



Under what Conditions, does Technology have a Positive Effect on Teaching and Learning

Report of EDUsummit 2009

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Introduction

Joke Voogt & Gerald Knezek

‘Under which conditions does ICT have a positive effect on teaching and learning?’ This was the leading question of the International EDUsumMIT, held in The Hague, the Netherlands from June 10-12, 2009. The basis for the discussion were the scholarly findings of the International Handbook of Information Technology in Primary and Secondary Education (Voogt & Knezek, 2008), a synthesis of research in the field of information and communication technology (ICT) in education.

Seventy international policymakers, researchers, and practitioners discussed this theme and reached consensus on action points where policy, research, and leadership need to join forces in order to successfully implement ICT in educational practice. These main action points included: a) views on the role of ICT in 21st century learning; b) conditions for realizing the potential of multiple technologies to address individual needs of students; c) better understanding of the relationship between formal and informal learning; d) implications of technology for student assessment; e) the need for models for leadership and teacher learning to successfully implement technology; f) the potential of ICT for digital equity; and g) the development of a list of essential conditions to ensure benefit from ICT investments. In this report we present the Call to Action and the post summit papers of the three Thematic Working Groups that formed the basis of the Call. Each Thematic Working Group took a specific perspective in discussing the overall theme: 1. ICT in teaching and learning; 2. Leadership and 3. ICT and policy in education.

Reference

Voogt, J. & Knezek, G. (Eds.) (2008). *International Handbook of Information Technology in Primary and Secondary Education*. New York: Springer.



**International Summit on the Future of ICT in Education:
A Call to Action
The Hague, Netherlands
June 10-12, 2009**

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Preamble

The learning landscape is undergoing fundamental changes, requiring new methods and perspectives to capture the new capabilities and learning processes that have emerged because of the basic technology infrastructure and tools generally available and the augmented capabilities that learners have through the use of such tools.

The publication of the International Handbook, edited by Dr. Joke Voogt and Dr. Gerald Knezek, comes at a pivotal time for our field. Summarizing 40-50 years of research on ICT, The Handbook provides a useful summary of “what we know” about ICT and thus an ideal starting point for defining directions in the areas of policy, research and leadership.

Process

Approximately 70 leading researchers, policy makers and practitioners spanning all continents, gathered in The Hague in The Netherlands June 10-June 12 at an international conference designed to define action steps following the publication of the Handbook on ICT in Primary and Secondary Education. The Handbook, published in 2008 by Springer, provides a broad international synthesis on major research in the field.

The International Summit was organized by the Handbook editors in close collaboration with Kennisnet (The Netherlands), Becta (UK) and ISTE (USA) to provide a platform to use the comprehensive Handbook to help move the field of ICT in primary and secondary education forward.

This report is the result of a joint effort of many of the participants at the EduSummit conference. In a number of consecutive sessions, issues about how to formulate and implement an agenda for research for policy and for leadership with the ultimate aim to stimulate the use of ICT in primary and secondary education were discussed.

A Call to Action

The reports from each of the groups (research, leadership and policy) revealed some strong overlapping themes in terms of a call to action. These actions included a challenge for researchers, leaders and policy makers:

- **To establish a clear view on the role of ICT in 21st century learning and its implications for formal and informal learning**

A better understanding is needed about ICT's role in 21st century learning, especially in relation to the formal and informal settings where 21st century skills may be acquired. Policymakers, leaders and researchers need to work closely together to incorporate 21st century skills in curricula and to develop assessments of those skills.

- **To radically restructure schools to be able to use multiple technology-enhanced pedagogies to address individual needs of students**

Integrated research and development of infrastructure (mobile technologies), digital content and pedagogies are needed to better prepare schools to use technology enhanced pedagogies to benefit student learning.

- **To better understand student technology experiences in informal learning environments, in order to inform work in formal settings**

Research is needed to better understand the implications of immersion in technology-rich informal learning environments. Policy makers and leadership need to develop policies and actions on the implications of such informal learning environments for formal learning settings.

- **To develop new assessments designed to measure outcomes from technology enriched learning experiences**

In many countries ICT has become an integrated part of curricular frameworks in primary and secondary education. However, assessment frameworks are often not changed accordingly. An urgent need for alternative assessment approaches and instruments is indicated, along with an understanding of the impact of IT on assessment.

- **To develop and use distributed leadership models for technology use in schools and teacher education programs**

An ecological perspective is needed to study ICT use in classrooms, in order to help explain and influence the complex interactions and events. Such a perspective benefits from distributed leadership models supported by information and communication technology (ICT) to help engage people at different levels of the ecology to effect change that flows throughout the system.

- **To develop and use models for teacher learning on technology use in schools and classrooms at the pre- and in-service levels**

Policy needs to be developed on levels of knowledge responsibility and capacity of teachers in ICT integration. Further research and development of the TPaCK (Technological Pedagogical Content Knowledge) model is indicated in relation to the development of collaborative models for teacher learning on ICT integration, at the pre- and in-service levels.

- **To develop ideas on international opportunities relating to new and emerging technologies in order to address the needs of developing countries and promote global social awareness and responsibilities**

Students around the globe are entitled to access to technology to enhance their opportunities for learning. The sponsoring organizations commit themselves to put this concern of EDUsumMIT participants on the agenda of international organizations such as UNESCO and the EU.

- **To develop and disseminate a list of essential conditions that need to be in place to ensure benefit from technology investments**

The investments of ICT in education are often not reflected in expected benefits. Policy makers around the world can learn from the mistakes related to ICT policy in the past.

Process

- **To actively study both research on and development of ICT applications in classrooms**

Across the research community there needs to be more support for developing practitioner driven research agendas. This would help to promote the shift to community or distributed forms of leadership in education. In addition review processes need to be established that reward researchers who work with practitioners to develop implications for practitioners in all research publications, including print and on-line journals. Networks and connections between practitioners and researchers need to be developed in order to contribute to shared knowledge development.

- **To use findings presented in the Handbook to inform research, policy and leadership for ICT in schools**

The creation of an infrastructure (wiki, blog, ning) is indicated, so that Handbook authors can share the most important findings from their chapters for a large audience and update their findings; In addition developments of ICT in education call for a regular update of Handbook themes and for the identification of emerging research themes to be addressed. The proposal is to approach the Handbook publisher to start a quarterly journal with the aim of updating and renewing the Handbook on systematic basis.

•To develop mechanisms for sharing and distributing research, promising policies and practices on ICT in education

The sponsoring organizations are asked to develop a clearinghouse, to create an international data base of promising policies and practices for the use of technology for learning and teaching.

•To nurture an international community of ICT scholars, policy makers and leaders who continually build upon our knowledge base to inform policy and practice.

To plan a bi-annual EDUSummit focused upon connecting current research and action plans for ICT by bringing groups from different disciplines and leaders from around the world together to foster cross-pollination and to address issues of leadership and practice with and through technology.

Finally

To disseminate and discuss the recommendation in this Call to Action to other national and international ICT initiatives, such as the National Technology Leadership Summit in the USA the Xi Hu Conference on 21st Century Learning in China.

Background information:

- www.edusummit.nl
- Voogt, J. & Knezek, G. (Eds.) (2008). *International Handbook of Information Technology in Primary and Secondary Education*. New York: Springer.

International Summit on ICT in Education EDU-SUMMIT 2009

ICT in Teaching and Learning Report from the Working groups on ICT and the teacher/learner perspective June 12. 2009

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Introduction

The following paper summarizes the outcomes of the Teacher and Learner working group meetings during the EDUsummIT – the international summit on ICT in Education. The paper is based on findings derived from the chapters of the International Handbook of Information Technology in Primary and Secondary Education, as well as from studies performed by the participants of the working-group and by others known to members of the working group.

We begin with research-based claims, divided into three sections: claims on ICT and pedagogy, claims regarding teachers' perspectives on ICT, and claims concentrating on students' perspectives on ICT. We further define actionable goals and objectives for the future of ICT in teaching and learning, based on the claims; then, we suggest strategies for attaining these goals and objectives.

Claims

ICT and Pedagogy

1. Pedagogical perspectives

- 1.1. A complex relationship exists between technology and pedagogy, which can be illustrated by the pendulum metaphor. The emphases shift from one to the other: while technology facilitates novel pedagogies, new forms of pedagogy enable the implementation of even more novel technologies developing constantly and vice versa (Ching, 2009; Kozma, 2003; Wozney, Venkatesh and Abrami, 2006).
- 1.2. The use of ICT must be underpinned by the dynamic interplay of learning theories and pedagogical principles. Technology should not be used alone to drive pedagogy (Lai, 2008).
- 1.3. ICT should be embedded in the learning environment and integrated into the classroom culture (Lai, 2008).
- 1.4. Collaborative environments would help with technology integration particularly when teachers understand the underlying philosophy (Webb, 2009; Johnson, Johnson and Stanne, 2000; Stevens and Palacio-Cayetano, 2003; Eickelmann and Schulz-Zander, 2008) because a hallmark of the new technology is that it empowers a “participatory culture” (Jenkins, Purushotma, Clinton, Weigel, and Robison, n.d.; Squire and Jenkins, 2003)

2. *IT and the Curriculum*

- 2.1. ICT changes the body of knowledge expertise, facilitating a diversity of resources, team teaching, new mix of expert personnel (learning facilitators, information professionals, subject experts, technicians) (Gibson, 2003, 2006).

Teacher

3. *Teacher Beliefs, Attitudes and Practices:*

- 3.1. Research highlights the role of teachers beliefs and attitudes in ICT implementation (Bai and Ertmer, 2008; Koster, Brekelmans, Korthagen and Wubbels, 2005) as well as social and cultural contexts (Knezek and Christensen, 2008; Park and Ertmer, 2007; Pearson and Somekh, 2006).
- 3.2. Teachers' beliefs are deeply seated and control their approach to new practice so there is a need to develop different pathways or a synergy between beliefs, attitudes and practices (Cox, 2008; Cox and Webb, 2004).
- 3.3. Teachers embody new practice, adopting for themselves new technologies which they expect learners to benefit from (Kozma, 2003; Law, Pelgrum, and Plomp, 2008). The more benefits are perceived by teachers the more likely they adopt the new technologies (Owston, 2003).
- 3.4. Teachers do not use IT in innovative ways automatically; more often they integrate the technologies in their routines (Müller, Blömeke, and Eichler, 2006). In general this does not change teaching (Tubin, Mioduser, Nachmias and Forkosh-Baruch, 2003) as studies indicate using a triangulation approach including different observational measures (Schulz-Zander, Pfeifer and Voss, 2008).

4. *Professional Development*

- 4.1. Professional Development of teachers for ICT implementation must emphasize quality, be embedded in teaching and learning, and be holistic in nature (Lawless and Pellegrino, 2007; Penuel, Fishman, Yamaguchi and Gallagher, 2007).
- 4.2. Teacher professional development is crucial for ICT implementation (Knezek, Christensen, Mayes and Morales, 2005), teachers state a lack of pedagogical and didactical measures (Law and Chaw, 2008; Eickelmann, 2009).
- 4.3. There is growing recognition of the importance in using online communities of practice as a model for teacher professional development (Kirschner and Lai, 2007). Furthermore intra-school offers and informal learning within the teacher community plays an important role and should be considered in school concepts and policy plans (Dexter, 2008; Eickelmann and Schulz-Zander, 2008)

Learner

1. *New Generation*

- 1.1. Research indicates there is a new generation learner being created as a result of ICT penetrating our lives (Beck and Wade, 2004; Prensky, 2001a, 2001b)
- 1.2. There is a need for multiple new literacies in the Digital Age (Mioduser, Nachmias and Forkosh-Baruch, 2008; Jenkins et al., n.d.), especially those preparing for life long learning (Voogt, 2008) and work force needs of the 21st Century (P2CS, 2008).
- 1.3. ICT has an impact on identity and self belief, interests, strengths and aspirations, confidence in ability to learn, and personal, informal use of ICT (research on partial anonymity – successes and problems) (Gibson, 2008; Schrier and Gibson, in press)

1.4. Online environments affect learning processes: gamers for example, are literate users of technology who acquire a large scope of skills and have a need to connect with outside groups (Gibson, Aldrich and Prensky, 2007; Sorenson and Meyer, 2007)

2. *Skills*

2.1. Diverse learners' aptitudes, information skills and judgement with ICT can be overestimated (Bennett, 2007; Laurillard, 2007).

2.2. Do students use technology well? Literature review states that exposure to ICT is not high and not innovative (Cox and Marshal, 2007; Cox, 2008). Informal use of computers for entertainment purposes does not necessarily increase relevant competencies for school, whereas program and communication-related uses do (Wittwer and Senkbeil, 2008).

2.3. Expert Internet usage among youth is an overstatement, since they fail to evaluate and criticize information and can fail to handle high loads of information (Zheng, 2008)

2.4. New feedback of data from ICT tools used by learners permits new action research, regarding meta-cognition skills (Laurillard, Oliver, Wasson, and Hoppe, 2009)

3. *Motivation*

3.1. Delight leading to productive engagement can be facilitated through ICT tools (Foreman et al., 2004; Gee, 2004; Squire and Jenkins, 2003), although this can be challenged by ICT unreliability (Millwood, 2000).

3.2. ICT facilitates co-design of learning by learners, ownership of their curriculum ICT competences and intrinsic motivation (Shroff and Vogel, 2009).

3.3. High levels of motivation are gained from mobile student-owned devices (Dede, Nelson, Ketelhut, Clarke, and Bowman, 2004) and the use of ICT within a new learning culture (Bull et al., 2008). Follow-up SITES-M2 study – motivation of students 4th-12th graders – motivation for using technology decreases slightly in schools by age when it is not combined with a new learning culture (Eickelmann and Schulz-Zander, 2008).

4. *Attitudes*

4.1. In places where IT implementation is widespread, 20% of the students do not want to use IT in their learning; this complies with a general population figure of people who are not motivated to engage in learning with IT. Overall students' attitudes and the perceived value of its use are positive and they would like to use it more often (Eickelmann and Schulz-Zander, 2008).

4.2. Willingness to risk mistakes can be supported through ICT approaches (provisionality etc.) and is increasingly an expectation of the digital native generation (Beck and Wade, 2004; Prensky, 2001b)

5. *Outcomes*

5.1. German and international studies show a positive effect of ICT use on reading and writing competencies whereas for other domains results are inconsistent, The time frame of several studies are meant to be even longer for further results. Best effects on school effectiveness are connected with mobile device (Eickelmann and Schulz-Zander, 2008)

5.2. PISA and PIRLS 2006 show: Students from with higher socio economic background profit from better access to ICT and parental support to use ICT for educational tasks to which the school has to counterbalance in terms of equal opportunities for all students (Senkbeil and Wittwer, 2008; Schulz-Zander, Eickelmann and Goy, in press).

5.3. In a follow-up study of the School of the Future (IL) – achievements were higher for this IT enriched school in traditional measurements (Chen, 2006).

- 5.4. SITES-M2 secondary analysis (IL) – research framework according to which students’ roles change as a result of innovative IT implementation (Mioduser et al., 2006).
- 5.5. Technology is effective if teachers use it to engage students in the learning tasks, scaffold them to inquire, discover, critique, create, and apply new understanding and knowledge, within a community of learners (Law, 2008).
- 5.6. Some uses of simulations improved understanding of science beyond that achieved by other pedagogical approaches particularly where its use is planned and supported by teachers and the simulations address difficult science concepts (Webb, 2008).

Goals and actions for the future of ICT in teaching and learning

The review of the evidence base for ICT in teaching and learning can be summarized in claims relating to four main themes:

1. Learners’ needs, expectations, knowledge and skills are changing, as a result of digital technology, in complex and diverse ways that we are only beginning to understand.
2. Relationships between technology, pedagogy and the curriculum are complex.
3. Teachers need time and professional development opportunities in order to adapt.
4. Evidence for benefits of using technology for learning is growing but the evidence base inevitably lags behind the rapid technological developments.

Major actionable goals for the future of ICT in teaching and learning are identified in Table 1. Specific objectives are presented in relation to each of the goals. While the strategies for achieving the goals, as shown in Table 1, align approximately to the main goals that they support, most of the strategies relate to more than one goal. The seven major goals focus on research frameworks, researching learners' communication, collaboration, teacher development, organisation of knowledge expertise, as well as a broader review of the general goals of education.

Table 1 Goals, objectives and strategies for the future of ICT in teaching and learning

Goals for the future of ICT in teaching and learning	Objectives for ICT in teaching and learning	Strategies for ICT in teaching and learning
<p>Research frameworks</p> <p>1 Understand better the complexity of pedagogy, learning theory & technology and their interrelationship, by proposing clearer conceptual analysis based on a systems approach (using ecology, cybernetics, inter-disciplinary thinking etc.).</p>	<p>Develop a new theory base that integrates learning theory, pedagogy and technological affordances within an understanding of emergent phenomena in complex systems.</p>	<p>Understand change as a process rather than an event</p> <p>Use a systems approach and combine bottom up and top down research strategies</p> <p>Establish inter-disciplinary research teams</p> <p>Develop complex models e.g. by using ecological approaches or complexity theories</p> <p>Use multilevel analysis techniques</p>

<p>Research on learners</p> <p>2 Discover how the characteristics of learners affect how ICTs impact and have interaction effects on the learner and on classroom culture.</p>	<p>Understand 21st century learners in relation to their use of ICT</p> <p>Understand how to develop 21st century learners in relation to their use of ICTs</p> <p>Understand the impact of ICTs on learners</p> <p>Understand the impact of ICTs on classroom culture.</p>	<p>Encourage practitioner research</p>
<p>Communication</p> <p>3 Through better design & communication, explain findings and analysis of complex systems to public, policy makers and practitioners.</p>	<p>Policy makers and stakeholders understand the nature of technology use in learning and its benefits and limitations</p> <p>Policy makers and stakeholders understand 21st century learners</p>	<p>Publish and share results via traditional and new platforms e.g. on YouTube</p> <p>Connect research and practice through evidence-based research</p>
<p>Goals for the future of ICT in teaching and learning</p>	<p>Objectives for ICT in teaching and learning</p>	<p>Strategies for ICT in teaching and learning</p>
<p>Collaboration</p> <p>4 Develop a community of practice in order to advance organisational growth in the profession</p>	<p>Establish mechanisms for joint knowledge creation by teachers, learners and policy makers</p> <p>Develop shared understanding of ICT and learning</p>	<p>Develop / describe scenarios for learning with ICT</p>
<p>Teacher development</p> <p>5 Inform and develop teachers' understanding, strategies, planning and practice by clarifying what levels of responsibility / skill / capacity / multi-tasking are available to what age / developmental stage of learner to engage in a participatory, creative, online culture of knowledge acquisition & sharing when ICT tools are widely available.</p>	<p>Enhance motivation, attitudes and beliefs of teachers</p> <p>Develop shared understanding of 21st century learners' needs, IT literacies and extent and range of competencies</p> <p>Develop shared understanding of characteristics of the 21st century teacher e.g. – flexibility, open-minded, adaptability</p> <p>Develop teachers' understanding of how to use ICT</p> <p>Embed ICT in the curriculum</p> <p>Empower teachers that debate knowledge as a normal process</p> <p>Create rich learning environments</p> <p>Enable teachers to participate in learning communities incorporating teachers, learners</p>	<p>Change teachers' views on education by enabling envisioning and scenario building</p> <p>Focus on both pedagogy and technology</p> <p>Implement ICT in pre-service education > change teacher education</p> <p>Teacher curriculum for pre-service education</p> <p>Integrate IT competencies in school programs: for teachers and students</p> <p>Develop strategies for understanding the nature of new technologies as they become available</p> <p>Facilitate collaboration through learning communities</p>

		<p>Consistency in teacher development; financing</p> <p>Embed ICT in all teacher professional development</p>
<p>Organisation of knowledge expertise</p> <p>6 Change the organisation of knowledge expertise towards a diversity of resources, team teaching, new mix of expert personnel (learning facilitators, information professionals, subject experts, technicians).</p>	<p>Enable teachers to be effective in classrooms</p> <p>Cope with media to evaluation of information</p> <p>Educate learners about ICT</p> <p>Develop awareness of disruptive innovation in classrooms and schools</p> <p>Develop understanding of disruptive innovation theory</p>	<p>In-service professional development through sharing good practice</p> <p>Envision how to create the 21st century learner?</p> <p>Assuming new technologies are better than older ones: create imbalance. Then strive for new balance by introducing disruptive technology</p> <p>Integrate IT on the input level – facilitate sustainability</p>

Goals for the future of ICT in teaching and learning	Objectives for ICT in teaching and learning	Strategies for ICT in teaching and learning
<p>Overall goals of education</p> <p>7 Review the goals of education in the light of affordances of ICT-based approaches to learning and teaching (including lifelong-learning, cultural, social, citizenship and workplace issues).</p>	<p>Understand the needs of the future citizen</p> <p>Re-define educational goals</p> <p>Ethical and proper use of technology – teachers and students</p> <p>Create a framework for alternative assessment</p> <p>Create learning communities – collaboration and sharing</p> <p>Equity in IT implementation</p>	<p>Create a learning environment for the whole school community (teachers and students)</p> <p>Promote authentic usable learning situations</p> <p>Consider:</p> <ul style="list-style-type: none"> ▪ should life be dominated by technology? ▪ how to live in a digital world ▪ outcomes from research and development in ICT and learning

Epilogue

The conceptual frameworks underpinning the relationship between teaching, learning and information and communication technologies are manifold and complex. In fact, the relations between them are associated with several concepts related to several components of the school milieu, including curricular issues, policy issues and leadership within the school. As features on this complex landscape, this working-paper sheds light on two of the core and vital aspects of education - teaching and learning.

References

- Bai, H. and Ertmer, P.A. (2008). Teacher Educators' beliefs and Technology Uses as Predictors of Preservice Teachers' Beliefs and Technology Attitudes. *Journal of Technology and Teacher Education*, 16(1), 93-112.
- Beck, J., and Wade, M. (2004). *Got game: How the gamer generation is reshaping business forever*. Boston, MA: Harvard Business School Press.
- Bennet, W.L. (2007). *Civic Life Online: Learning How Digital Media Can Enhance Youth*. Boston: MIT Press.
- Bull, G., Thompson, A., Searson, M., Garofalo, J., Park, J., Young, C., et al. (2008). Connecting informal and formal learning experiences in the age of participatory media. *Contemporary Issues in Technology and Teacher Education*, 8(2).
- Ching, G.S. (2009). Implications of an experimental information technology curriculum for elementary students. *Computers and Education*, 53, 419–428
- Cox, M.J. (2008). Researching IT in Education, in Voogt, J. and Knezek, J. (Eds.), *International Handbook of Information Technology in Primary and Secondary Education*, Section 10: Researching IT in Education (pp. 965-982). New York: Springer.
- Cox, M.J. and Marshall, G. (2007). Effects of ICT: Do we know what we should know? *Education and Information Technologies*, 12, 59-70.
- Dede, C., Nelson, B., Ketelhut, D., Clarke, J., and Bowman, C. (2004). Design-based research strategies for studying situated learning in a multi-user virtual environment. Retrieved Jan 26, 2006, from <http://muve.gse.harvard.edu/muvees2003>
- Dexter, S. (2008). Leadership for IT in Schools. In J. Voogt and G. Knezek (eds.), *International Handbook of Information Technology* (pp. 543-554). New York: Springer.

- Eickelmann, B. and Schulz-Zander, R. (2008). Schuleffektivität, Schulentwicklung und digitale Medien. In W. Bos, H. G. Holtappels, H. Pfeiffer, H.-G. Rolff and R. Schulz-Zander (eds.), *Jahrbuch der Schulentwicklung*. Band 15. (pp. 157-194). Weinheim: Juventa.
- Eickelmann, B. (2009). Erfolgreich digitale Medien in Schule und Unterricht integrieren – Eine empirische Analyse zur Nachhaltigkeit der Implementation digitaler Medien aus Sicht der Schulentwicklungsforschung. Dissertationsschrift. Dortmund Technische Universität Dortmund.
- Foreman, J., Gee, J., Herz, J., Hinrichs, R., Prensky, M., and Sawyer, B. (2004). Game-based learning: How to delight and instruct in the 21st century. *EDUCAUSE Review*, 39(5), 50-66.
- Gee, J. (2004). *What Video Games Have to Teach Us About Learning and Literacy*. New York: Palgrave Macmillan.
- Gibson, D. (2003). *New directions in e-learning: Personalization, simulation and program assessment*. Paper presented at the International Conference on Innovation in Higher Education, Kiev, Ukraine 2003.
- Gibson, D. (2006). Elements of Network-Based Assessment. In D. Jonson and K. Knogrith (Eds.), *Teaching Teachers to Use Technology* (pp. 131-150). New York: Haworth Press.
- Gibson, D. (2008). Make it a two-way connection: A response to "Connecting informal and formal learning experiences in the age of participatory media. *Contemporary Issues in Technology and Teacher Education*, 8(4), n.a.
- Jenkins, H., Purushotma, R., Clinton, K., Weigel, M., and Robison, A. (n.d.). Confronting the challenges of participatory culture: Media education for the 21st Century [Electronic Version]. *New Media Literacies Project*, 72. Retrieved April 5, 2009, from <http://www.newmedialiteracies.org/files/working/NMLWhitePaper.pdf>
- Johnson, D. W., Johnson, R. T., & Stanne, M. B. (2000). *Co-operative Learning Methods: A Meta-Analysis*. Minneapolis: University of Minnesota
- Kirschner, P.A. and Lai, K.W. (2007). Online communities of practice in education. *Technology, Pedagogy and Education*, 16,2, 127–131.
- Knezek, J., Christensen, R., Mayes, G. and Morales, C. (2005). A Comparison of Self-Report and Observer Ratings of Educator Technology Integration Proficiency. In C. Crawford et al. (Eds), *Proceedings of Society for Information Technology and Teacher Education International Conference* (pp. 892-897). Chesapeake, VA: AACE.
- Knezek, J. and Christensen, R. (2008). The Importance of Information Technology Attitudes and Competencies in Primary and Secondary Education, in Voogt, J. and Knezek, J. (Eds.), *International Handbook of Information Technology in Primary and Secondary Education*, Section 4: IT Competencies and Attitudes (pp. 321-332). New York: Springer.
- Koster, B. Brekelmans, M., Korthagen, F. and Wubbels, T. (2005). Quality requirements for teacher educators. *Teaching and Teacher Education*, 21, 157–176.
- Kozma, R.B. (Ed.) (2003). *Technology, Innovation and Educational Change – A global perspective*. Eugene, Oregon: ISTE Publications.
- Lai, K.W. (2008). ICT Supporting the Learning Process: The Premise, Reality, and Promise, in Voogt, J. and Knezek, J. (Eds.), *International Handbook of Information Technology in Primary and Secondary Education*, Section 3: IT and the Learning Process (pp. 215-230), New York: Springer.
- Laurillard, D. (2007). Modelling benefits-oriented costs for technology enhanced learning. *High Education*, 54, 21–39.
- Laurillard, D., Oliver, M., Wasson, B., and Hoppe, U., (2009). Implementing Technology-Enhanced Learning, in Balacheff, N., Ludvigsen S., de Jong T. Lazonder, A. and Barnes S. (Eds), *Technology-Enhanced Learning: Principles and Products* (pp. 289-306). Netherlands: Springer
- Law, N. and Chaw, A. (2008). Teacher Characteristics, Contextual Factors, and how these affect the pedagogical use of ICT. In N. Law, W. J. Plegrum, and T. Plomp (eds.), *Pedagogy and ICT*

- use in schools around the world. Findings from the IEA SITES 2006 study. (pp. 182-221). Hong Kong: CERC-Springer.
- Law, N., Pelgrum, W.J. and Plomp, T. (2008). *Pedagogy and ICT Use in Schools around the World*. HK: CERC, Springer.
- Lawless, K.A. and Pellegrino, J.W. (2007). Professional Development in Integrating Technology into Teaching and Learning: Knowns, Unknowns, and Ways to Pursue Better Questions and Answers. *Review of Educational Research*, 77(4), 575-614.
- Millwood, R (2000) A new relationship with media?, in Gamble, N. and Easingwood, N. (Eds.), *ICT and literacy: information and communications technology, media, reading and writing*. London: Continuum.
- Mioduser, D., Nachmias, R., and Forkosh-Baruch, A. (2008). New literacies for the knowledge society. In Knezek, J. and Voogt, J. (eds.). *International Handbook of Information Technology in Education* (pp. 23-42). NY: Springer.
- Müller, C., Blömeke, S. and Eichler, D. (2006). Unterricht mit digitalen Medien - zwischen Innovation und Tradition? Eine empirische Studie zum Lehrerhandeln im Medienzusammenhang. *Zeitschrift für Erziehungswissenschaft*, 9 (4), 632-650.
- Owston, R.D. (2003). School context, sustainability, and transferability. In R. B. Kozma (ed.), *Technology, innovation and educational change: A global perspective* (pp. 125-162). Washington D. C: ISTE.
- P2CS. (2008). Partnership for 21st Century Skills. Retrieved Sept 9, 2008, from <http://www.21stcenturyskills.org/>
- Park, S.H. and Ertmer, P.A. (2007). Impact of Problem-Based Learning (PBL) on Teachers' Beliefs Regarding Technology Use. *Journal of Research on Technology in Education*, 40(2), 247–267.
- Pearson, M. and Somekh, B. (2006). Learning transformation with technology: a question of sociocultural contexts? *International Journal of Qualitative Studies in Education*, 19(4), 519-539.
- Penuel, W.R., Fishman, B.J., Yamaguchi R.Y. and Gallagher, L.P. (2007). What Makes Professional Development Effective? Strategies that Foster Curriculum Implementation. *American Education Research Journal*, 44(4), 921-958.
- Prensky, M. (2001a). *Digital game-based learning*. New York: McGraw-Hill.
- Prensky, M. (2001b). Digital Natives, Digital Immigrants. *On the Horizon*, 9(5).
- Schulz-Zander, R., Eickelmann, B. and Goy, M. (in press). Mediennutzung, Medieneinsatz und Lesekompetenz. In Bos et al. (eds.), IGLU 2006. Band 3. Münster: Waxmann.
- Schulz-Zander, R., Pfeifer, M. and Voss, A. (2008). Observation Measures for Determining Attitudes and Competencies Toward Technology, in Knezek, J. and Voogt, J. (eds.). *International Handbook of Information Technology in Education* (pp. 367-379). NY: Springer.
- Schrier, K., and Gibson, D. (Eds.). (in press). *Ethics and game design: Teaching values through play*. Hershey, PA: IGI.
- Senkbeil, M. and Wittwer, J. (2008). Antezedenzen und Konsequenzen informellen Lernens am Beispiel der Mediennutzung von Jugendlichen. *Zeitschrift für Erziehungswissenschaft*. Sonderheft 10/2008, pp. 109-128.
- Sørensen, B.H. and Meyer, B. (2007). Serious Games in language learning and teaching – a theoretical perspective. *Proceedings of the Digital Games Research Association (DiGRA) Conference*. Tokyo, Japan.
- Squire, K., and Jenkins, H. (2003). Harnessing the power of games in education. *Insight*, 3(5), 5-33.
- Stevens, R., and Palacio-Cayetano, J. (2003). Design and performance frameworks for constructing problem-solving simulations. *Cell Biology Education*, 2(Fall), 162-179.
- Tubin, D., Mioduser, D., Nachmias, R., and Forkosh-Baruch, A. (2003). Domains and levels of pedagogical innovation in schools using ICT: ten innovative schools in Israel. *Education and information technologies*, 8(2), 127-145.

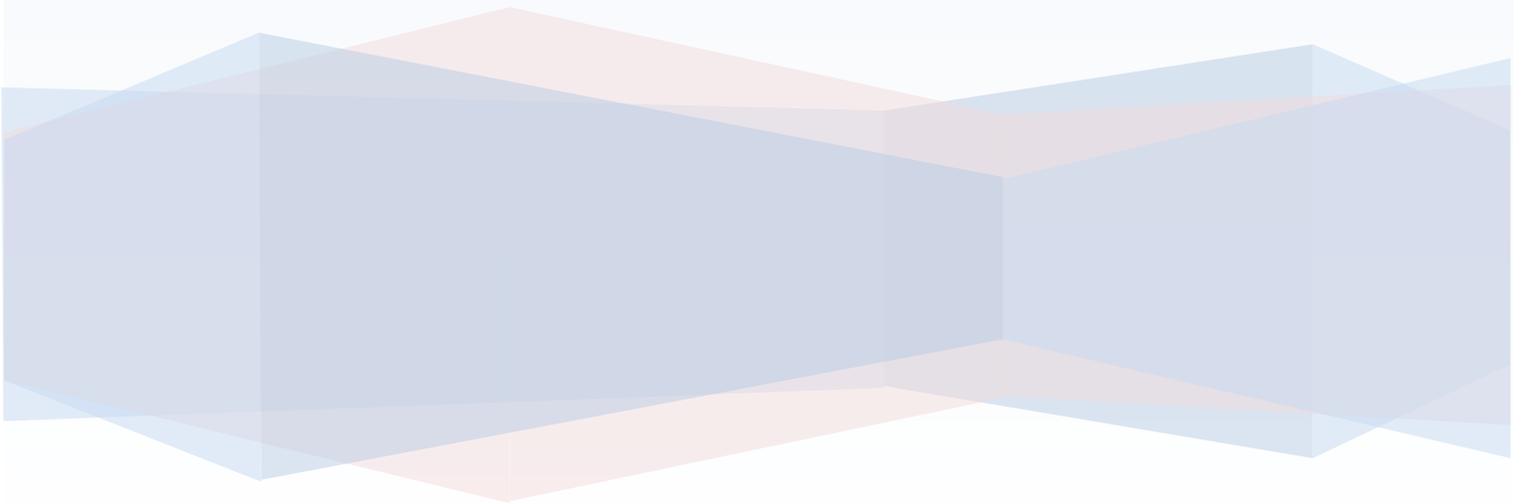
- Voogt, J. (2008). IT and curriculum processes: dilemmas and challenges. In J. Voogt and G. Knezek (eds.), *International Handbook of Information Technology* (pp. 117-132). New York: Springer.
- Webb, M. E. (2008). Impact of IT on science education. In J. Voogt & G. Knezek (Eds.), *International Handbook of Information Technology in Primary and Secondary Education* (pp. 133-148). London: Springer.
- Webb, N. (2009). The Teacher's Role in Promoting Collaborative Dialogue in the Classroom. *British Journal of Educational Psychology*, 79(1), 1-28.
- Wittwer, J. and Senkbeil, M. (2008). Is students' computer use at home related to their mathematical performance at school? *Computers and Education*, 50, 1558-1571.
- Wozney, L., Venkatesh V. and Abrami, P.C. (2006). Implementing Computer Technologies: Teachers' Perceptions and Practices. *Journal of Technology and Teacher Education*, 14 (1), 173-207.
- Zheng (2008). *Cognitive effects on Multimedia Learning*. US: Information Science Reference.

Call to Action for Leadership:

EDUSummIT Report from Leadership Committee

Lead by Wing Lai

Reporter: Margaret Riel



Introduction

The leadership committee at EDUsummIT discussed societal shifts in leadership away from the “hero” leader who holds the vision, the resources, and the power to making sweeping changes, and towards one of “service” leadership that builds the skills for distributed human and social capacity of the organization. However, such changes are not pervasive. The ecologies of education are complex with nested hierarchies of educational, political, professional, and commercial dimensions that operate at different levels of the system from the classroom to the global arena.

The committee discussed how distributed leadership supported by information and communication technology (ICT), helps engage people at different levels of the ecology to effect change that flows throughout the system. Some new practices in teaching with technology are designed by teachers and shared with other teachers and beyond the school. However, access to technology accompanying visions and goals for instructional use also come to the classroom from the different levels of the educational system. And new tools and innovative uses of technology enter the classroom from the side as researchers and developers build knowledge and tools to shape education.

The wide-ranging introduction of technology into schools suggests that shared leadership from different points within the ecologies of education is needed. Anyone within the educational complex, who engages in learning can develop new skills that are of value to others in their community of practice. Sharing these skills develops social networks of informal leaders. When informal leaders reach beyond the local sphere and work with others to externalize the knowledge of the community and share emergent knowledge across distances, they often are moved to formal roles of leadership-- building new knowledge with and about technology.

When thinking about its charge to consider a “call to action,” the committee challenged themselves to model the use of technology in the calls for action. Researchers, developers, educators, and leaders can model innovative and participatory use of information and communication technology as they evolve methods and practices to work with educators. For example, writing a book to share knowledge about participatory collaborative technology is possible, but does not model the use of the technology as both the medium and the message.

In a model of distributed leadership, the responsibility for leadership is shared throughout the educational community. The members of the committee recognized that modeling the value of distributed leadership, would involve not only seeing themselves as creators of the call to action but also as the recipients of the call. In the hero model of leadership, it is easier to make assertions about what leaders and organizations need to do. In the participatory model of leadership employing emergent technology, this call to action is also an acknowledgement that all participants share the responsibility to play active roles in developing the change.

In our discussion of leadership the committee recognized that leadership in the design of new practices supported by the technology enters the system (1) from inside the classroom as teachers share practice, (2) beyond the classroom in the form of educational policies and organizational support, and (3) outside of schools as knowledge building research and commercial development provides new ideas and tools. Our call to action addresses each of these different levels of the educational hierarchy.

CALLS TO ACTION

From the Classroom: Call to Action for Educators

Educators need to conceptualize their work to include personal learning and development. A quality teacher is one who is learning every day through practice. In order for teachers to engage their students in knowledge building rather than knowledge reception, teachers themselves have to be engaged in knowledge building using the collaborative tools that support this work. This is not something that they do as a project from time to time. It should be an everyday part of their work. Teacher teams that rise to levels of leadership because of the knowledge of technology enhanced practice that they are building should be rewarded. Peer review is a much better way to judge the quality of teachers than using students' performance on standardized tests. The committee reviewed a number of recognized processes for teachers to develop skills for learning from and through practice:

a. Action Research

Action research is a rigorous form of progressive problem solving from practice by teachers who collect and analyze data and then engage in collective and individual reflection on data in an ongoing cyclic pattern. Action research becomes a disposition toward learning, values evidence, and develops a reflective stance towards deep understanding of the underlying causes of change. Action research with technology has been demonstrated to produce deep knowledge of how technology is changing learning.

b. Lesson Study

Lesson study is a focused examination of a lesson by a group of educators who work together to understand the learning processes in students that occur when the lesson is delivered. Lesson study is a way to create learning contexts that is open to student knowledge building and yet prepares the teacher for how to best deal with the multiple approaches that students bring to the learning context. When lesson study is used on lessons that implement technology, it generates deep knowledge about the role of technology in learning.

c. Collaborative protocols for examining student work

Looking at student work is a powerful way for teachers to focus on the practices that lead to improvement in student learning. Student work, rather than performances of tests, is a better indicator of learning and with the use of computer tools for assessment could become standardized assessments of student learning.

d. Professional learning communities and networking

Forming professional learning communities is a way of formally structuring the social networking in a school to increase the flow of expertise among teachers. By externalizing the knowledge of the group, teachers learn how to make use of the intellectual resources that are distributed throughout the school. Forming professional learning communities around the use of technology has the potential to enhance the flow of technical expertise through the school. This networking can be productively extended beyond the school with teachers assuming important roles in

this knowledge-building process. A wide application of this idea could result in rethinking the way we assign teachers' workloads such that teachers can engage in work beyond the classroom as well as teach in the classroom.

From Beyond the Classroom: Call to Action for EDUSummIT Organizers and International Agencies

While informal social networking can be effective, more intentional work at an organizational level will be required to make the distributed projects described above successful. Establishing and supporting the collaborative spaces for international groups to work in partnership to develop knowledge sharing practices could be led by Kennisnet (The Netherlands), BECTA (UK) and ISTE (USA) --perhaps supported by UNESCO. This group could model the form of distributed, service leadership that we seek to extend throughout the educational ecology. Fostering links between national organizations at different levels in the ecologies could be a priority. Specifically this coalition might:

a. Call the international community together with more EDUSummIT conferences.

Working summit conferences bring groups from different disciplines and leaders from around the world to foster cross-pollination and to address issues of leadership with and through technology. These conferences could be sponsored by a coalition of different groups under a joint banner to create an international focus.

b. Fostering links between national conferences and journals with a focus on ICT.

These organizations and conferences could be encouraged to give priority to research that focuses intently on learning and how technology can best be used to support learning in changed learning landscapes. This could include a discussion of how technology-centric approaches are less helpful in evolving the knowledge of the field.

c. Lessen the divide between research and practices.

Establishing review processes that reward researchers who work with practitioners to develop implications for practitioners in all research publications, including print and on-line journals is called for. Research that merely dips into schools and develops findings to share only with researchers are not developing knowledge that is improving schools. Networks and connections between practitioners and researchers need to be developed because the present system is not useful, and not being used by educators.

d. Leadership in the establishment of a clearinghouse and or database of practice.

There is a need for better vehicles to share action- and design-based research, policy, and innovative ideas related to IT in education that is informed by an understanding

of the changing landscapes, including information about adoption and impact (possibly building on former initiatives such as [ISTE's CARET database](#)).

e. Advocate for funding agencies to support the evolution of new research ecologies.

If priority, including funding was accorded to multi-level multi-role engagement in research then teachers, principals, technology coordinators, curriculum and education policy makers would have time to conduct the action and design research described above. . The [McArthur foundation funding for digital media and learning](#) coordinated with dissemination of research about ways that media are changing the society and our understanding of learning exemplify this idea. It needs to be reproduced.

1) From the side: Call to Action for EduSumMIT Members and Researchers:

a) Participatory knowledge building –The International ICT-WIKIWEB.

The handbook uses print technology to convey information about a field that is emergent and engaged in rapid shifts that are reshaping the way we work together. New technologies make it possible for large numbers of people to write documents that live and change over time. These living documents are different than traditional publications as they do not go through the sequential process of writing, editing, reviewing, and final publishing. Instead these processes take place continuously in parallel, or in never ending cycles. There is no final publication but rather an evolving changing publication. This process challenges the way we think about knowledge building. The Wikipedia is a demonstration of how millions of people worldwide can create a living document that has value.

The first action is a call to the participants of EduSummit to create a wiki handbook of innovative uses of technology for learning and teaching. The current handbook (citation) can inform the initial structure but, of course, this structure will evolve over time. Each author of a handbook chapter could be asked to write a single page that highlights the most important messages for their chapter with links to where more information can be found. The one-page entry is a roadmap to resources on the topic. One of the key resources will be the chapter but the one-page entry provides an opportunity to link to other resources. An entry would be monitored by the person who initially posted it, but anyone in the world could share in the revision process suggesting different ways of thinking about the issues. If each handbook author agrees to monitor the writing on their topic, the site will immediately have 75 authors. If each of the attendees at the EDUsummIT authors a page, then we will begin with 150 different topics.

This activity would be an example of distributed leadership. It will take some organization and seed funding but the start of this activity does not have to be extensive. None of the authors received any funds for writing their chapters in the current handbook. It is possible that being identified as a topic editor on a project

author with international participation will be compelling enough to create the next, more interactive version of this important undertaking .

b) Call to Action to Support Practitioner Research in Education

Across the research community there needs to be more support for developing practitioner driven research agendas. This would help to promote the shift to community or distributed forms of leadership in education. The use of ICT to support and develop this research agenda and collect and share stories of change is the intent of this call.

Action research with technology is one form of change. The development and promotion of conferences, web publications and practitioner presentations at major conferences engages teachers in the process of knowledge building. Learning from practice is the first stage of leadership and schools need to be transformed into places that support teacher learning. If teachers use and learn from evidence based knowledge, then they will become better consumers of research. The present research-development-dissemination model in which researchers conduct studies some other agency translates these results for classroom use is a failed model. The most avid consumer of research is someone doing similar research. If teachers are researchers learning from practice, then they will more effectively be researcher partners for larger scale studies and more likely to attend to and use the outcomes of research studies.

The products of reflective practitioner research are not likely to be research reports. New participatory technology makes it possible for them to share their work in other formats and mediums. For example, teacher researchers could share video and graphic narratives. This database of narratives could be sponsored by any number of organizations. This is similar to TeacherTube but could be more narrowly focused on research around the use of information and communication technology in the classroom. This might be a participatory international construction of something similar to Edutopia, perhaps with support from the George Lucas Foundation

c) Development of the International EDUSummIT Community

While creating the International ICT-WikiWeb or practitioner based narratives might be community products, there could be other activities that help to build a community from the initial EDUSummIT conference. While other tools might emerge, the initial use of NING could serve to connect people past the conference. It could also be a place to share and coordinate the work of a global community.

International Summit on ICT in Education
EDU-SUMMIT 2009

ICT and Policy in Education

Report from the Working groups on ICT and the policy perspective

Roumen Nikolov, Vanessa Pittard, Leslie Goodyear and Maria Vasquez tard

Claims

1. The use of technology by young people outside of formal education is richer than their use of technology in formal educational settings.
2. Technology is now at the heart of knowledge creation and sharing, and is therefore an essential aspect of education and learning.
3. The ever changing nature of technology and the convergence of technologies demand that education systems are responsive and agile to technology-based change.
4. Assessment of the learning that occurs through the use of technology is not always valid, fair or appropriate.
5. The role of informal learning and its relationship to formal learning is an increasingly important issue for education policy and for the development and implementation of new approaches to learning and teaching.
6. Effective learning is fully promoted only by addressing the wide range of student needs. This demands a rich ecology of approaches to learning and teaching.
7. The development of technology-supported learning demands a range of disciplines - technological and pedagogical perspectives, information sciences and other disciplines.
8. It is critical that digital divides are addressed. In an information and technology-rich world, digital divides widen knowledge divides.
9. Professional development is a key need across all stakeholder groups, including education professionals and policymakers.

Goals/Objectives

1. Build clarity about the role of technology in education, which are various, for example, equipping young people with skills for learning and life, improving formal learning outcomes, building specific vocational competencies, making learning experiences more engaging, extending learning opportunities.
2. Increase educators' and policy makers' incorporation of the opportunities afforded by technology into policies, programs and practice.
3. Build understanding of promising technology-supported practice relating to learner-centred/personalised approaches and authentic learning and assessment.
4. Develop among policy makers a comprehensive understanding of what is meant by and how to measure 21st century skills.
5. Build understanding of the current position in relation to young people's 21st century skills through internationally-shared definitions, indicators and metrics.
6. Assess the contribution of technology-based informal learning to formal student learning outcomes.
7. Incorporate and support technology-based informal learning approaches within formal settings.
8. Establish the key drivers to promote a rich ecology of pedagogies that appropriately incorporate technology and 21st century skills.
9. Ensure ICT/technology policies and strategies are embedded within overall curriculum policies.
10. Develop and maintain partnerships that ensure ongoing sustainability of successful development projects.
11. Clarify and establish an international 'digital entitlement' for learning, linked to broader educational/learning entitlements.

Actions required

1. Compile the different worldwide organizations' stances on the role of technology in education and engage national policy makers in clarifying agendas regarding their countries' educational technology policies,
2. Engage with national policymakers on the value of technology-supported learning, placing this discussion in the context of global economic and social trends.

3. Bring together current thinking on what are 21st century skills, how they're interpreted in different contexts/cultures, how they can be measured and their relationship to education.
4. Fund the development of fair, valid and efficient ways of assessing the depth and complexity of 21st century skills and learning.
5. Fund research on the development of informal technology-supported learning practices within formal settings.
6. Fund research into how a rich pedagogical environment influences and improves learning, particularly with regard to technology.
7. Incorporate technological pedagogical content knowledge (TPCK) into professional development systems for both educators and education policymakers.
8. Create an international database of promising policies and practices for the use of technology for learning and teaching.
9. Develop and disseminate a list of essential conditions that need to be in place to ensure significant learning benefit is derived from technology investment.
10. Develop a thought paper on opportunities relating to new and emerging technology developments (e.g. cloud computing) with the aim of developing solutions to address needs of developing countries in cost-effective ways.
11. Develop accreditation systems for teacher competencies relating to technology-supported learning and connect these to practice (for example, inspection, performance review).