and field notes, gave some insights to the following questions:

1. How can social networking be used to engage students in learning English as a second language?
2. How can social networking be used to support students in learning the English language?

Keywords
Facebook, social networking, English as a second language (ESL)

Biography
Noreen Kamarudin is a PhD student at the Graduate School of Education, University of Bristol
The affordances of the interactive whiteboard for pedagogical orchestration

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Abstract

This paper revisits the analysis of how the interactive whiteboard (IWB) can contribute to effective pedagogy. It builds on previous work concerning the relationship between the features of IWBs and associated technologies and some key components of pedagogy, including the stage of IWB use, the role of ICT, the type of interactivity, the type of talk and the overarching aspect of orchestration for learning.

An exemplar lesson is constructed to illustrate the relationships associated with the most advanced stage of IWB use, and the analysis of this lesson is discussed. Implications are drawn concerning the need to develop skills in orchestration for learning alongside technical skills in IWB use through initial teacher education and subsequent professional learning.

Keywords
Interactive whiteboard, orchestration, affordance, teacher’s role, teacher education

Biographies

Steve Kennewell was involved in initial teacher education and ICT education research in Swansea for 21 years. He is editor of the journal Technology, Pedagogy and Education.

Gary Beauchamp is Professor of Education and Director of Research in the School of Education at Cardiff Metropolitan University.
Abstract
In this paper, we describe the design of a practical course to develop competencies in building reliable nanosystems from unreliable nano structures. Recent research on future nanosystems, built from nanodevices, arises new challenging boundary conditions, which have to be mastered by future nanosystem engineers.

We present the identified competencies of future developer of embedded micro- and nanosystems as a part of our empirically refined competence model. For this, a detailed normative analysis of curricula, module descriptions and current nano-system related research was taken as a basis.

The lack of appropriate teaching materials for the development of the competencies led to the initial concept presented here. Instead of focusing on the manufacturing processes, the required competencies of future developer which result from nano scaled structures are taken into account.

The initial conceptual design of the new practical course will be stated more precisely in the next research step. Therefore, every educational unit of the course will
be checked for its relation to the competencies of the empirically refined competence structure model.

In this way, we will identify possible required improvements. Furthermore, each experiment will be tested empirically by video recordings documenting possible learning difficulties.

**Keywords**
Nanoelectronics, fault tolerance, redundancy, systems engineering education, competence development

**Biographies**

**Bruno Kleinert** received his diploma in informatics (2010) from the University of Erlangen-Nuremberg, Germany. Since December 2010 he is employed as a research assistant at the University of Erlangen-Nürnberg. He focuses on research in the field of computer architecture, concentrating on dependable nanosystems built of unreliable nanodevices.

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**Dietmar Fey** is Chair of Computer Architecture at the University of Erlangen-Nuremberg, Germany. His research interests are in the areas of parallel embedded processor architectures, heterogeneous parallel architectures, Cluster and Grid computing, and nanocomputing. Prof. Fey is a member of the GI.

Since 2005 **André Schäfer** has worked as a research assistant at the Institute of Microsystems Technology at the University of Siegen, Germany. His research focus is on computer engineering in education. His focus is on experiments and lab tasks which promote the competence development for embedded micro- and nano-systems.

**Rainer Brück** works as a Full Professor at the electrical engineering and computer science department of University of Siegen, Germany since 1998. His current research focus is in computer aided product engineering for MEMS and IC systems. Prof. Brück is a member of GI, VDE and VDI.
Steffen Jaschke received his diploma in informatics (2010) from the University Siegen, Germany. Since October 2010 he is employed as a research assistant at the University of Siegen. His main research interests include system oriented didactics as well as education methodologies for embedded systems.

Steffen Büchner received his diploma in informatics (2011) from the University Siegen, Germany. Since August 2011 he has been employed as a research assistant at the University of Siegen. He focuses on research in the field of competence oriented teaching for embedded system requirements and design.

Sigrid Schubert has taught informatics in secondary, vocational and higher education since 1979. She received her diploma in physics, her doctoral degree in informatics and has been professor of “Didactics of Informatics and E-Learning” (Universities Siegen and Dortmund, Germany) since 1998. She is a member of IFIP TC 3 Education, Lifelong Learning (WG 3.8), Higher Education (WG 3.2) and is vice-chair of Working Group 3.1 Secondary Education.
Competence descriptions for informatics education - using the example of logic programming

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Abstract
The main programming concept, which is taught in informatics lessons, is the object-oriented programming concept. The Association for Computing Machinery (ACM) Curricula for high schools recommends the object-oriented and functional programming concept. This article suggests the logic programming as an alternative secondary concept. Therefore, a competence model for logic programming was established. With respect to this a research method to formulate competencies is exemplified. By the example of logic programming in upper secondary education, different methods of describing competencies in detail are referred and analysed. Furthermore, a new approach is presented. As a research result learning outcomes for informatics views of logic programming are formulated.

Keywords
Competence model, competence descriptions, learning outcomes, logic programming, upper secondary education

Biography
Barbara Linck received her teaching degree for secondary schools in mathematics and informatics in 2008 from the University of Dresden, Germany. In 2010 she successfully completed her teacher training in a grammar school. Since September 2010 she is employed as a research assistant at the University of Siegen. Her research interest is logic programming and competencies in secondary education.
Empirical refinement of a theoretically derived competence model for informatics modelling and system comprehension

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Abstract
This paper reports on an approach used in a competence model research study within the project "Measurement Procedure for Informatics in Secondary Education (MoKoM)" funded by the German Research Foundation (DFG). The research process started with the establishment of a theoretically derived competence model through the analysis of international syllabi, curricula and expert papers. In a further step 30 expert interviews were conducted and analysed by utilising a qualitative content analysis methodology. By means of this approach significant refinements and additions were made to the theoretically derived competence model and led to an empirically refined competence model. The individual steps and the final integration of both competence models are presented. Furthermore, the procedure is illustrated by a few examples, which give an overview of the alterations on the basis of selected competences and their sub-competences.

Keywords
Competence model, theoretical and empirical competence analysis, informatics system application, informatics system comprehension, informatics modelling, secondary education

Biographies
Barbara Linck received her teaching degree for secondary schools in mathematics and informatics in 2008 from the University of Dresden, Germany. In 2010 she successfully completed her teacher training in a grammar school. Since September 2010 she is employed as a research assistant at the University of Siegen. Her research interest is logic programming and competencies in secondary education.
Johannes Magenheim is a Professor for Computer Science Education at the Institute of Computer Science at the University of Paderborn. His primary areas of research and teaching are CSE, E-Learning, CSCL. He is also member of different working groups of the German Informatics Society (GI) and member of IFIP WGs 3.1 and 3.3

Wolfgang Nelles is psychologist (Diplom-Psychologe) and his research interests concern Work- and Organizational Psychology. Since 2008 he is employed as a research assistant at the University of Paderborn.

Jonas Neugebauer received his first state exam for secondary education in computer science and mathematics from the University of Paderborn, Germany (2011). Since April 2011 he is employed as a research assistant at the Computer Science Education Group at the University of Paderborn.

Laura Ohrndorf received her diploma in informatics (2011) from the University Duisburg-Essen, Germany. Since July 2011 she is employed as a research assistant at the University of Siegen. Her main research interests concern competencies in secondary education.

Niclas Schaper is a Professor for Work and Organisational Psychology at the University of Paderborn. His primary areas of research are job analysis, occupational training, approaches of competency modeling, methods of competency measurement, E-Learning, and teaching in higher education. He is a member of the German Society of Psychology and vice president of the German Society of Teaching in Higher Education.

Sigrid Schubert has taught informatics in secondary, vocational and higher education since 1979. She received her diploma in physics, her doctoral degree in informatics and has been professor of "Didactics of Informatics and E-Learning" (Universities Siegen and Dortmund, Germany) since 1998. She is a member of IFIP TC 3 Education, Lifelong Learning (WG 3.8), Higher Education (WG 3.2) and is vice-chair of Working Group 3.1 Secondary Education.
Text mining: technology to enhance the qualification of pedagogical practice

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Abstract
This article presents how the inclusion of text mining technology in a Collective text editor (ETC) can qualify pedagogical practices. A text mining tool was integrated to a collective writing tool in a distance learning context (ETC) and possibilities for pedagogical practices were identified, based on the results extracted from the written productions. The analysis showed that it is possible to identify qualitative evidence in the texts. Based on this, educational actions are highlighted, which may qualify the pedagogical practice to meet the demands identified in the student production process and in the construction of knowledge. The intention is to create conditions to facilitate the growing demand for digital work spaces linked to distance education practices.

Keywords
Collective text editor, text mining, pedagogical practices

Biographies
Alexandra Lorandi Macedo holds a Masters in Education and PhD in Computers in Education degrees from the Federal University of Rio Grande do Sul (UFRGS), Brazil. She is currently working as a researcher at the Center of Digital Technology Applied to Education (NUTED, UFRGS), Brazil.

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Patricia Alejandra Behar received her MSc and PhD degrees in Computer Science from the Federal University of Rio Grande do Sul (UFRGS), Brazil. Dr. Behar is currently a lecturer and researcher at the Post-Graduate Program of Education and of Computers in Education, at UFRGS. She is also the coordinator of the Center of Digital Technology Applied to Education (NUTED), Brazil.
Towards a competence model for ICT and Informatics in general education at secondary level

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Abstract
Currently, the call for improving the confusing situation of Informatics Education in most countries at secondary level is getting louder. Accordingly, the development of a modern, coherent and holistic approach is necessary to balance and allocate the educational needs in this field. With the Bento Goncalvez Declaration 2009 for a new IFIP model curriculum in view, this paper deals with the difficulties, initiatives and existing approaches at the levels in the CS/Informatics frameworks. Finally, intermediary results in terms of a comprehensive competence model for Informatics education at secondary level in Austria are presented.

Keywords
Informatics, computer science, IT, ICT, curricula, competence model, framework

Biography
Peter Micheuz has been an Austrian teacher for Mathematics, Physics and Informatics since 1979 at the Alpen-Adria-Gymnasium Völkermarkt and since 2000 he has been in charge of teacher education for Informatics at the Alpen-Adria-University Klagenfurt. As a generalist and digital immigrant he publishes in the domains of Informatics education and E-Learning.
Developing software for early childhood education

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Abstract
In our paper, we present a four year research project, which we have recently realized, applying modern research strategy in the inspiring and challenging environment of an early childhood (ECE) setting. Our main research question was how to develop educational software appropriate for ECE children, while fully respecting and supporting their physical, cognitive and emotional development.

In the first part of the paper, we explain why the area of integrating ICT into ECE is so attractive and topical. We reason about the potential of these technologies to support learning, play and complex development of ECE children – if the technologies are properly selected and productively integrated into activities. In the second part, we focus on particular ICT, namely educational software for ECE children aged 5 to 6. We will explore which properties and user interface such software should have, and which skills and developmental domains it may support if correctly integrated.

In the third part, we focus on our research area and our main research goals. We specify the research strategy that we decided to apply, so called design-based research. We will treat this issue in detail, because it is relatively new and so far not well known. When dealing with various research problems concerning technology-based learning and integration of ICT into modern teaching and learning processes, it frequently offers correct and prolific instruments, gaining interesting results. In the final part, we present the main outcomes and findings that we obtained. The outcome is an educational software intervention, which we developed within the project. However, more important are the main research findings: we designed and iteratively improved and verified (a) a general framework for research in ECE setting; (b) a scheme of the design, development, implementation, and analysis of an ECE activity with ICT integrated in it; and the most of all (c) a methodology of the iterative educational software development for ECE children.

Keywords
Educational software, early childhood-education, design-based research
Biographies

Milan Moravčík has recently defended his doctoral thesis at the Department of Informatics Education, Comenius University under supervision of Ivan Kalaš. After that he became the leading educational software developer of the team recently established at the Department as an academic-private partnership. He is currently engaged in developing educational software for ECE, based on the methodology presented in this paper.

Ivan Kalaš is a professor of Informatics Education. He concentrates on developing Informatics as a subject at primary and secondary school levels. Ivan is also involved in developing educational software for students of all stages. He is heading a national initiative for developing digital literacy of the kindergarten teachers in Slovakia. Ivan is a member of the International Advisory Board of the Microsoft Partners in Learning Network and of a Governing Board of the UNESCO
Building future educational scenarios in a European context: a look at the iTEC project

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Abstract
Innovative Technologies for an Engaging Classroom (iTEC) is a €9.45 million European Commission project that has an ambitious agenda. Involving 27 European partner organisations - including 14 Ministries of Education - its aim is to develop engaging, technology-enhanced scenarios of the future classroom, pilot them across 1,000 classrooms in Europe and take them to scale. This paper investigates the context of 'innovation' in technology-enhanced learning in which the iTEC project sits and then discusses the iTEC scenario development process and outputs within that context.

Keywords
European projects, motivation, engagement strategies, international comparisons

Biographies

Alison Oldfield works as an independent researcher on the iTEC project for Futurelab and lectures at Bath Spa University on social and educational inclusion. Her professional interests focus on innovation and digital technology in learning, as well as inclusion and participation. She’s a former youth worker and teacher.

Sarah Payton is an independent researcher. In addition to working on the iTEC project for Futurelab, her current work and research interests are focused on digital literacy, inquiry-based learning, teacher professional development and informal learning outside the classroom. She is a former primary school teacher.
Teacher educators working towards networking literacy - a matter of didactics and digital content

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Abstract
A starting point of this paper is that the use, production and sharing of digital resources by teacher educators may contribute to innovative tutoring processes and thus be beneficial to the profession itself and to student teachers. By using, sharing and communicating about digital and open educational resources in their lecture design, teacher educators may develop networking literacy. The complex nature of teacher education should be taken into account. The importance of recognizing the didactic relation between the teacher educator, the student and the design of digital content is pointed out. To use and produce digital resources and preferably open educational resources (OER), sharing them and communicating about them may point teacher educators to a praxis of technology-enhanced teaching and learning, as well as new literacies. The digital repository, Share.TEC for teacher education, which was developed within a large EU-project between 2008-2011, will serve as an example and a possible scaffold for development.

Keywords
Networking literacy, digital content, didactics

Biography
Lena Olsson is senior lecturer at Department for Education at Stockholm University, earlier Director of Learning Resource Centre at Stockholm Institute of Education, Research and Development in Digital literacy, Teacher Education, active within National and European projects and networks on E-learning, Expert Evaluator for the European commission. Former University Librarian, PhD in Technology and Social Change. Member of IFIP TC 3 and National representative for Sweden.
Managing the challenge: involving future professionals into their own (life-long) learning strategy

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Abstract
Today’s social, technical and economic scenario is highly complex and subject to constant change. Education systems are finding it increasingly difficult to face the challenges they encounter in training not only future professionals, but also those already in the labour market. Computers now have a leading role in solving these problems, but there are still many issues regarding how they can engage or re-engage learners and so be effective tools for their personal and professional development. This paper describes an experiment carried out during two consecutive years with students in their last semester at University, that is, imminent life-long learners, in an attempt to involve them in Information and Communication Technology (ICT) use with a view to their future professional activity. Results show that: (a) Problem-solving based training, where the teacher acts as a guide and the students themselves discover in what way ICT can be useful for them, is an effective way to involve them; and (b) students are more interested in those ICT tools that they perceive as most related to their future professional activity.

Keywords
Life-long learners, problem-based learning, teacher as facilitators, learning strategy

Biographies
Javier Osorio, Ph D. is an Associate Professor at Las Palmas de Gran Canaria University. He has worked as organizational advisor for private and governmental bodies. His research has focused on information systems management, decision and simulation models, strategic planning and innovation in organizations.

Julia Nieves is an Assistant Professor at Las Palmas de Gran Canaria University. She has combined her teaching work with her professional activity in the financial and the audit sector. Her research focuses on knowledge strategic management and innovation in services.
Technology enhanced learning in the economic crisis: how learning technologies assist in bridging the budget gap and overcoming the crisis

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Abstract
In the last three years, the world has been hit by the most severe economic, and by extension social and political, crisis in more than half a century, with rising unemployment and social welfare under threat across the developed nations. Just like in previous recessions, these recession years might offer opportunities for technological advancements, as well as economical and societal transformations. E-learning technologies are inevitably a significant part of the future of our education and, whatever the evolution or the aftermath of the economic crisis might be, such technologies can play a significant role in counteracting the recession. This paper explores the two-way relationship between learning technologies and the economic crisis: on one hand the impact of the crisis on e-learning or technology enhanced learning (TEL); and on the other hand, the significant effect that learning technologies can have in mitigating or reversing the crisis.

Keywords
Technology enhanced learning, economic crisis

Biographies

Annette Payne is a Lecturer in the School of Information Systems, Computing and Mathematics, Brunel University, UK.

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Lampros Stergioulas is Reader in the Department of Information Systems and Computing at Brunel University, UK. A qualified chartered engineer, he has studied Informatics and Physics at the University of Athens, and received an M.Sc. and a Ph.D. in Electrical Engineering from the University of Liverpool, specializing in information engineering and communications.
New technologies are unlikely to improve learning - unless the entire world is collaborating

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Abstract
This presentation will examine some of the educational uses of technology since 2008. Educational use of technology frequently gets compared, unfavourably and unfairly, to technology use in other professions. Together we will examine significant examples of successful uses and how these collaborations are being facilitated.

Education has identified many opportunities in the latest technologies. By examining, and contrasting, some of the present educational practices, we may find that the current road ahead is an exciting one! Emerging technologies have offered e-learning enthusiasts with the potential to justifiably provide their learners with collaborative and creative classroom experiences.

Although relatively short, the history of computer education can perhaps better inform us about future opportunities and pitfalls. We will briefly consider the current expectations detailed in '21st century learning'.

The increasing use of technologies in the ‘outside’ world, as well as in the classrooms of our students, has new consequences for teachers in schools. Students and teachers can now progress their digital literacy skills inside and outside the school. The opportunities for new collaborations, local or international have flourished; and as technology enables this very easy access, both students and teachers are interacting acting beyond their classroom walls. We know that 2012’s students are being prepared for the future. But might the future already be here? In 1960, teachers were asked to link their schools to the world outside the classroom. Again, in 2006, the Cambridge Primary Review recommended schools create educational links with communities beyond school walls.

Technologies are now ubiquitous in classrooms, homes and businesses. Unlike subjects that are primarily taught in a classroom, like mathematics; people learn about new technologies daily. There are crucial implications for educators resulting from this omnipresent property.

At the conclusion of this session, we will have considered some of the consequences of this constant presence. Steadily, teachers have been progressively embedding technology into their classrooms. It may well be that teachers in 2012 are behaving differently with new technologies to how they behaved in 2008. Many teachers are actively distributing their everyday practical experiences in unprecedented ways. This presentation analyses some contributing elements that appear to be sustaining the changes to teachers’ practices.
Biography

Christine Redman is head of Science Education at the Melbourne Graduate School of Education at The University of Melbourne, Victoria, Australia. She is a senior lecturer teaching and researching in Science, Technology and Information Communication Technology. Christine is currently researching teachers' practices, and learners' interactions with iPads and Interactive Whiteboards.
Pre-service teachers perceptions of the affordances of games as a new technology

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Abstract
This study sought to understand the types of affordances that pre-service teachers perceived electronic games might offer the primary aged student. This sociological ethnographic study also investigated the personal use of a range of mobile devices. It examined the pervasive pedagogical visions held for new technologies by graduating pre-service teachers. 108 participants completed the questionnaire on exit from a full-time two-year primary Masters of Teaching (M.Teach) degree. The questionnaire was designed to ascertain the type of personal usage that was being made of new technologies. It also aimed to identify the professional expectations of these technologies and the pedagogies that might inform their classroom use. In the final semester, of the primary M.Teach degree, three new computer lab workshops had been provided to these pre-service teachers with opportunities to explore the affordances of several different technologies. This computer lab work was always preceded by a lecture. The lectures introduced the potential for classroom learning experiences using specific tools and provided a pedagogical and theoretical framework. Our research goal was to determine how closely these lectures and workshops aligned with the pre-service teachers’ personal experiences, and professional needs and interests. This paper reports on the perceptions pre-service teachers held for classroom learning opportunities with new technologies, including gaming experiences. This small study indicates that pre-service teachers recognise, and have used, technological games to contribute to their classroom teaching and learning. The opportunities for drill and practice games for mathematical skills and knowledge seemed to be particularly valued. Notably absent from their dominating perceptions of the affordances of gaming experiences was the recognition that games may offer learners experiences in problem solving situations and opportunities to utilise creative or strategic thinking approaches. Not all pre-service teachers favoured the use of classroom games. It may be a perspective created by a lack of extensive classroom teaching experience with games. It maybe that ‘games’ in the classroom are considered to be either ‘busy’ work or are seen to be ‘just fun’ and are not related to ‘real learning’. It may be that pre-service teachers lack personal experiences of learning through games and therefore are unaware of their potential value. They may benefit from opportunities to engage with the research knowledge about ways to create affordances for learning through gaming. The recommendations here include a need to provide pre-service teachers with meaningful personal learning experiences with gaming. They may find opportunities to engage with the research literature will support their understanding of the theory of play and its contribution to problem solving, creativity and strategic thinking.

Keywords
Engagement, gaming, pre-service teachers, new technologies, pedagogy
Biographies

Christine Redman is head of Science Education at the Melbourne Graduate School of Education at The University of Melbourne, Victoria, Australia. She is a senior lecturer teaching and researching in Science, Technology and Information Communication Technology. Christine is currently researching teachers’ practices, and learners' interactions with iPads and Interactive Whiteboards.

Fiona Trapani is a PhD student at the Melbourne Graduate School of Education at The University of Melbourne, Victoria, Australia. She is researching gaming theory and the types of contributions new technologies offer to effective learning experiences in diverse classroom contexts.
Building teacher ICT capacity in science education: a most significant change story

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Abstract
A project designed to support university academics’ ICT capacity in order to develop pre-service teacher ICT capacity revealed tensions between the pedagogical practices of the academic and those of her students. These tensions presented themselves most obviously when students were required to change their thinking about placing technology, and the representation of scientific thinking, into the hands of their own school students. This project is presented here as a ‘Most Significant Change’ story.

Keywords
Teacher education, science, ICT

Biographies
Nicholas Reynolds is a lecturer in ICT in Education at the University of Melbourne. He is the TTF Project Coordinator for The University

Paul Chandler is the TTF ICT Pedagogy Officer for the University of Melbourne, along with teaching in Science education programs. He has previously been a teacher and administrator in Victorian government and independent schools, specialising in Information Technology, Science and teacher’s professional development. Paul has been active in pondering issues of technology and teacher change for over 20 years.

Jacinta Duncan is the Director of the Gene Technology Access Centre and a lecturer in science education at the University of Melbourne. She has an interest in representational practice and visualisation theory for promoting engagement in authentic problem solving in the Sciences.
The role of ICT in national curricula: Focus Group discussion

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Abstract
This group will investigate/discuss the role/function of ICT in National Curricula with the aim of producing a statement about how it views ICT in education.

This focus group is open to all participants. Those wishing to make a contribution will need to register their interest with the chair before the conference and will need to be prepared for some focused discussion around the areas indicated in this proposal.

Guiding Questions
What factors relating to the curriculum framework and implementation affect students' interests and creativity in relation to computing and IT?

What approaches to ICT in the broader curriculum best serve student learning outcomes?

Biographies
Nicholas Reynolds is a lecturer in ICT in Education at the University of Melbourne. He is the TTF Project Coordinator for The University

Mary Webb is Senior Lecturer in Information Technology in Education at King’s College London and Chair of IP Working Group 3.3 on Research into educational applications of information technologies. Her current research interests include pedagogy with information technology, professional development of teachers in the use of ICT, use of computer-mediated-communication for Teacher Education and formative assessment. She is co-author of ICT Inside the Black Box.
**Clim@ction: fostering interactions with a digital epistemic game**

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**Abstract**  
This paper is an introduction to a workshop that intends to promote a collaborative work on the use of digital epistemic games. The participants will have the opportunity to discuss the impact the choice of tools and game design criteria have on epistemic interactions. We (1) advocate the consideration of digital epistemic games as learning situations adapted to new learners, (2) describe a game designed for the purposes of our research, (3) describe the methodology that we used to track epistemic interactions and (4) give an overview of the objectives of the workshop.

**Keywords**  
Serious games, digital epistemic games, epistemic interactions, game-based learning, ill-structured problems, complexity

**Biographies**  
**Eric Sanchez** is professor at the French Institute for Education (Ecole Normale Supérieure de Lyon, France), head of EducTice-S2HEP. His research work concerns the uses of Information and Communication Technology for educational purposes such as elearning, simulation, serious games

**Caroline Jouneau-Sion** is a secondary history and geography teacher. She is involved in research & development projects into the uses of ICT for secondary education in EducTice-S2HEP a team of the French Institute for Education (Ecole Normale Supérieure de Lyon, France). She is also president of e.i@b a teachers association and network which aims to imagine the future of education in the digital society.
A brief overview of the state of TEL research around the world

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Abstract
This paper explores the current state of Technology Enhanced Learning (TEL) and provides some glimpses on future developments. This paper is part of TEL-Map’s on-going work. An exploratory survey of funding calls and projects in the TEL field was carried out from institutions such as governments, ministries and research councils from around the world. In this survey are some examples which help to highlight the difficulties faced by researchers and practitioners. We then attempt to analyse some of the strategies that people use to overcome these difficulties.

Keywords
Technology enhanced learning, e-learning, ICT in education, investment in e-learning, global e-learning, e-learning research

Biography
Lampros Stergioulas is Reader in the Department of Information Systems and Computing at Brunel University, UK. A qualified chartered engineer, he has studied Informatics and Physics at the University of Athens, and received an M.Sc. and a Ph.D. in Electrical Engineering from the University of Liverpool, specializing in information engineering and communications.
Metaphorical Facebook – how can visual media help understanding of the structure of social networks

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Abstract
Metaphors are useful for explaining the structure of digital systems, since they can connect knowledge from well-known areas to new and unfamiliar domains. They are used in all sciences but especially important in informatics. The competence of understanding and creating metaphors can be considered to be a facet of computational thinking. In this paper, I describe a few classroom activities using metaphorical media (illustrations, animations) inspiring to discuss, reflect and explore the structure of social networks.

Keywords
Computer science education, computational thinking, Facebook, metaphor, structural knowledge

Biography
Michael Weigend studied Computer Science, Chemistry and Education at the University of Bochum and the University of Hagen and received a PhD in Computer Science from the University of Potsdam. He is a teacher at a secondary school in Witten, Germany and he has taught Didactics of CS at the University of Hagen for almost 20 years. He has published several books on computer programming, web development and visual modelling.
Aligning digital and social inclusion: A study of disadvantaged students and computer provision

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Greg Neal, greg.neal@vu.edu.au
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Abstract
This paper reports on a project that was initiated with disadvantaged students and their families in four Australian States. Families from low socio economic areas were eligible to participate based on their qualifying for a health care card. They were provided with a refurbished computer and broadband Internet access in their homes. The project was aimed at reducing the impact of the digital divide which discriminates between the ‘haves’ and ‘have nots’ in terms of ownership and access to information and communications technologies (ICT). We documented the ways in which the families used the computer over a period of three years and collected data in the form of surveys that were administered on two occasions (pre and post computer delivery) as well as in focus groups and phone interviews. The data showed that all families were positive about the impact of having a home based computer in their lives. They indicated that they had improved their digital skills and felt that they were now able to participate in, and feel part of, the 21st century. The project also highlights that on-going ‘training’ or support is necessary in order to provide for, and extend, the skills of participants over time. It became evident that without on-going guidance only certain types of basic skills were being acquired and practised. In order to progress with new web 2.0 technologies, families and their student aged children needed advice about how to maximise the potential of the machines capabilities to enhance their daily lives, both in and out of school contexts.

Keywords
Social inclusion, digital divide, disadvantaged students

Biographies
Nicola Yelland is a Research Professor in the School of Education at Victoria University. She has conducted a variety of studies about the use of ICT in both school and out of school contexts and written extensively in the area.

Greg Neal is a Senior Lecturer in the School of Education at Victoria University. He has continued to work with teachers and research ways in which ICT can be successfully integrated into teaching and learning contexts.
Engaging students in the later years of schooling: Three teachers case studies on teaching content and literacy using information and communication technologies

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Abstract
Literacy for a 21st century context is far more complex than reading and writing print. As society and information and communication technology (ICT) has changed, so what counts as literacy and how a person is deemed to be literate changed. Students from low socio-economic backgrounds in the later years of schooling require access to multiple literacies mediated through ICT and to teachers willing to provide opportunities for them to be taught explicitly.

This paper will focus on how three teachers in the later years of schooling (years 9-12) used technology to enhance learning and engagement of students in learning the literacies associated with their subject. They challenged the hegemony of print literacy by providing opportunities to develop students understanding, critique and creation of multimodal texts, but also supported students in achieving more effective print literacy. These teachers provided good teaching for students from low socio-economic backgrounds, engaging them in thinking, feeling and acting at high levels while simultaneously providing positive messages about their knowledge, ability, control, place and voice. Their pedagogy supported the development of cultural and social capital that will enhance their students life options.

Keyword
Strategies to engage learners, motivation and engagement, new pedagogies, secondary education, multiliteracies

Biography
Katina Zammit is Director of Academic Program (Primary) at the University of Western Sydney. Her research focuses on engagement of students in learning multiple literacies mediated through the use of ICT. She has recently been involved in a large research project Teachers for a Fair Go with colleagues at UWS and is working on a project to enhance the experience of students from refugee backgrounds at university.
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