Look to Denmark

Morten Søby

The use of ICT in education is an important aspect of the Danish government’s aim to strengthen professionalism in primary and secondary schools. A key part of the target is that ICT should be integrated into daily teaching to a greater extent than it is currently the case. In this way the huge potential for ICT-based teaching can be exploited to create modern schools with better performance. The initiative to increase the use of ICT in schools is organisationally rooted in the Danish Ministry of Education.

The initiative is part of the Danish government’s common digitisation strategy and includes the following four areas of focus:

– Better access to fully-functioning ICT during teaching;

– Clear goals for the use of ICT and digital learning resources and learning goals;

– Research in ICT-based learning;

– Support for the purchase of digital learning resources.

DKK 500 million have been set aside to encourage the development of ICT in Danish schools. At the same time, an agreement has been reached with Local Government Denmark, the interest group representing Danish municipalities, for the municipalities themselves to be responsible for the infrastructure. In addition, the municipalities are also expected to spend DKK 1 billion of their own funds to purchase digital learning resources.

A new Danish study shows there are positive effects from using ICT and digital learning resources in primary school teaching, since digital learning resources can be used to vary and differentiate teaching and to motivate pupils. Digital learning resources can also help free up time – particularly in terms of teacher planning and preparation. The study is based on in-depth interviews with 194 teachers and two questionnaires distributed to approx. 1425 teachers and approx. 405 head teachers. The study was undertaken during the first quarter of 2014 by Rambøll Management Consulting and Boston Consulting Group.

1. http://uvm.dk/~media/UVM/Filer/Udd/Folke/PDF14/Juni/140619_Anvendelse af digitale læremidler effektmaaling.ashx
The report’s analysis is based on there being great diversity in what can be considered to be digital learning resources. An overall distinction is made between non-didactic and didactic learning aids. Within didactic learning aids there are four subcategories, which are, respectively, ‘repetitive’, ‘communicative’, ‘scaffolding’, and ‘practice-based scaffolding’ digital learning resources.2

**Repetitive digital learning resources** are created for training simple routines, procedures, and/or facts (e.g. letter recognition, counting, grammar, and vocabulary). They are based on context-independent, formalised knowledge, and structured problems that can be coded using binary logic, e.g. true/false, or right/wrong. A typical repetitive digital learning aid is a multiple choice test.

Another type of digital learning aid is the **communicative** digital learning resource, designed for the communication of knowledge within a subject, academic area, or interdisciplinary topic. They often resemble a digital version of a textbook system, since they attend to the same functions in teaching: suggesting tasks and organising teaching, dissemination to the student, but also teacher support and guidance.

**Scaffolding** learning resources are designed in order to support pupils and build scaffolding around their reflexive experiences with content within a subject, academic area, or interdisciplinary topic. They can immediately resemble communicative learning aids as they attend to some of the same functions in teaching, but they distinguish themselves by supporting a different kind of structure in teaching that puts the pupil in focus as the active party and assigns the teacher and learning aid the role of responsive party. For example, this may be in the form of an interactive assistant or an interactive dilemma game.

The fourth category of digital learning resource is ‘**practice-based scaffolding**’. They are designed to support pupils (most often in groups) as they solve realistic, potentially simulated tasks in complex contexts. The learning resources are developed through project work and inquiry based science teaching. They may, for example, be storyline learning-aids that take the shape of epistemic games or interactive, practice-based scaffolding platforms where pupils step into the role of a politician or journalist. There are few examples of this final type in the Danish market.

In the report, the professional, pedagogical, and temporal effects of using digital learning resources are analysed using both quantitative and qualitative methods. For both types of data it is important to emphasise that it concerns **perceived effect** rather than **real effect**.

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The teachers experience the greatest impact of digital learning resources in relation to differentiation, followed by motivation. Digital learning resources with the following characteristics contribute to teaching differentiation:

- **Differentiating functions**: Digital learning resources that have features that can be adapted to the needs of the class as a whole and/or the individual pupil contribute to teaching differentiation. The features can provide the opportunity to adjust the level of difficulty, scope of tasks, and forms of presentation.

- **Intuitive use/good explanations**: Digital learning resources that are good for students to navigate. These contribute to pupils working more independently. This frees up the teacher’s time so that he or she can focus on individual pupils or groups of pupils with special needs.

Digital learning resources with the following characteristics contribute to motivation:

- **“The digital”**: Elements that enable features, colours, sound, photos, film, etc.

- **Variation**: Combinations of analogue and digital teaching forms and materials. The variation represented by the individual digital learning aid (e.g. variation in types of task, use of photos/film, etc.).

- **Learning through play**: Digital learning resources featuring tasks, which in various ways resemble play (e.g. game-like elements).

- **Good layout**: The neat screenshots, products etc., that often characterise digital learning resources.

- **Teaching differentiation**: The opportunity for teaching differentiation as pupils are motivated when they feel they “are a part of it”.

- **Immediate response**: Digital learning resources that can provide pupils with immediate responses to their tasks, including providing a competitive element to the solving of the task.

Digital learning resources with the following characteristics contribute to authenticity and make teaching more realistic:

- **“Reality” and topicality**: Digital learning resources, which in teaching form and teaching material make use of elements from real world and thereby reflect current topics.

Digital learning resources may help to free up time, particularly in terms of teacher planning and preparation. The study shows that digital learning
resources can help in this regard, particularly in terms of preparation, but also in terms of teaching (in the sense that more can be achieved in the same amount of time) and in connection with evaluation.

The digital learning resources’ potential temporal and pedagogical effects are to a great extent dependent on the school’s ICT infrastructure and the teachers’ access to digital learning resources. According to the report, positive pedagogical “effects” depend on: the teachers’ digital skills; in-job training in current digital learning resources; fully functioning networks in schools; and that the learning aid supports project-oriented teaching.

The report makes a number of recommendations to improve learning using digital learning resources. Firstly, further work is required to improve ICT infrastructure. For example, all schools should have a 1:1 strategy realised through a “bring your own device” initiative, through providing tablets/computers to all children, or through a combination of the two. Secondly, it is crucial that there are robust networks in place that can handle many simultaneous users with complex tasks. The third recommendation asks for continued development of school culture, an increase in knowledge sharing, and collaboration. The fourth recommendation is to ensure development of skills for teachers in the use of digital learning resources. In addition, it is necessary to develop a long-term strategy for the purchase of digital learning resources.

The report shows that Denmark is at the internationally forefront with its investment in digital learning resources. Digitisation of schools is also coordinated through an offensive digital strategy covering the entire public sector. Furthermore, Denmark is a long way ahead in terms of digitising and modernising its examinations. We are eagerly awaiting the results of the comprehensive R&D work.

The OECD also says Look to Denmark in the report Measuring Innovation in Education (2014).3 Denmark tops the OECD’s Global Innovation Index in primary and secondary education. The report is based on assessing significant changes in key practices in educational establishments, be they pedagogic or organisational. This approach was implemented using international surveys such as PISA, TIMSS, and PIRLS. Taking all practices together in an overall composite innovation index, countries in which there has been the most innovation at the classroom and school levels in primary and secondary education include Denmark (37 points), Indonesia (36 points), Korea (32 points), and the Netherlands (30 points).

And Norway? As far as the OECD average goes...

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