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Guest Editorial: Technology Enhanced Quality Education for All – Outcomes from EDUsummIT 2015

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ABSTRACT
There are ample studies that demonstrate how digital technologies can be used effectively to facilitate teaching and learning in the 21st century. However, the insights gained from these studies often do not result in the uptake of technologies in educational practice (Voogt & Knezek, 2008). It is increasingly agreed upon that the implementation of digital technologies in education needs a systemic approach in which stakeholders at the micro, meso and macro levels of the education system actively interact with each other to align the needs of learners and the potential of technology with requirements of educational systems. EDUsummIT is a global knowledge building community of researchers, practitioners and policy makers working on this alignment with the aim to move education into the digital age. The EDUsummIT community meets every two years to discuss developments concerning technology and education from a systemic perspective with key stakeholders in the field. In this special issue the scholarly contributions of EDUsummIT 2015 are presented.

Keywords
EDUsummIT, Research-informed ICT integration strategies, Policy, Practice

Introduction
This special issue is the result of the fourth international EDUsummIT 2015, which was held from September 14-15, 2015 in Bangkok, Thailand. The EDUsummIT is an invitational summit focusing on the integration of Information and Communication Technology in education. Approximately 100 key stakeholders, policymakers, practitioners and researchers, from all over the world were invited and discussed challenges and research-informed and practice-based strategies to effectively implement technology into teaching and learning. EDUsummIT 2015 closely collaborated with UNESCO Bangkok to determine the central theme for the summit, “Technology Enhanced Quality Learning for All.” EDUsummIT 2015 resulted in a Call to Action and policy briefs, in addition to the articles contained in this special issue of Educational Technology and Society. For further information about EDUsummIT, see http://www.curtin.edu.au/edusummit/.

EDUsummIT emerged from the International Handbook on Information Technology in Primary and Secondary Education (Voogt & Knezek, 2008). The handbook editors realized that much of the scholarly work done during forty years of research in the field of technology in education had not found its way into policy and practice. This was the initial reason for bringing researchers, policy makers and practitioners together in an international summit on technology implementation in education, which was held in 2009 in The Hague. This first summit led to EDUsummITs in Paris (2011) (in close collaboration with UNESCO), Washington DC (2013) and Bangkok (2015). The fifth EDUsummIT is planned for September 18-19, 2017 in Borovets, Bulgaria. The EDUsummIT has been supported by international organizations such as UNESCO, the Society of Information Technology in Teacher Education, the International Society of Technology in Education, the International Federation for Information Processing (IFIP - working group named Research on Education and Applications of Information Technology), the Association of Teacher Educators, and UNESCO’s Teacher Development and Higher Education Division as well as Kennisnet (the Netherlands).

Prior to and during the summit the participants collaborated in teams of policy makers, practitioners and researchers in thematic working groups (TWGs) spanning nine themes: (1) smart partnerships; (2) advancing mobile learning in formal and informal settings; (3) professional development for policy makers, school leaders and teachers; (4) addressing gaps and promoting educational equity; (5) assessment as, for, and of learning in the 21st century; (6) creativity in a technology enhanced curriculum; (7) indicators of quality technology-enhanced teaching and learning; (8) digital citizenship and cyberwellness; (9) curriculum - advancing understanding of the roles of Computer Science /Informatics in the curriculum. Some of these themes evolved from earlier EDUsummITs, other themes were new and suggested by the local host, UNESCO Bangkok. Within each theme actual developments and issues were
discussed from system, school, classroom and student levels and their interconnections. In this special issue we present the scholarly work that resulted from EDUsummIT 2015.

Contributions to the special issue

It is increasingly agreed upon that the implementation of digital technologies in education needs a systemic approach in which stakeholders at the micro, meso and macro levels of the education system actively interact with each other to align the needs of learners and the potential of technology with requirements of educational systems. The papers in this special issue show the importance of these interactions from several perspectives. The special issue starts with a study about the EDUsummIT as a knowledge building community. This is followed by five contributions that discuss learning, curriculum and assessment in the 21st century. The subsequent five contributions elaborate upon the implementation of technology at the teacher, school and system level.

The EDUsummIT as knowledge building community

In the first paper of this the special issue Kwok-Wing Lai and colleagues discuss the EDUsummIT as a unique global knowledge building community. Data were collected from the EDUsummIT 2015 participants about the effectiveness and impact of the EDUsummIT. Based on theoretical notions about knowledge building communities (Scardamalia & Bereiter, 2003) and features of successful research practice relationships (Pieters & de Vries, 2007) the opportunities and potential threats to the EDUsummIT as a knowledge building community of researchers, practitioners and researchers were examined. This study led to recommendations strengthening the EDUsummIT and provided suggestions for the design of other internationally oriented knowledge building communities. The authors concluded that successful international knowledge building communities that aim to bring together researchers, practitioners and policy makers to solve educational problems should be designed with the following characteristics in mind: commitment to a shared goal; agency of all participants; enough opportunities for (online and face-to-face) discussions; fast disseminations of the knowledge produced; and a structure to warrant sustainability.

Learning, curriculum and assessment in the 21st century

The second paper begins from the perspective of the learners in today’s society. Khaddage, Müller and Flintoff argue that mobile learning is not so much about mobile devices but about the mobility of the learner. This implies that learners can be engaged in activities that make explicit use of the location, allowing for informal learning. A major challenge for educators in mobile learning contexts lies in bridging the gap between these informal learning experiences with the expected outcomes of formal learning as required by educational institutions. The paper starts with briefly reviewing a framework that was developed during EDUsummIT 2013, which addressed the pedagogical, technological, policy and research challenges of mobile learning (Khaddage et al., 2015) Potential solutions for these challenges are discussed. Technological developments result in mobile apps that allow for motivational design, “quiet” design and playful interfaces which make new approaches to bridging informal and formal learning settings feasible. To illustrate how mobile apps technologies can be used to connect formal and informal learning at the school level, an approach using mobile apps technologies is elaborated for the STEAM subjects.

The next three paper contributions discuss important elements of a 21st century curriculum. The contribution of Henriksen, Mishra and Fisser explores creativity as a core construct for 21st century curricula. The contributions of Fluck and colleagues and Angeli and colleagues address the role of Computer Science as a new subject in the curriculum. Based on previous research, Henriksen, Mishra and Fisser, adopt three components of creativity as a product and/or process: novel, effective and wholeness. Creativity is novel and effective when it provides useful solutions to problems (Sternberg, 2006). Wholeness refers to the esthetic component of creativity (Mishra & Koehler, 2008). It is argued that creativity is not an individual endeavor, but needs to be approached from a systems points of view: the person, the domain and the field and their interactions (Csikszentmihalyi, 1997). By making use of the affordances of technology to support teaching and learning of content domains teachers can develop a creative mindset contributing to good teaching. Recommendations for teacher education, assessment and educational policy are elaborated as means toward realizing the effective integration of creativity and technology in 21st century education.
Fluck and colleagues discuss the position of Computer Science as core subject in a 21st century curriculum. Three rationales – economic, social and cultural – for the importance of computer science in the school curriculum are offered. In addition, two dimensions help to assess the significance of Computer Science: who can benefit from learning Computer Science and for which time period. The authors propose to reconsider Computer Science as a separate subject both in primary and secondary education. Based on the position of Computer Science in the school curricula of three countries, implementation issues are discussed and recommendations given. Considerations for the design of a computer science curriculum for K-6 education with a focus on Computational Thinking and the knowledge teachers need to teach Computational Thinking for this age range are elaborated in the next paper. Based on a review of the literature of Computer Science curricula, Angeli and colleagues developed a Computational Thinking Curriculum Framework that could be used to guide the design of K-6 curricula. The authors argue that such a framework needs to be focused on solving authentic and real life problems in order to engage students in Computational Thinking and have them see relevance to daily life. The second part of this paper deals with the knowledge teachers need to teach Computational Thinking. Based on previous work on Technological Pedagogical Content Knowledge (TPCK) (Angeli & Valanides, 2009) the authors analyze the specific TPCK teachers need to teach Computer Science in K-6 (TPCKCT) and provide an example of how teachers can be prepared for this.

Spector and colleagues elaborates on the role of formative assessment in 21st century education. The authors argue that changes in assessment practice are needed in two ways. First, more emphasis needs to be put on formative assessment at the expense of summative assessment. Second, formative assessment needs to be meaningful and to address learning situations that are complex and challenging. Trends in formative assessment are discussed: (1) advanced formative feedback mechanisms that use additional information about the learner, beyond just performance; (2) formative feedback to facilitate the development of problem-based and inquiry learning; (3) ePortfolio technologies that lower the complexities and challenges usually associated with the use of ePortfolios; (4) learning environments that promote immediate formative feedback to improve motivation and engagement; (5) tools for the formative assessment of complex skills such as critical thinking and problem solving; (6) adaptive formative assessment systems that adjusts the type of content and resources a learner needs based on the interactions and performance level of the learner, and (7) providing meaningful formative feedback to large numbers of online learners (e.g., in MOOCs). Finally, the authors argue that all these developments require that teachers are supported to be able to use technology-enhanced formative assessment in an appropriate ways.

**Implementation of technology at the school and system level**

Monitoring the quality of technology-enhanced learning and teaching implementations and outcomes require new indicators according to Law and colleagues. They propose a multilevel system framework of indicators at the student, school and system level. Examples of indicators are provided. The framework emphasizes the linkages between the indicators and the interactions and interdependencies within and across the student, classroom, school and system level. The authors advocate the need for longitudinal, multilevel research designs to contribute to in-depth insights of the links between intentions, implementation and outcomes.

In the next paper by Leahy and colleagues the concept of Smart Partnerships in education is introduced. In today’s discourse “smart” in the context of education refers to the use of technology to shape teaching and learning based on the needs of the learner (Kinshuk, Chen, Cheng & Chew, 2016). Technology both creates big data and can make big data accessible to empower teachers and learners to improve education. The contribution of Spector and colleagues in this issue reflects on the possibilities of big data for formative assessment purposes. The authors argue that education can benefit from “smart” uses of technology for teaching and learning if they partner with others inside and outside the school to foster “the free sharing and exchange of knowledge and ideas to the benefit of [all] parties” (Falloon, 2015, p. 216). Smart partnerships include partners within and across education that have a shared purpose and a strategic and holistic approach, and facilitate their organizations to change. Smart partnerships aims to deploy technologies to enhance the quality of education, harness technology smartly and recognize the role of technologies in emergent processes. The assumption is that by partnering with multi-stakeholders the technological tools can develop the expertise and infrastructure needed to use technology in “smart” ways. Using a case study methodology, Charania and Davis present a study about a Smart Partnership in India. The focus is on the integration of technology to enhance the quality of educational outcomes. The Smart Partnership constitutes of a trust, non-governmental organizations (NGOs) and district and state government providers of education. The Smart Partnership of India serves more than seventeen thousand students in India, including students from remote and deprived populations.
The development and outcomes of this Smart Partnership are analyzed using the characteristics of Smart Partnerships introduced in the contribution of Leahy and colleagues in this issue.

While the previous two papers address the implementation of technology at the system level, Tondeur and colleagues take the teacher’s perspective. Because teachers are core to the adequate implementation of digital technologies in teaching and learning, this contribution focuses on the importance of teacher professional development for technology integration. Five challenges for teacher professional development are presented: (1) contextualization: sociocultural awareness; (2) sustainability and scalability of professional development; (3) empowering pedagogy through ICT; (4) technology discernment and (5) professional development that is systemic and systematic. Exemplary teacher professional development cases from Kenya, Australia, Israel and Sri Lanka that successfully coped with these challenges are described, resulting in a model for teacher professional development on technology integration through teacher inquiry learning.

In the final contribution Passey and colleagues discuss technology planning and implementation issues of NGOs and governmental organizations in developing countries. Based on an analysis of research on technology implementation in developed countries possible explanations for the many failures (and some successes) are derived. New models for technology implementation that cater to long-term and sustainable implementation of technology in developing countries are proposed.

References


