

**OECD STUDY ON DIGITAL LEARNING RESOURCES
AS SYSTEMIC INNOVATION**

COUNTRY CASE STUDY REPORT ON FINLAND

30 DECEMBER 2008

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1. INTRODUCTION

This is one in a series of country reports prepared as part of the study on Digital Learning Resources as Systemic Innovation being conducted by CERI/OECD during 2008. It focuses on five case studies of systemic innovation in the Finnish school system and draws on:

- background information provided by Finnish authorities on the five case studies, and
- meetings and interviews conducted during a study visit to Finland that took place on 15th-17th September 2008.

The visiting team consisted of Jim Ayre, Managing Director of Multimedia Ventures Europe Ltd., Ólafur H. Jóhannsson, Assistant Professor at the School of Education, University of Iceland, Allan Luke, Professor at the Faculty of Education, Queensland University of Technology, Australia, Katerina Ananiadou analyst at the OECD/CERI Secretariat, and Jan Hylén, consultant to the OECD/CERI Secretariat. During the visit the team met with various stakeholders involved in the different case studies selected by the national coordinator for detailed study in the context of the project. Stakeholders covered a range of institutions, including senior Ministry officials, curriculum developers, educational researchers, teacher educators, teachers, students, media producers, and digital resource developers. A complete list of participants' details is given in Annex 1.

The overall aim of the study is to review and evaluate the process of innovation involved in policies and public as well as private initiatives designed to promote the development, distribution and use of digital learning resources for the school sector. In so doing, the activity will bring together evidence of:

- how countries go about initiating ICT-based educational innovations related to digital learning resources, the players and processes involved, the knowledge base which is drawn on, and the procedures and criteria for assessing progress and outcomes;
- factors that influence the success of policies for the promotion of ICT-based educational innovations, particularly those related to the production, distribution and use of digital learning resources, including involvement of users in the production process and new actors such as the gaming industry and media companies;
- user-driven innovations by learners and teachers, such as innovative production and use of digital learning resources, and how the educational system responds to such innovations.

Accordingly, instead of focusing on discrete institutional innovations, this report aims at a better understanding of how the process of systemic innovation works best in relation to digital learning resources, and of which factors (including variable policy settings, governance and financing, and practical matters of regional and local implementation) influence its development.

The definition of systemic innovation adopted here is: *any kind of dynamic, system-wide change that is intended to add value to educational processes and outcomes*. The aim is to analyse innovation systems and strategies regarding the production, distribution and use of DLRs by bringing together evidence of the drivers for systemic innovation in the five Nordic countries: Denmark, Finland, Iceland, Norway, and Sweden. All countries participating in the study have

selected at least three case studies of recent DLR innovations for in-depth analysis by the expert team.

The following section provides a brief overview of information and communication technologies (ICT) in the Finnish educational system followed by a short description of the different case studies selected for the study. As these form the main focus of this report, they are described and discussed in more depth in later sections. The cases were selected by Finnish officials, in collaboration with the OECD/CERI Secretariat.

2. CONTEXT

The purpose of this review is to provide an overview and analysis of the use of digital learning resources (DLR) in Finnish schools and, based on this, to review and evaluate the process of innovation in a broad range of related policies projects and initiatives. We define digital learning resources (DLRs) as the full range of digital curriculum materials, learning objects, environments, and tools that are available to teachers and students for teaching and learning purposes in educational settings. We acknowledge that the range of DLRs is dynamic, rapidly shifting in relation to technological development and user innovation in educational, workplace and community contexts, face-to-face and virtual environments.

Our focus here is on educational settings including schools and home learning environments. The issue of digital learning resources, further, is addressed: by an analysis of the broader policy contexts for the introduction of ICT infrastructure and digital curriculum materials in Finnish schools; and a selective review of empirical work on the uses of DLRs by Finnish teachers and students in everyday classroom and community work.

Our review involved a range of cases and site visits. We were briefed by senior staff from: the National Board of Education and Ministry of Education on ICT strategy and policy initiatives; the state controlled Finnish Broadcasting Company (YLE) on DLR content; the Vice-Secretary General of the Ministry of Transport and Communications on the current *Ubiquitous Information Society* policy; and by researchers at the University of Helsinki and the University of Jyväskylä on current key research projects. Site visits included a secondary school in Jyväskylä and the City of Helsinki Education Department's Media Centre. We met with members of the Steering Group for the National Innovation Strategy for the Ministry of Employment and the Economy. We also visited relevant websites to examine online resources, tools and learning platforms. Our study also entailed a selective review of relevant literature by Finnish educational researchers on digitalisation and schooling.

In what follows, we first outline the overall policy context and general findings on digitalisation of Finnish schools. We then turn to five case areas for discussion:

- **Innovation in digital learning research and development:** University-based research and development activities;
- **Innovation in digital tools:** digital tools developed within projects supported by, NBE, universities, and private providers;
- **Innovation in digital content:** digital learning objects, online learning platforms, and web-based content by the NBE, YLE, universities and private developers.
- **Innovation in teacher education:** in-service resources developed by the NBE, universities, municipalities and private providers; pre-service teacher education courses.

- **Innovation in gaming:** current developments at the Agora Centre, University of Jyväskylä.

For each case we consider issues of: aims, principles and content, implementation and evaluation. Throughout our comments draw upon baseline information and analysis provided in the Finland Country Report (Taalas & Kankaanranta, 2008). It concludes with a summary of issues and discussion of the current challenges for systemic innovation related to digital education policy and practice in Finland.

2.1 ICT in Finnish Education

Finland, with a population of 5.3 million people, has been acknowledged as one of the most successful education systems internationally. Its success in PISA and comparative testing results is outstanding. Much of this success has been attributed variously to its level of infrastructure and schooling resources, the professionalism of its teachers, and effective traditional print-based curriculum and pedagogy (Sahlberg, 2007; OECD, 2005).

Finland has had three policy waves of innovation in digital learning resources, beginning in the 1995: *Education Training and Research for the Information Society* (1995); *National Strategy* (2000-2005); *Information Society Program for Education Training and Research* (2004-2006). *The National Knowledge Society Program* (2007-2015) is the overarching agenda for policy formation, providing a scaffold for the current *Ubiquitous Information Society Strategy – Action Program* (2008-2011). Various interim and formative reports have been published on the success of these programs. They have marked a gradual transition from a focus on technological infrastructure, to a focus on broader issues of information and technological literacy, to an ongoing focus on community integration and everyday use. Ilomäki (2008) provides a detailed description and review of national ICT strategies.

The current aim of National Board of Education is to develop digital capacities in the context of learning subjects of the national core curriculum via a “learning environments” approach (Manninen, Burman, Koivunen, Kuittinen, Luukannel, Passi and Sarkka, 2007). In this approach, ICT is seen as one key aspect of learning environments, which are described in terms of physical, technical, social and local variables. The Ministry of Transport and Communications coordinates the *Ubiquitous Information Society Strategy* (2008), a joint initiative with the Ministry of Education and the National Board of Education. This includes an ICT in education strategy for 2008-2010, including an identification of “best practice” innovations in schools.

2.1.1 World Class Innovation

In education, these policy waves have enabled different, overlapping approaches to digital resources in schools: an evolution from foci on (1) providing digital infrastructure and teacher professional development with new technologies, (2) developing curricular materials and digital tools for teachers, to a current focus on (3) digital resources as part of whole school reform and learning environments, with the aim of changing classroom pedagogy. These include Ministry of Education teacher professional development provided online through the Virtual School, high quality learning objects, digital archives and educational programmes and online content developed by the state broadcaster YLE. Many of these innovations benefitted from exchange and cooperation with other Nordic countries in the 1990s.

This follows larger international and European paradigm shifts in attempts to optimally deploy digital resources: shifts from an emphasis on technical infrastructure to workforce capacity (e.g., Cuban, 2003); shifts from an emphasis on individual learning objects to their use within learning platforms, shifts from a focus on curriculum to a focus on pedagogy (e.g., Warschauer, 2007). In this way, innovation and the policies related to digital learning resources have been logical, incremental evolutions following the field, rather than arbitrary paradigm shifts. This is particularly important to note, given the degree of teacher scepticism towards successive waves of digital policy that we note later in this report.

The Review Team found that each of these waves of policy have created an environment of grassroots and decentralised, 'bottom-up' innovation. This is in part because of the autonomy of local municipalities to interpret the national curriculum and central policy: the 'loosely-coupled' educational policy that has, to date, been highly successful. The Case Studies presented in Section 3 below illustrate the wide range of high quality and innovative resources developed over the past decade which are currently used in a range of local sites.

These innovations have resulted in: classroom and school-infrastructure at international standards (e.g., Kankaaranta, 2008), a range of quality digital resources available from different government and non-government sectors, a rich digital archive of curriculum materials for teachers, diverse university-based research and development activities, national online teacher in-service programs and content, and innovative video game resources and materials.

2.1.2 Evidence of School and Teacher Use

Yet the uptake of these has been extremely variable. As the Country Background Paper reports: by comparative international standards, the actual use of digital resources by teachers is not widespread or ubiquitous (Taalas, 2008; Kankaaranta, 2008). In the International Education Association SITES study comparing technology and pedagogy in 22 countries, Finland ranked in the top 8 in terms of computers in schools. But its maths and science teachers reported lower rates of ICT usage than in 9 other countries – including their counterparts in Denmark and Norway, but also Canada, Hong Kong, Singapore, Italy and Chile.

There is little large-scale observational data on use of digital resources. The strongest impact has been in teachers using the web as an accessible archive of curriculum materials (print/traditional and digital): 90% of teachers self-report that they use materials sourced online (European Commission, 2004). But this gives us no indication of the use of digital technology in classroom pedagogy.

In a representative sample of year 8 teachers, less than 30% of teachers self-report as using digital technology “often” in the classroom, with science and maths teachers having the lowest rates of usage (Kankaaranta, 2008). Further, when actual uses were sampled, word processing, spreadsheet and email use were rated highest (95+%) – with digital learning resources and media production tools accounting for 70+% of use. Simulation and games, interactive white boards and mobile communication devices were the least frequently used media. Finally, there is emerging evidence that actual uptake of digital resources in classrooms has stalled and began tailing off slightly in the late 1990s (Taalas, 2008).

In sum: There is a range of quality and innovative materials available to teachers and schools. But the uptake has been extremely variable. Teachers are using digital technology – for

professional and personal communications, for accessing conventional lesson and curriculum materials, and for administrative purposes. But the daily use of digital learning resources by learners and teachers in classroom could be estimated, on the basis of an overview of self-report data, to occur in no more than a third of classrooms – varying greatly by subject fields and levels.

There is little evidence that digital learning resources have had a major impact on everyday pedagogy – teaching/learning interactional relations between teachers and students. Further, there is very little evidence that digital resources have supplanted print textbooks as the dominant focus of the curriculum to any significant degree. There is no generalisable or system-wide data on the effects of digitalisation on student learning. These findings have been triangulated in the limited published data on Finnish schools, and were corroborated by every stakeholder interviewed by the Review team.

2.1.3 Factors Influencing DLR Innovation

The tendency internationally has been to look to two principal explanations: the lack of school technological infrastructure and support; and resistance and lack of capacity by the teaching workforce (Cuban, 2003). Other researchers have raised the aging teacher demographic profile as another explanation for limited uptake of new technologies (*e.g.*, Lankshear & Knobel, 2007).

However, the emergent view here is that the picture is more complex. In Finland, as noted above, *there has been considerable and ongoing investment in school technology and in teacher education and upgrading at all levels.* The Ministry of Education, and several municipalities continue to offer in-service teachers in digital competence through both online and face-to-face training modules. All preservice teacher education programs provide introductory training with digital resources. However the duration and depth of introductory training varies greatly across universities and programs; there is no generally agreed syllabus content for pre-service training. Though there is variance across the system, with a substantial number of small and remote schools, there is little evidence that schools generally have insufficient technical infrastructure or that teachers are poorly trained compared to other countries.

The Country Background Paper, published literature, and stakeholder interviews conducted by the review team suggest a range of factors that, taken together, can be seen to influence the patterns of school use and innovation with digital learning resources. They include:

STRUCTURAL FACTORS

1. Decentralisation and Problems with Systemic Communication

There are major challenges involved in mandating and implementing centrally an approach to DLR innovation within the context of a decentralised, municipal school governance and curriculum planning system. There is also evidence of a significant number of small/medium-sized, innovative projects funded by government and national agencies which, when combined with “bottom up” initiatives, have the potential to be a driver of change in schools. The fact, however, is that while there is a critical mass of projects and initiatives, they appear to be fragmented or too ‘loosely coupled’ and lack a strong connection to the research base within the country (which is itself not optimally networked).

The innovation emerging from university/school partnerships, innovative schools and municipalities, specific teams of university researchers and teachers, is thus largely local

and regional – with no systemic discussion to date of the issues around generalising and ‘scaling up’ local success or comprehensively networking different programs. There appears to be no central digital ‘clearing house’ for teachers and schools, or students, to access the wide array of materials and providers. Alternative approaches to content and information sharing, such as federating municipal content repositories, are similarly not in evidence.

There is also a lack of systematic coordination or targeting of efforts of the education sector, other Ministries, universities, NGOs, technology companies, tools’ developers, textbook publishers, broadcasters and media companies.

The risks of the current situation are multiple: the duplication of efforts and lack of synergy between innovations is an obvious concern. Further, the study team saw instances where high quality work of demonstrable efficacy in DLR development, online tool development, teacher training, and local game development was at risk of ‘fading away’ because of lack of systematic profiling and exchange beyond the municipality and region.

2. Lack of Documented Results

Despite the high quality work in specific cases noted here and the published literature cited in the Country Background Paper – there has been little comprehensive, widely-circulated evaluation of educational interventions to date. The Country Background Paper itself appears to be the most comprehensive overview to date. Linked perhaps to the decentralisation issue above, measurement of impact appears to be restricted to descriptive evaluations of individual projects and initiatives.

This paucity of documented results over three waves of innovation regarding DLR, however, has not led to a situation where policy makers now urgently recognise a need to address this a potential residualisation of existing workforce capacity and digital resources. On the contrary, the reported view of many senior policy-makers is that there has simply been “too many projects” and that analysis of previous and current innovative practice, or tools’ and learning platform developments, will not be productive in terms of shaping future national strategies. The risk is the potential loss of existing DLRs, and a failure to capitalise upon previous investments in teacher and developer expertise. Finland has entered a second decade of digital educational policy and innovation: a whole scale appraisal and analysis appears to be needed.

‘EDUCATIONAL’ FACTORS

Factors that reflect and influence teacher beliefs and school operations include:

3. Evidence of success of current school practice

For teachers, Finland’s successful international performance on PISA may be providing a disincentive to reform print-based curriculum and pedagogy. Parents and politicians may also be resistant to change if conventional Finnish approaches to teaching and learning are producing internationally acclaimed results (see also cultural factors).

4. Quality of existing non-digital resources

Finnish teachers rely heavily on print textbooks, which have a strong impact upon the structures of pedagogical exchange and interaction in classrooms. As in other smaller countries, there is also little evidence that national textbook publishers have yet found an

economically viable business model for the production of DLR that would lead them to risk what is a profitable textbook market. Compounding this situation, there are anecdotal reports that, as a consequence of PISA, some recent, visiting educational delegations have even licensed Finnish textbooks and translated them verbatim (as opposed to producing localised version for their own country), in the hope of improved test score outcomes. Within the context of a successful philosophy of collaborative learning, the Finnish textbook continues to be the dominant classroom resource and pedagogy remains largely talk and print-based.

5. School leadership

There is evidence in Finland that school principals have quite negative attitudes towards the role of ICT in schools. For example, in 2006, only 5% of principals at lower secondary schools considered ICT very important for changing the performance of pupils. This is a clear impediment to the adoption of DLRs. It is difficult to see how pedagogical innovation can be fostered in schools unless there is systematic professional development or incentives for principals and other school leaders.

6. A ‘disconnect’ between ICT use and assessment

The senior matriculation examination is a traditional print-based curriculum assessment that does not require digital skill or competency. Ironically, YLE’s most popular digital resource with students is the *Abitreenit* exam preparation site where pupils can revise for the paper-based matriculation exam using web-based materials, TV programmes and a discussion forum. In sum, the high stakes assessment system does not motivate senior subject teachers to engage with digital resources or new pedagogies.

7. Change fatigue

There is evidence of many enthusiastic early teacher adopters of digital resources and information technology at national level. Given the age profile of the teaching workforce, it is important that their expertise and ‘institutional memory’ be renewed. At European level, NBE has made a very strong contribution in DLR projects such as CELEBRATE and some 811 Finnish schools are currently registered in the European Commission’s eTwinning initiative. At the same time, there is also evidence that many teachers, particularly those nearer the end of their careers, appear to have become inured to successive waves of digital reform and affiliated claims about the potential of ICT to effect radical change in teaching and learning.

8. A ‘disconnect’ regarding ICT use in and out of school

There is extensive evidence that Finnish adolescents’ ‘out of school’ uses of digital technology (mobile communications, blogging, social networking, gaming) do not dovetail or match teachers’ and school use (Taalas, 2008). Specifically, there appears to be a growing discrepancy between students’ expanded digital competencies and cultures and the applications of DLRs in schools.

CULTURAL FACTORS

9. Lack of belief in ‘home grown’ innovation

Linked to the results of the two PISA studies, international attention and the media have speculated on the reasons for Finland’s successful educational formula according to these assessments. However, within Finland, scholars have already highlighted that PISA results came as a surprise to the main stakeholders in Finnish education and that “Finns

are used to think that models for educational reform have to be brought from abroad.” (Väljörvi, 2004).

Certainly, a recurrent theme of the interviews and briefings was a crisis of confidence over what had been achieved already via major ICT initiatives, such as the Virtual School. There was a shared uncertainty over the direction of educational innovation, with ICT in the education sub-program coordinated by the Ministry of Transport and Communications.

Finland continues to cooperate with other countries in the design of ICT strategies, recognising the importance for careful national and regional adaptation. The aim is to develop a new strategy for ICT use in schools, drawing on findings from 4-7 new pilot projects. However, if a well articulated ‘vision’ is seen as a prerequisite for successful DLR innovation, there is continued uncertainty about what has already been accomplished, the successes and problems of previous policies, and overall system capacity. As noted, a whole-scale ‘stocktaking’ of current and previous activities is needed.

10. Impediments to the promotion of good practice

The conservatism of Finnish teachers and their strong commitment to print and face-to-face collaborative interaction were mentioned repeatedly during the visit, as was the reticence of teachers to showcase, actively promote and share their own personal forms of classroom innovation with DLR. Others commented on the organisational structures and everyday cultures of schools, where workloads, existing professional responsibilities and lack of incentives may play a role in deterring innovation. These may be contributing factors to the difficulty in ‘scaling-up’ school and project-based innovation and development. This could also be detrimental if it inhibits the emergence of high profile ICT educational leaders who, in some other countries, have motivated inexperienced teachers and been important drivers of change.

3. CASE STUDIES

This section offers analyses and discussions of innovative practice currently in use in Finnish education. For each case, we report the nature of the innovation, its sources and principles, implementation issues, monitoring and evaluation with summary comments on implications of the case.

3.1. Innovation in Research and Development

Finnish university researchers have undertaken internationally recognised research and development activities in the field of digital learning. This has led to new theoretical models, and important teacher and school-based development activities. Finnish researchers have developed and prototyped the application of “dialogical learning” (Paavola and Hakkarainen, 2004) to explain learner interaction with new technology at the University of Helsinki: this is a major paradigm in the cognitive learning science field that dominates educational research on new technologies. It marks a shift away from the nature of technology as ‘tools’ towards the study of human interaction with and around technology, drawing broadly upon sociocultural activity theory. Hence, current work in the University of Helsinki Department of Psychology focuses on

working with teachers to shift the pedagogical interaction away from didactic, traditional print-based models. This research has informed the content and structure of the Helsinki municipality's professional development courses. It also has led to several school-based interventions which have successfully engaged students in problem-based and constructivist curriculum. These form a model of university/school, researcher/teacher collaboration. The cases have been documented and evaluated in published research papers (Ilomaki, Lakkala and Paavola, 2006),

Research teams at the University of Jyväskylä have made important contributions in terms of tools' development (Institute for Educational Research, 3.2) and gaming (the Agora Centre, 3.5). The Agora Centre's emphasis on an interdisciplinary approach is particularly interesting, bringing together researchers in the area of IT and computer sciences, mass communications, linguistics and education under a research umbrella that aims at private sector and corporate innovation. The educational research and development strategy has focused strongly on the documentation of students' out of school technology uses. Government supported research has examined the mismatch of students' and teachers' technology use, new youth technological cultures, language-use with new technologies (e.g., Taalas, 2008). This has led to professional development and school-based interventions on technology and language with migrant students in local schools; the introduction of new digital tools and games to municipal schools, and change in the University's teacher education curriculum (3.4) below.

There is high quality research on digital learning resources and technology in education and schooling occurring at other Finnish universities. It has and continues to receive international recognition and citation. This work approaches the issue from diverse theoretical and disciplinary paradigms. In many cases, it has yielded school and municipal level development activities with teachers. This has been evaluated and documented in qualitative case studies of school reform and pedagogical innovation.

However, as much of the other innovation described in this report – there appeared to be little systematic effort on the part of Ministries, statutory bodies or the private sector to coordinate their efforts, or to disperse the development and training models and research findings broadly. While coordinated work and action across academic communities has proven difficult in many national settings – *better coordination or a clearing house of research and development activities might enhance the efficacy of researchers' work to date in influencing reform.*

3.2. Innovation in Tools

Peda.net

The Peda.net collection of web tools is a subscription-based service that emerged out of a small, regional R&D project at the Finnish Institute for Educational Research, University of Jyväskylä. This initiative currently provides both municipalities and individual schools throughout Finland with access to: a VLE called Oppimappi; a platform (portal) called Veräjä that allows teachers to create, collect, modify, and share information or materials; a WebMagazine authoring tool; and OpsPro, a tool for writing, maintaining and publishing the school curriculum. Peda.net membership fees depend on the size and the number of schools in a municipality or the number of pupils in an individual school.

Funding for the original project was obtained from the European Social Fund in 1997 at a time when few people within the university were enthusiastic about this sort of project. As is the case in many countries, the driver behind the development of an innovative suite of tools has been the vision, enthusiasm and, sometimes, the dogged persistence of the development team itself. The

survival of Peda.net following the end of project funding and its current longevity can probably be attributed to a number of factors: the shallow learning curve and user-friendliness of the tools themselves; involving users as co-developers of the tool set; the academic background of the development team and the intention that the tools should be “pedagogically neutral”; effective teacher training and support; and an affordable subscription model.

The development team’s plans to extend Peda.net currently include the implementation of a ‘layer’ on top of the tools themselves that will provide pedagogical support, including scenarios related to the innovative use of DLR and curriculum based models and practices. This will be important as there are now many similar tools available to schools in Finland and Peda.net will need to stay innovative by providing added-value services beyond the tools themselves. The graphic design and interface of some Peda.net tools may also need further development to ensure that Peda.net remains competitive with learning platforms and tools that are now incorporating more Web 2.0 functionalities.

Peda.net remains a good example of successful “bottom up” DLR innovation that has had a significant impact at national level. However, it is unclear how it fits within the current strategy for ICT in schools or how it will continue to evolve, particularly as it now exists in a market where many similar open source or free tools have been successfully introduced. For example, to highlight just a few of these, Finnish schools currently have access to the award winning Magazine Factory¹, the LeMill² web community for finding, authoring and sharing resources, and the Pedamate³ platform that allows teachers to create, modify and share learning resources. As indicated below, the state broadcaster is also offering a number of innovative content services to schools.

Of course, Peda.net must also now promote its tools alongside commercial providers such as SanomaWSOY that is professionally marketing its Opit learning platform. In this context, Peda.net has decided to co-operate with the commercial content provider Otava. As yet, however, it is unclear whether this strategy will result in Peda.net significantly increasing its market penetration.

What is the fact that, over the last ten years, Finland seems to have gone “from famine to feast” in terms of the number of innovative tools like Peda.net that have become available to its schools. Tools development also seems to have emerged as a systemic part of the DLR landscape, at least partly because a number of universities (LeMill was developed within the EC-funded CALIBRATE project) are exploiting European funding channels. While this is an encouraging development, it nevertheless presents new challenges.

Finnish tools’ developers exist as a fragmented community, each group largely working on their own projects and struggling to find economic models that will allow them to survive. No national agency yet seems to have attempted to coordinate their efforts or to help tools’ developers to connect with broadcasters like YLE or other organisations (e.g. museums, science centres) that are digitising their content. Teachers are also increasingly being presented with (and possibly confused by) a plethora of rival tools, but there is no regulation of the tools being adopted (unsurprising given the decentralised educational structure) or any agency that has yet carried out a comparative evaluation of available tools.

¹ <http://www.edu.fi/magazinefactory/>

² <http://lemill.net>

³ <http://www.pedamate.com>

3.3. Innovation in Digital Curriculum Content

YLE

YLE, Finland's national public service broadcasting company, operates four national television channels and six radio channels and services complemented by 25 regional radio programmes. It has made significant progress in offering digital resources and services to Finnish schools and the impact of some of these is clearly evident from pupil uptake. The Abitreenit exam preparation site, for example, allows pupils to revise for the paper-based matriculation exam using web-based materials, TV programmes and a discussion forum. In Spring 2008, nearly 28,000 users per week were recorded as using the site out of approximately 30,000 matriculation exam candidates. Abitreenit is also an example of a 'home-grown' innovation. The YLE service was launched in 2001, not long behind the BBC's Bitesize revision service for schools that was launched in 1998 in the UK.

Mirroring to some extent services offered by several other European broadcasters, YLE has also introduced: its own digital "Living Archive" of video and audio clips; the Areena service that provides streamed (and soon downloadable) programmes that have been copyright cleared for online use; and the new Opettaja TV.

While working within a relatively modest budget, YLE's Learning & Science division, appears to be delivering both innovative and popular DLR services for schools. However, it acts with a considerable degree of autonomy; there is cooperation with NBE and the Ministry of Education but decisions on what types of services to provide to schools are largely made within the company itself, rather than in response to a direct request from government or educational agencies..

YLE is currently a member of the current Ubiquitous Information Society Advisory Board that is examining how to improve "cooperation between different administrative sectors." This may be a key issue for the Advisory Board, as there are areas in which YLE might clearly benefit from an even closer cooperation with NBE; for example, by leveraging recent work at NBE related to the implementation of Creative Commons' licenses for open educational resources and new approaches to professional indexing and social tagging of content in the NBE repository.

The diversity of approaches to IPR within Finland is worth noting here. For example, how will YLE meet the inevitable demand from teachers who wish to adapt and repurpose YLE content and maybe share it with other schools in Europe or internationally? YLE content also exists in a market that includes both private sector and non-profit tools' developers providing subscription services (SanomaWSOY and Peda.net) and others (LeMill) who have an almost ideological commitment to free software and open educational resources. LeMill, for example, only permits use of content that has a Creative Commons Attribution-ShareAlike 2.5 license. How can YLE work equitably with these different groups? Will DLR innovations from the state broadcaster provoke a reaction from commercial publishers in Finland, as the BBC experienced when it used the UK license fee to support production of free DLR for schools?⁴ Or, will effective monitoring by copyright organisations in Finland mean that both public and private sector content providers find it easier to coexist? Finally, how will the concept of an international 'digital commons' for educational content fit within a new national strategy for ICT and DLR?

In conclusion, YLE appears to be very capable of defining its own strategy for successful DLR innovation at national level. Nevertheless, there is evidence that it could benefit from even closer cooperation with some of the other stakeholders within Finland that are defining policy,

⁴ http://www.bbc.co.uk/bbctrust/news/press_releases/14_03_2007.html

developing tools and implementing school-based ICT innovation. A greater focus on IPR issues might particularly be necessary in order to ensure that YLE's publicly financed content can be exploited by all Finnish DLR stakeholders.

Virtual School

Launched in 1999, the Virtual School project is part of the national Information Society Programme and was one of the major action lines in the 2000-2004 national information strategy. The core of the Virtual School is a portal that is part of the online Edu.fi service maintained by the National Board of Education. The portal functions as a channel to disseminate best practices and offers information about study opportunities and learning materials. Responsibility for provision of virtual education lies with the schools and other educational institutions.

Throughout its existence, the Virtual School project has had a significant impact on both developing technological infrastructure (in an earlier phase) as well as on the production of learning materials. It has also carried out several extensive development projects in co-operation with education authorities, education providers and schools in order to develop and produce study modules, support services and learning resources.

For a top-down, national initiative of strategic importance, however, it is surprising that the financing for the Virtual School project as a whole has not been better coordinated (which would facilitate longer-term planning) and that a budget has been granted annually according to perceived demand. A major difficulty seems to have been that the initiative was funded from four different state budget lines for: developing teaching materials; computers and pedagogy; in-service training; and development of a small, national portal. This led to overall issues around integration and implementation.

The ability of the Virtual School to shape and help consolidate local projects and initiatives may also have been limited initially by the fact that some municipalities received direct funding for projects, tended to work autonomously and failed to share materials produced in their projects via the national portal. Subsequently, parallel projects were developed and distributed via the portal, which now contains around 400 titles for teachers and students.

In 2001, a digital learning resources group (working in parallel with the Virtual School) made a series of recommendations concerning support for a wider range of delivery platforms, solid evaluation criteria for learning resources, improved distribution channels and the creation of an information bank for teachers. These reasons as to why this advice was not taken up by government is not clear but, as a set of recommendations for improving DLR innovation, they would not look out of place in our own 2008 report, particularly given the 'loosely coupled' nature of DLR innovation that has been observed.

NBE as an agency and its Virtual School project have made important contributions to the use of ICT and DLR in Finnish schools over a considerable period. NBE also makes continuing contributions to teacher training, publishing, seminars and networking. While it is difficult to single out specific innovative actions in a project with such a broad remit, it is important to highlight the following:

- In terms of DLR generally, NBE has moved quickly to adopt standards-based approaches to indexing resources (LOM-based application profiles) and to explore the potential of re-useable learning objects (LOs) in European Schoolnet's CELEBRATE project. Finnish teachers and researchers in CELEBRATE also provided some of the best and most influential case studies on LOs (Ilomäki, 2004).

- NBE has moved to create attractive learning resources for children with special educational needs and to address a sector of the market that is seen as providing no viable commercial return. As government rethinks its ICT strategy via a small number of new projects, it is important that the momentum is maintained here.
- Quality criteria for learning resources were drawn up by a working group (researchers, teachers, publishers, production houses, education developers) in 2005. These represent a major step forward in this field, have impacted on the thinking of several European Ministries of Education and continue to be exploited in large-scale, EC-funded projects such as MELT.

3.4. Innovation in Teacher Education and Professional Development

Initial teacher education in Finland has been recognised as setting international benchmarks (e.g., OECD, 2005). A Masters degree is required for all teachers in compulsory schools (age 7-16). Class teachers, for pupils in forms 1- 6 study education as their main subject. Subject teachers usually follow the so called consecutive model, meaning that student teachers first complete studies in the main subject areas and after that they complete a one year study in education and pedagogy including teacher practice.

According to the available information, studies in ICT have not been an integral part of teacher education until recently. Taking into account the age profile of Finnish teachers, it seems likely that relatively few of them have had an opportunity to study ICT during their initial training. In-service training of teachers seems, therefore, to be the way to provide them with the necessary understanding and skills in using ICT (or DLR) in their daily teaching.

In the decentralized school system of Finland, municipalities and individual schools are responsible for the in-service training of teachers. But the state has also taken initiatives in in-service training of teachers with an emphasis on ICT pedagogy. One example is an ambitious program from 1996 with the goal that “every fifth teacher in the whole teaching cohort in Finland would participate in the so called Tieto Suomi courses between 1996-1999” (Country Background Paper, p.7). Referring to the same reference, “only 10% of the teachers had gone through the intended training” in 1998 (ibid p.8) and teachers that attended the courses “did not take the know- how back to their schools as was assumed” (ibid p.22).

Another major state effort to be mentioned is the OPE.Fi I, II, III training framework initiated in 2000 with the goal of providing 30,000 teachers (out of 44,400) with in-service training in ICT and to “ensure that all graduating teachers have learnt the equivalent skills during the university studies” (Country Background Paper, p.8).

It is difficult to obtain data on the scale of in-service training of teachers with regard to DLR in Finnish basic education (almost 3,600 schools). Below are brief descriptions of two cases of initiatives in supporting teachers with knowledge and skills in DLR.

Professional development: Helsinki school district media centre

The main purpose of this media center is to develop media education and e-learning in Helsinki by supporting teachers’ ICT skills and media competences and provide support to schools using DLR. The emphasis has moved from technology towards pedagogy, drawing, in part, on models of learning and activity from University-based research. The center provides a range of in-service courses for teachers with an emphasis on DLR and web-based learning environments.

In the municipality of Helsinki there are jointly agreed focus areas in the curriculum work and the schools employ these in their own curriculum work. The curriculum content will be based on competences, emphasizing the process of learning. This is considered to be working against the individualism of teachers which, according to Pasi Silander, the Media Centre's Special Planner, characterizes teaching in Finland.

The schools decide themselves which materials they use. The purchases of the digital material are centralised in many municipalities. Publishers of educational material, mainly textbooks, can have an impact on the teaching methods in the sense that every textbook is supplied with a thorough teacher's guide. This can lead to fairly homogenous teaching in Finnish schools.

It was mentioned that, in a decentralized school system, principals play a key role in all efforts of changing school culture and teaching practice. The education of principals is therefore likely to be a major catalyst in improving teaching and learning in Finnish schools. The demand for training programmes appears strong, maybe partly because the Helsinki administration provides funding for staff to cover for those attending courses. In other parts of the country, funding for this comprehensive approach to teacher inservice education and professional development is in shorter supply

A major factor inhibiting DLR innovation in schools may be that, even with adequate training, many teachers want, not simply to use DLR but to adapt resources and even create their own materials. Even with training programmes such as those provided here, this remains technically challenging and can raise issues regarding the intellectual property rights of the resultant resources, including their use in open source environments. The Media Centre's Special Planner, with a background in education and in commercial resources development, suggests that most teachers do not currently have the professional resources or capacities to create quality educational resources or to adapt these.

Pre-service Teacher Education

At the University of Helsinki and the University of Jyväskylä the team met with teacher educators and educational researchers. These universities, like others across Finland, have a required pre-service teacher education subject that all student teachers must take. These subjects typically introduce teachers to basic information technology competence, familiarising them with a range of tools and learning objects. The course at Jyväskylä featured the study of work on digital youth cultures – but the principal focus of these courses is the provision of skills that might generate constructivist pedagogies.

However, both sites reported that there was extremely variable uptake of digital resources in the other key curriculum subjects. The problem here is that there is little consistent emphasis on digital resources across the curriculum – an issue facing teacher education programs internationally. The result, according to SITES and other data (Taalas, 2008; Kankaanranta, 2008) is that the uptake and use of digital technology is inconsistent across subject areas in schools, with the highest frequencies of use in information technology courses, for obvious reasons. The uptake in other areas of the curriculum – from maths and science, to Swedish and English – appears to be extremely variable, with overall low levels of usage reported. *It would appear that the 'silo' of a discrete information technology component in preservice teacher education contributes to teachers' lack of engagement with digital learning resources across the curriculum.*

3.5 Innovation in gaming

Video gaming research – and work more generally on the creation of digital learning environments that are based on user active participation in narrative and simulated scenarios – is a growing area of educational research and development (Gee, 2007). Video gaming has become an important part of youth digital culture out of schools, even at very young ages – with a large scale uptake of dedicated gaming consoles (e.g., X-Box; PlayStation) in EU and North American contexts. Some educators have argued that video-gaming generates user-agency with complex problem-solving skills, collaborative work, narrative understandings, and scenario planning .

Video game development for educational use is underway at the Agora Centre at the University of Jyväskylä and brings together information scientists, educators, linguists and private-sector stakeholders. The results have been the development of high quality DLRs, and the development of video-games which are currently available to teachers. Major research and development work is underway that engages youth in the development of games. As in much of the other development noted above, the result has been state-of-the-art work that is of an internationally marketable calibre.

Yet, as with other developments, issues of dissemination, implementation and marketing remained unclear. *There also seemed to be lack of a clear sense of the relative roles of the private sector and government funded research and development in overall approaches to digitalisation.*

4. CURRENT ISSUES AND FUTURE CHALLENGES

A case school visit

The development of DLRs and educational policies on digitalization ultimately come to ground in schools and classrooms, with teachers and students. We conclude our report with brief commentary on our brief visit to a Jyväskylä municipal high school. While the school cannot be taken as an exemplary or generalisable case for Finnish education, our visit brought together and focused many of the themes that we have reported above.

This urban school enrolled approximately 500 year 7-9 students in a well-resourced and staffed environment. It was opened as a ‘school of the future’ in the early 1990s, with technology infrastructure support from local telecommunications companies. After an initial start up period, a number of issues around the infrastructure maintenance and the operational realities of school and community context developed. Subsequently, the school has returned to a traditional print-based learning environment. School leadership and teaching staff, though highly professional and experienced, expressed little specialist interest in digitalisation or pedagogical reform.

In a language lesson, pupils listened to an audio tape of a conversation in English while they followed the text in their books and then individual pupils were asked to read the same text aloud in Finnish. In a Swedish language class, the teacher used an overhead projector to do a past tense exercise with the class. Computers were visible in the music room but the teacher noted that the emphasis was on teaching pupils to play real instruments. The Chemistry lesson consisted of blackboard and verbal instructions and a hands-on traditional experiment. Religious education instruction entailed an oral listening activity. A teacher of domestic science stated that there was little need to use computers in her subject.

The most extensive use of DLR was, not surprisingly, in the school ICT lab where a lesson was in progress that required pupils to do a simple exercise on the derivation of names. This involved searching for information on the Internet and answering questions that had been set by the teacher using one of the Peda.net tools. Most pupils seemed to have no difficulty completing the work. Indeed several seemed to finish it quite quickly and showed an ability for web-based research that was not being fully exploited by the set exercise. Other students were using the computers for social networking and general web-browsing, having completed the activity.

We do not mean to suggest that any or all of these teachers should be using other technologies or DLRs in these lessons, particularly given the brevity of our visits and conversations. Knowing how and where and, indeed, whether to use ICTs in schools and classrooms depends on a variety of complex educational variables and on the professional judgement of teachers and principals. Nor can this single case school visit cannot be taken as generalisable. We, like many visitors studying Finnish schools, were impressed by the overall resourcing of the school, the professionalism of the teachers and support staff, and the levels of engagement of the students.

But it focused and triangulated many of the themes and issues that had been raised across the visit by Ministerial staff, researchers, teacher educators and teachers: that the levels of engagement with digital learning in schools were neither frequent nor 'ubiquitous'. The pedagogy across the curriculum was an admixture of textbooks, black/whiteboard demonstration, teacher-led talk, collaborative exchange, hands-on activities, and the generation of print artefacts by students.

Conclusion

We have here described the Finnish context of innovation in digital learning resources. Finnish education has been the site for a host of grassroots, small and medium sized innovative projects in digital education. These range in scope from the school and municipal innovations undertaken with university partners, to the Ministry's virtual schooling resources for teachers, to YLE's digital archives project on Finnish history. The Review team also saw evidence that many Finnish schools and teachers are using digital resources and information technology in creative and innovative ways. For example, several schools teamed with the University of Helsinki researchers were developing new pedagogies, new digital literacies and innovative learning materials.

But these appear to be exceptional cases. The overall picture here is of substantive local innovation, a broad range of available digital learning resources and tools, a successful building of school infrastructure, reasonable levels of teacher proficiency - with little system-wide spread and uptake.

Digital innovation in Finnish schools is at a key juncture. We have described structural, educational and cultural impediments to the effective dissemination, coordination and use of digital resources. This is not an uncharacteristic or uncommon policy dilemma. There is visible indecision in the field. After a decade of enthusiasm and successive waves of 'reform' across OECD countries, there is little clear international consensus on the specific educational effects, and even what might count as evidence of changed teaching/learning relations in the field. Finland, and many of the countries of the SITES survey, have reached international benchmarks in technological infrastructure and teacher capacity – but actual substantive change in the classroom seems elusive.

Development of the *National Innovation Strategy* (Ministry of Employment and Economy, 2008) and the *Ubiquitous Information Society Action Program* (Ministry of Transport and Communications, 2009) are in progress as this report goes to press. The former will identify the

need for a new workforce with high levels of digital capacity and engagement, optimal community digital resources and utilization, and an educational system that enhances entrepreneurship and innovation across the economy and culture. The latter will attempt to identify best practice in schooling and publicise, 'scale-up' and generalize these models. The Ministry of Education and National Board of Education's strategic directions are contingent on these policies, particularly the latter. As in other OECD countries, these efforts will now have to take into consideration the impacts of emergent new economic conditions on state educational funding, the availability of corporate partnerships and funding, and the realignment of educational priorities.

It will be important that any whole of government policy duly consider and capitalize upon the outcomes of previous policies. These include the range of innovative strategies and practices that we have described here. High quality digital tools, curriculum materials, learning objects, and learning environments are currently available. Yet their uptake and use is uneven and, in instances, undocumented.

The conservatism of teachers and reticence of stakeholders to promote and share their own good practice/resources/tools has resulted in a situation where a 'silo' mentality has developed. Innovation is certainly evident but it characterised by small, local projects and initiatives some of which fail to see the value in sharing their results via the available national portal. In a decentralised education system, better coordination is needed to enable cross-fertilisation and 'mashups' of innovations (increasingly necessary in a Web 2.0 world).

Finland, like many national systems, has built the infrastructure and capacity to be a leader in the digitalization of schooling. Better coordination, communication and systemic dissemination of innovation is needed. Enhanced incentives for teachers, principals, schools and municipalities are needed. But in the absence of anything other than small scale, case study data on the improvement of student learning - the core issue will be in identifying and clarifying exactly what an optimal set of educational practices and, indeed, educational outcomes might be. Teachers and principals, parents, students and communities need clear answers to questions about 'Why digitalise schooling?', 'What might this look like?', 'To what ends?', and 'With what outcomes for students?' - particularly as governments, educational systems and technology companies move from a period of economic prosperity and growth to address new, difficult economic conditions.

ANNEX 1: List of Participants

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