Section 1: Curricular Challenges of the 21st Century'

Section editors Joke Voogt & Ola Erstad

This section elaborates on the role of technology in 21st century curricula. Recently international organizations such as OECD and the European Union as well as national policies in many countries are reconsidering curriculum frameworks from the perspective of competences that are considered relevant for living in and contributing to a global and digitalized society. These competences are considered to be generic and are often referred to as 21st century skills (North America), life long learning competences (OECD, 2005) or key competences (EU, 2007). According to Klieme, Hartig and Rauch competences are 'context-specific cognitive dispositions that are acquired by learning and needed to successfully cope with certain situations or tasks in specific domains' (p. 9). They have cognitive, behavioral and affective components. 21st Century competences of skills are certainly not new (Voogt, Erstad, Dede & Mishra, 2013). For instance already in 1910 Dewey (1910) mentions critical thinking as an important skill to be taught. What is different is that 21st century competencies should not be taught separately, but in conjunction with each other. Technology plays a specific role in the acquisition of 21st century skills, not only because the ubiquitous use of technology in society also requires students to be digital literate, but also because technology may facilitate the acquisition of 21st century skills. A second important issue, related to the role of technology in 21st century curricula, refers to the potential of technology better align curricula with students needs. From the perspective of personalization of the curriculum, the curriculum is not bound to formal learning only but is considered a life long learning process, including informal learning experiences. It implies that curricula that are need to become more aligned with students' out of school digital practices.

In this section we present research on some prominent 21st century competencies. We discuss conceptualizations of these 21st century competencies and the implications for schooling in the 21st century.

In Chapter 1.1, Erstad and Voogt introduce the concept of 21st century competencies. They present four meta-reviews that analyzed major conceptual frameworks that aim to provide an answer to the question of what should be taught and learned in the 21st century. The second part of the chapter focuses on the specific roles for new technologies to facilitate the implementation of 21st century competencies in the curriculum. The chapter finishes with recent research on barriers of and drivers for changing curricula in preparing students to live, learn and work in the 21st century society.

Based on the assumption that the nature of reading and writing is changing due to technological developments, Larson, Forzani and Leu, in Chapter 1.2, elaborate on

the implications of a new literacies perspective for literacy research and practice. They argue that schools today need to prepare students who can navigate and participate online in a global society. Two specific challenges are addressed: research on the need to be able to critically evaluate online texts and research on the potential of collaborative online learning across national and cultural borders. Research about implications for instruction and school curricula is presented. Because the pervasive use of social media and its global implications the concept of citizenship is changing in the 21st century. Law, Chow and Fu (Chapter 1.3) conceptualize digital citizenship and discuss research on the implications for citizenship education, in terms of curriculum and the challenges for implementation. In Chapter 1.4, Ainley, conceptualizes computer literacy and related concepts such as ICT literacy. In his contribution he reports about large-scale assessment studies measuring computer literacy of students. Results show large differences between students. Ainley shows how curriculum development can be informed by such assessment studies.

An important aspect of digital literacy is computational thinking. Computational thinking is rooted in computer science and considered an important 21st century competency (THE Royal Society, 2012; Wing, 2006). In Chapter 1.5, Yadav, Sands, Good and Lishinki describe how computer science education in schools has developed in a number of countries. The chapter finishes with implications for the knowledge teachers need to have to be able to teach computing and factors that influence students learning to program are discussed.

Finally in Chapter 1.6, Kumpulainen, Mikkola and Rajala discuss current research on the ways in which school can become a space in which students' digital practices can be aligned with teaching and learning and how this can contribute to students' identity building. They show promising findings on how digital technologies and media can be used to encourage engagement and learning across sites and contexts.

REFERENCES

- Dewey, J. (1910). *How we think*. Lexington, MA: D.C. Heath & Co.
- Europe Union. (2007). *Key competences for lifelong learning. European reference framework*. Retrieved from http://ec.europa.eu/dgs/education_culture/publ/pdf/ll-learning/keycomp_en.pdf
- Organisation for Economic Co-operation and Development [OECD]. (2005) *The definition and selection of key competencies [Executive Summary]*. Retrieved from <http://www.oecd.org/dataoecd/47/61/35070367.pdf>
- The Royal Society (2012). *Shut down or restart? The way forward for computing in UK schools*. London: The Royal Society. Retrieved from http://royalsociety.org/uploadedFiles/Royal_Society_Content/education/policy/

[computing-in-schools/2012-01-12-Computing-in-Schools.pdf](#).

Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning*, 29, 5, 403-413.

Wing, J. M. (2006). Computational thinking. *Communications of the ACM*, 49(3), 33–35. doi:[10.1145/1118178.1118215](#).