Synergies for Better Learning – Where Are We Now?

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Connectedness is shaping the economy and society.
(Pedro, 2012)

Look to Norway

ICT has been on the educational-policy agenda in Norway for nearly 30 years. Throughout these years, there have been varying approaches to the area of ICT as a strategic instrument in the educational sector. Periods of reports and strategies have alternated with periods when ICT has not been encompassed by separate strategic planning. The Knowledge Promotion Reform has helped usher in a more knowledge-based development of the school sector. Moreover, figures and data from the national tests can be applied as a basis for educational policy and improvement of practices.

Since 1996, the Ministry of Education and Research, the Ministry of Government Administration, Reform and Church Affairs, the Norwegian Directorate for Education and Training and their precursors have submitted a number of strategies and documents for the use of ICT in the educational sector. The Programme for Digital Competence 2004-2008 (UFD 2004) maintains the emphasis on general educational development and implementation of ICT as described in previous action plans, with its goal that everybody should be digitally competent. At the inauguration of the Knowledge Promotion Reform in 2006, digital competence was widely defined, ranging from basic digital skills to full proficiency.

The introduction of the Knowledge Promotion Reform gave digital skills a prominent position in Norwegian education, especially since the use of digital tools was defined as a basic skill in the national curriculum. Norway was thus the first European country to have a curriculum linking digital skills with subject-related goals. The use of digital tools must be included in competence goals in all disciplines at all levels, although the impact will vary somewhat for different subject curricula.

Report no. 31 (Kunnskapsdepartementet, 2007-2008) to the Storting, Quality in Schools, and Report no. 22 (Kunnskapsdepartementet, 2010-2011) to the Storting, Motivation – Mastery – Opportunity refer to a temporary increase in the interest in ICT in schools that came after the introduction of the Knowledge Promotion Reform. Investment in equipment, supplementary ICT training for teachers, use of ICT in school subjects and training in the safe use of ICT were prioritized during the initial period, but in 2010 we could see this growth levelling off. Studies and reports from the sector show that digital skills and the use of digital tools were insufficiently integrated into the training (Egeberg et al., 2012).
The introduction of digital skills in Norwegian schools has proceeded too slowly, for reasons including local self-management. This is now reflected in the widening gaps between Norwegian schools. These widening gaps have been documented qualitatively and quantitatively through studies such as Monitor 2010 (Hatlevik, Tømte, Skaug, & Ottestad, 2011), Monitor 2011 (Egeberg et al., 2012) and the Survey of Schools: ICT in Education (EUN, 2013). Gaps are detected in terms of varying allocation of time to ICT in schools, in the digital competence of students and teachers, in teacher training, in absent or insufficient digital learning resources, in the support provided by school owners and in inequalities in the availability of equipment and infrastructure.

Digital skills and the use of ICT for learning do not appear to be embedded in different reform areas, measures, prioritized areas and national programmes to any appreciable extent. The programmes Assessment for learning, Class leadership and School-based competence development for the lower secondary level are examples of national programmes where it is difficult to ascertain whether they relate to the challenges and opportunities found in digital school realities. The inequalities are not unique to the school sector; insufficient attention to ICT has been evident in nearly all parts of the public sector, cf. the debates on the police, the health services and Norway’s declining scores on international rankings of e-government.

The efforts devoted to ICT in Norwegian schools have been at the forefront in an international context. The EU study Survey of Schools: ICT in Education (2013) shows that Norway comes top in Europe with regard to ICT infrastructure and use. In the period 2006-2012, the potential inherent in educational use of ICT has been insufficiently exploited for increasing the students’ motivation, learning outcomes and completion of educational pathways.

A Digital Knowledge Promotion?

The digital dimension of the Norwegian Knowledge Promotion Reform has been insufficiently coordinated throughout the broad programmes and instruments encompassed by the reform. Digital skills were a new skills set in the reform, with a weaker knowledge base than the established skills: oral skills, reading, writing and arithmetic. With some honourable exceptions, digital skills have not been made clear in the competence objectives, forms of assessment rarely include digital tools, and forms of teaching are only relatively little adapted to the use of ICT. It is also noteworthy that none of the ten research projects that have evaluated the Knowledge Promotion Reform address its digital dimension as a separate topic.

The evaluation of the Knowledge Promotion Reform (Aasen, Rye, & Ottesen, 2012) has shown that the sector has struggled to understand and implement the basic skills in teaching and in the subjects. In 2011, the Ministry of Education and Research therefore decided to develop a framework for basic skills, as well as to revise the curricula in the general subjects to reinforce the position of the basic skills. As part of this process, new definitions of basic skills have been prepared, and “basic skills in the use of digital tools” were changed to “digital skills”. Progression matrices for the skills have also been developed, and for the first time there is now a formal document that specifies the skills at various levels of training (Utdanningsdirektoratet, 2012).

The main challenge in the follow-up of the Knowledge Promotion Reform, and in the integration of digital skills in particular, has consisted in identifying the types of educational policies and practices that could best sustain and promote a diverse and differentiated learning environment. This view
is also shared by the Technology Council, which in its recommendation to the Storting has summarized the challenge thus:

The Norwegian school system has invested in infrastructure, but fails to exploit the opportunities provided by ICT to achieve key objectives, such as adapted education or systematic formative assessment. These are areas in which ICT may have a key role, but in which digital tools are currently being little used. Appropriate ICT solutions may also help reduce the administrative burden on teachers, and thus liberate more time for educational work. (Teknologirådet, 2012)

In 2006, the Knowledge Promotion Reform entailed a promise of promotion of digital skills. The next step ought to consist of follow-up in the form of systematic use and coordinated attention to ICT in the educational sector. The Knowledge Promotion Reform also ushered in more freedom for each school owner, each principal and each teacher to define the way in which their school should be run, the tools that should be used and the learning processes that should be regarded as most suitable. On the other hand, the same actors are legally bound to train the students in the five basic skills.

Both national and international research has shown that there are large variations in the capacity of children and adolescents to use digital media for formal learning purposes (Egeberg et al., 2012; Pedro, 2012). It has emerged that the students’ digital experiences from their leisure time cannot be directly converted to appropriate learning strategies, and fail to immediately produce better learning outcomes. Widespread misconceptions of digital skills have been documented in the practical field, as well as limited use of ICT in subject-related areas and high practical and psychological thresholds for teachers to make use of ICT.

The challenges faced by the educational system in the area of ICT require a long-term perspective, totality and consistency, as well as distinct and well-considered plans for appropriate implementation of programmes. More clarity from the national level is called for regarding the priorities in the ICT area, the national measures and instruments that are to be given priority at any given time and the resources that will be available to the sector’s leaders and practitioners. This means expanding the scale of good learning practices with the aid of ICT. It also means that the Norwegian Centre for ICT in Education must reinforce its role as a contributor to the school of the future, in close collaboration with the educational sector. Furthermore, it is essential to ensure that research and knowledge from the practical field are translated into meaningful guidelines for better use of ICT in schools.

The evaluation of the Knowledge Promotion Reform and several reports from the Norwegian Centre for ICT in Education point to a stagnation in the use of ICT in the Norwegian school system. At the same time, this may indicate that we are facing a watershed in this field. Technological, social and political development has helped promote an international dedication of resources to enhance digital competence, and Norway, which undertook pioneering efforts, may slowly but surely be overtaken by the programmes implemented in other countries.

**International trends**

Over nearly 30 years, different countries have chosen different paths to introducing ICT as a tool for increasing the quality, efficiency and social equality in their educational systems. A feature which is shared by all these countries is that a combination of national strategies and concentrated
programmes or beacon projects to promote the use of ICT in their educational systems may prove effective. A review of a number of national strategies and programmes, as well as the country studies in the ongoing project IT2ET\(^2\) shows that there are large variations in how each country uses strategic planning. The majority of the countries included in the project appear to have no major strategic plans for ICT in the field of education. Several countries are opting for individual initiatives or integration of the objectives for ICT in education in national digital agendas.

Depending on the level of autonomy given to schools, national, regional and local policy makers should combine – rather than choosing a single one – a set of actions from the following: defining and implementing specific policies about ICT integration in teaching and learning as well as in subjects, discussing on a regular basis this issue with teaching staff, implementing incentives to reward teaching staff using ICT in teaching and learning, promoting collaboration among teachers about their ICT daily practice, and providing them with time for it. In addition, especially at institutional level, these policies should be systematically accompanied – or relayed when defined at a more central level – with concrete support measures for teachers’ professional development and daily support in the classroom.

In 2012, Denmark updated its digital strategy. The e-Government Strategy\(^3\) has launched a coordinated plan for the entire public sector. With regard to the educational sector, the strategy encompasses five focus areas:

- Support for development, acquisition and efficient distribution of digital learning resources. To develop the market for digital learning media, a total of DKK 500 million has been allocated for the period 2012-2015. This is based on principles of shared, open standards (e.g. a kind of “app-store”).
- Wireless networks in all classrooms by 2014.
- All students should have access to a personal computer by 2014.
- Clear objectives for how digital learning resources will be used and the goals that are to be achieved.
- Research into ICT-based forms of learning.

The goal that all students should have access to a personal computer by 2014 is especially innovative, in that students must start bringing their own laptops, tablets and mobile telephones to school. Schools are obligated to provide a PC for those who have no access to one of their own. The plan states that:

> More individually adapted and differentiated teaching practices require individual tools that the schools therefore should support – as far as possible with the aid of the students’ personal equipment. Schools must ensure that all students may work individually with computers (or similar) in the period up to 2014. This can only be achieved if the majority of students bring with them their own computer or similar for use in their daily studies.

As the first country in the world, Denmark is institutionalizing the trend Bring Your Own Device (BYOD).

The experience from the Danish plans and programmes is highly interesting, since they appear to be shifting schools towards working more with competence development than with knowledge.
reproduction. In Denmark, education is a key component of the overall egovernment strategy. UNiC (Danish IT Centre for Education and Research) is working closely with the political leadership of the Ministry of Education. The Norwegian government’s digitization programme Online with the Citizens (Regjeringen, 2012) says, for example, that “the development of ICT solutions should be seen in association with the work processes and organization of public administration”, but no specifications are provided with regard to the educational sector. The document does not refer to education, with the exception of drawing. Here, Norway and other countries may learn from Denmark.

Denmark has a long tradition of using PCs in examinations at the upper secondary level. Since 2000, PCs have been permitted in several subjects as an examination aid, and this has made digital examinations an engine for the educational use of ICT in Denmark. In the period 2008-2010, the Danish Ministry of Education conducted trials of examinations with open access to the Internet. These trials were also evaluated.4

The evaluation has been concerned with how cheating and plagiarism can be prevented. It points out that qualified monitoring of the students during the examination procedure and installation of security software will be important measures to restrict the opportunities for cheating. Another interesting finding in this evaluation is that in the teachers’ opinion, the high-performing students will benefit greatly from examinations with open Internet access. Moreover, the evaluation shows that teachers increasingly endorse the view that low-performing students have obtained better opportunities to demonstrate their skills at examinations when they have access to the Internet. The assignments have served as a catalyst for the development of the subjects and enhanced the quality of the training in the form of more efficient teaching, better opportunities to make use of the students’ personal learning styles and a better understanding of the depth and breadth of the subjects. The report concludes that examinations with open Internet access are well suited for assessment of the students’ competence in a number of subjects. The trials have been successful and will continue. Today, the authorities are preparing to extend the trial project to other subjects in all disciplines. Permitting Internet access at oral examinations is also being considered.

Today, Sweden has no national plans or programmes for ICT in education. Nevertheless, a number of innovative school development projects have been initiated at municipal level, in collaboration with industry. ComputerSweden (24 October 2012) reports that 94 of Sweden’s 290 municipalities have launched projects for tablet computers in schools. Atea, which is the largest supplier of ICT equipment to Swedish schools, is expected to deliver a total of 40,000 tablet computers to schools in the course of 2012.

According to the Swedish curriculum for compulsory education, students should be able to “use modern technology as a tool for searching for knowledge and for communication, creative activities and learning” (Curriculum for compulsory education, pre-school and supervised after-school activities, Lgr11). However, even though Swedish schools have invested in ICT, the new tools are rarely used for learning purposes. During the school year 2011/2012, the Swedish Schools Inspectorate investigated the teaching of sciences, physical education and health, Swedish and RI. The inspectorate studied whether ICT was applied in a manner that promoted the students’ learning and knowledge development, as well as whether the schools devoted strategic efforts to the use of ICT in education. In brief, they found that:
The acquisition of ICT equipment had not been followed by appropriate educational and subject-related efforts.

School leaders fail to actively manage the use of ICT in various subjects.

The teachers have insufficient digital competence.

This situation has many features in common with that in Norway. For many years, Sweden has debated widely its lack of national plans. Despite this absence of large, national plans, an active school development is nevertheless taking place with the aid of ICT. The tablet computer project in Stockholm is one example, in which 28 schools have received a total of 6,000 iPads. In ComputerSweden (15 April 2013) Stockholm’s school director reports that according to the evaluation, iPads in schools help motivate students. He mentions in particular that the teachers have more varied documentation available for their assessment and that iPads are light, quick and have large battery capacity, but adds that iPads must be personal and cannot replace computers completely.

In Sweden, the local innovative school development projects have been an engine for promoting learning quality. This notwithstanding, the Swedish debate calls for systematic collection of knowledge, better defined guidelines and a national infrastructure. Several Swedish municipalities are now regarding FEIDE as a possible solution to the establishment of a general infrastructure.

The UK was a frontrunner in terms of its consistent ICT programme. When the Labour Party came to power after the parliamentary elections in 1997, schools were set high on the political agenda. Information and communications technology was a key element of the Blair government’s programme for schools. From 1998 and until the elections in 2010, when the Conservative-Liberal coalition took over, the UK stood out in terms of a number of initiatives in the ICT area.

Becta (British Educational Communications and Technology Agency), which was established in 1998, was reinforced and became a spearhead for knowledge development and research, innovation, shared solutions and standards for acquisition of infrastructure etc. In the last five years before the decision to dissolve Becta was made in 2010, the institution was also responsible for implementing the national strategy for ICT in British schools, Harnessing Technology. Becta was dissolved in the spring of 2011. Curriculum reforms are giving more latitude to schools. ICT and digital competences are being reformulated, and it is unclear how these forms of competence will be ensured in the final account. The present trend towards schools that are independent of local government control (“Academies”) means that technology programmes and integration will depend more than before on visible and forceful school heads. Other schools may risk falling behind because of weak leadership. In all, this is likely to result in more pronounced inequalities in terms of technology integration and efficient use of technology nationally.

Singapore is a pioneer of ICT in education, and has implemented three “master plans for ICT in education” since 1997. The first plan sought to establish a sufficient infrastructure in the schools. The second master plan, enacted in 2002, partly sought to reinforce the ability of the schools to use technology in education, and partly intended to prepare the ground for its innovative use in schools, for example 3-D environments. The third master plan for ICT in education covers the period 2009-2014. The plan is based on experience from its precursors, and expands the measures from the pilot stage to the school system. The initiatives are along five axes: ICT in the curriculum and assessment; development of ethical and moral content; differentiated, practice-based competence
development; research and development; as well as ICT infrastructure such as fibre-optic broadband and mobile applications. It is especially noteworthy that Singapore has developed a baseline for ICT competence, which amounts to a minimum set of skills that students aged 6-16 should master. The standards are described in the areas of mastery of tools, search skills, simple programming and digital discernment. Teachers are also expected to comply with these standards as a minimum.

The programmes in Singapore are characterized by a recognition that integrating ICT in education and learning takes time. They include supportive resources for teachers through a national education portal, and provide close linkages between R&D and the practical field. The research programme for digital media is coupled to the needs of the educational sector and to how ICT affects students. Schools are also included as innovators. In 2012, the OECD and Pearson Foundation featured Ngee Ann Secondary School, a Future School in Singapore, in the video *Strong Performers and Successful Reformers in Education*. The George Lucas Foundation featured the school in *Edutopia*, in a video with the title *Singapore’s 21st-Century Teaching Strategies*.

**Hong Kong** has prioritized ICT in education since the late nineties. The programmes have followed a route that has become fairly classic with regard to ICT in schools: first infrastructure, then teaching competence before a more comprehensive programme is developed. Hong Kong’s present ICT programme is embedded in the plan “Right Technology at The Right Time for The Right Task”, adopted in 2007. The plan encompasses six focal points: teaching modules with appurtenant digital learning resources, teachers’ skills in ICT pedagogy, schools’ development plans for ICT, parental information skills and home guidance. The current plan gives priority to integration of ICT in teaching and learning, and takes a systemic approach. Goals for the various groups (students, teachers, parents etc.) and the needs for support that the plan activates are all defined in the plan. ICT is regarded as one of several instruments for teaching and learning, and the plan’s ambition is to enable students and teachers to assess when ICT is the best choice for the learning process at hand. The plan intends to support a transition to more student-centred forms of learning.

The Hong Kong programme also includes development of a framework for the students’ information competence, to be used by teachers to support the development of digital skills among students, as well as a programme for comprehensive school development with the aid of ICT. In addition, Hong Kong has portals for learning resources and interactive tools, as well as full educational programmes linked to the syllabi. Schools have also joined network clusters to promote cooperation and reflection in this area.

Hong Kong is in the process of formulating its fourth strategy for ICT in education. Measures will focus on capacity-building for school staff and on providing an environment in terms of technology and digital learning resources that enables students to develop into self-directed learners.

**Connected Minds and Audacious Leadership**

We need to explore the growing economic and educational imperative for new strategies and policies to achieve an ubiquitous technology environment at school, at home and in the community. In some countries (Argentina, Chile, Portugal and Uruguay) ICT is increasingly viewed as a policy instrument for social inclusion and equity, rather than just an educational strategy. These bold efforts are extending learning beyond classroom walls, helping teachers and students to be more engaged and connected, bridging the home/school gap and improving the lives of families.
The report *Connected Minds. Technology and Today’s Learners* summarizes the OECD project *New Millennium Learners* (Pedro, 2012). Not only adolescents, but also governments and business must constantly be online. The report shows how forcefully ICT is contributing to economic growth. Its conclusion is that “connectedness is shaping the economy and society” (Pedro, 2012: 21). We can no longer afford to remain unconnected. This OECD report argues that the educational sector must follow the impact of technological development for communication, socializing and knowledge administration. Through systematic innovation and educational governance we can reap the potential for improving the students’ performance and enhance the implementation of educational pathways (Pedro 2012: 168).

Leadership in the use of educational technology requires a map and a compass to guide decision-making and action plans. To be truly useful, such roadmaps need to strike a delicate balance: they must incorporate a contextual understanding of real-world technologies, but remain grounded in pedagogical frameworks that guide their application.

Development of digital competence provides children and adolescents with a more varied range of forms of learning, more content resources and often a more stimulating learning environment – and thus with a potential for better and deeper learning. In the schools of the future, students will use digital media innovatively and with confidence to develop the skills they will need as individuals, professionals and interactive participants. A digital culture for learning presupposes involvement, the ability to think critically, cooperation and creative problem-solving: a culture of sharing.

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1 http://www.udir.no/Tilstand/Evaluering-av-Kunnskapsloftet/Prosjektene-i-Evalueringen-av-Kunnskapsloftet/
2 "From IT to ET: Enabling Technologies and European Growth", www.enablingtechnology.eu
3 http://www.digst.dk/Digitaliseringstrategi/Digitaliseringstrategiens-initiativer
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5 http://computersweden.idg.se/2.2683/1.472718/segertaget-fortsatter-i-skolorna

6 FEIDE - Felles Elektronisk IDEntitet [a common electronic identity] - is the solution chosen by the Ministry of Education and Research for safe online identification in the educational sector. www.feide.no

7 http://www.pearsonfoundation.org/oecd/singapore.html