Introduction of Computers in Primary Schools in Norway – From Experiments to Implementation

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Abstract. The article presents the introduction of computers in Norway from the mid-eighties to the beginning of the nineties. In 1984 the first IT initiative on IT in education passed Parliament; White Paper no 39 (1983/84) included an action program run by a ministerial task force, an experimental activity within selected areas and schools. This White Paper was followed by a number of initiatives and more White Papers indicating a high priority and profile for IT in national policy. The experimental programs were closed according to a shift of direction presented in White Paper 24, closing down the task force and IT integrated in the ordinary administrative bodies and curricular programs. There were the years of experiments and policy developments when ICT in schools moved from the era and field of enthusiasts to implementation in regular programs and curriculum. The Norwegian Pedagogical Computer Society was founded in 1987 after a year of preparatory work.

Keywords: IT in schools, policy and history

1. Introduction

From the 1960s till the mid-80s computers in education were the era of enthusiast teachers and single experimental schools. But around 1980 there was a shift in policy as computers became more widespread in society.

In 1985 a revised version of the curriculum guidelines for primary and lower secondary education was launched – M85. The impact of computers was one reason to present a new policy, introducing computers as part of the curriculum. The year before the government established a Ministerial Task Force (Datasekretariatet) to speed up introduction of computers in education. Substantial budget resources were allocated to the program's experimental work, including research and evaluation of the initiative. The Task Force ran a wide range of activities and sub programs till it was closed down in the early 90s when the implementation phase started. In this period several White Papers on computers in education passed the Parliament, discussing the policy and strategy of experiments and implementation. The Task Force was empowered with wide proxies both on policy strategies and resources. The initiative was followed by research programs of classroom practices, software initiatives including an evaluation of national policy in the field.

This experimental phase included several elements among which some turned out to become quite controversial:

Table 1: Overview of white Papers on IT and their focal points

White Paper/Plan	Curriculum	Focus	Suggested initiatives
No. 39 (1983-84)	M74: non-obligatory subjects: Technology (Computers not mentioned) Media knowledge: TV, film, newspapers etc. (Data, computers not mentioned)	1. National programme. 2. Experiment: 'whole schools' project and limited projects 3. Software development, and import for translation. 4. Competence building on technology and methods, co-operation across the system. 5. Vocational/ special education had special attention 6. Hardware: chosen to make all software work.	1. Ministerial Task Force, evaluated by IMTEC/OECD 2. Experimental schools: 21 schools Projects: 20 schools. 3. Almost 100 educational software programmes. 4. Conferences and courses. Design and methods. Reference groups. 5. Special software, applications and hardware (switches etc.) 6. CP/M-system chosen: and within the program, brands: TIKI, Scandis
No. 37 (1987-88)	M87: Computer-/media technologies included in general part: School in Society, and Learning Environment. In subjects: *integrated* approach. IT-themes within: science and social science.	1. National developmental centre –DATOPP 2. Dissemination of results gained at experimental schools/projects. 3. Software development. 4. Competence development. 5. Vocational/special education 6. Evaluation of programme 1984-88	1. Turned down by Parliament, Task Force continued its work. 2. Regional administration, Ministry council-bodies: New Projects, conferences/courses. 3. Software programme continue. 4. Teacher Colleges critical factors. 5. Software/application projects. 6. IMTEC and OECD evaluation Presentation included.
No. 14 and 42 (1989-90) The latter supplement	M87	7. Permanent structure for experiment/development work –and dissemination.	1. Task Force, Ministry bodies, intro and implementation of IT. 2. Projects, competence centres

		2. Plan of action – IT apart from traditional R&D. 3. Vocational and special education programmes. 4. Teacher competence development. 5. New electronic infrastructure	3. Software and competence development, and projects. 4. Basic/continuing teacher education, distant education. 5. Programs to establish infrastructure. Concepts developed of Task Force.
No. 24 (1993-94)	M87	1. Ministerial strategy plan: responsibilities distributed, no dedicated task force.	1. Describes responsibilities of actors like: National bodies, universities/ colleges, regional/local authorities.

In 1984, a milestone was set when the Parliament approved White Paper no 39 (1983/84), a programme of action to introduce computer technology into schools through experimental activity in selected areas and schools. The very clear purpose was to prepare for the introduction of compulsory IT in Norwegian schools. The urge of doing this was so strong that the compulsory introduction did not wait for any results from this programme of action before information technology, in a broad sense, was made a part of every subject (integrated) in primary and lower secondary education. In 1985 a preliminary edition of a new, revised, curricular guideline was introduced. In 1987 the final version was approved by the Parliament, one year before the programme of action was fulfilled, and final evaluation results were published. The revision where IT was included in the new curriculum guidelines announced the information age and represented a broad and overall approach. The Plan of Action represented a narrow, or a project approach, to gain experience in use of computers in education. In this chapter I will concentrate upon White Paper no 39 (1983/84) and White Paper no 24 (1993/94). There are several reports to the Parliament in between which will not be dealt with here.

2. The Task Force (Data Secretarial) period 1984 - 1988

1984 - 1988 can be named as the Data Secretarial (DS) period, but it must be underlined that there were activities throughout the school system not linked to the programme. The programme in general did not address all schools and teachers but was limited to experimental schools only. This caused some stress among teachers that were rejected assistance by the Task Force. Schools in general should be served by the National Advisory Council for Primary and lower Secondary Education, the National Advisory Council for Upper Secondary Education and the National Advisory Vocational Training in Working life. The tasks of the National Councils were to handle educational matters within their field, including professional

developments and projects. They enjoyed a relatively independent role within their defined area and were considered to supply the education system with educational expertise and knowledge.

IMTEC (International Movement toward Educational Change, http://www.imtec .org/english_version/) in their evaluation of the programme found a system-conflict between the National Councils and the Task Force. It seemed clear that the project model caused some stress throughout the school system. The reason might have been unclear, or lack of, communication between central actors when it came to distribution of responsibility and tasks. This is in spite of intentions of close co-operation explicitly outspoken in White Paper 39 (1983/84). The Task Force was established in understanding with (p 49), and should co-operate closely with (p 39), the National Councils. The National Councils should by and by take care of most tasks (p 39). Access to available resource in the field is of course an important reason to conflict as well, but it is likely that the Ministry did not take enough care of its' own system understanding, and therefore was not able to sort out and distribute the tasks in a reasonable way.

Introduction of IT in general in schools lies under the Ministry with the regional School Directors and the National Advisory Councils, and was not within the mission of the Task Force. Their work could rather be defined as an innovation programme, preparing reform. Innovation in this case can be defined as renewal, or "*a considered effort to improve practice related to given goals*" (Dalin 1986: 35). Results from the programme were open to a broader educational public when it came to programming courses, development of educational software, and in providing the schools with educational software.

The main elements in the strategy outlined in White Paper 39 (1983/849) were a programme of action carried through by a task force, and evaluation of the programme by an external agency, IMTEC:

1. *A project strategy approach with experimental activity at selected areas and schools.*
2. *There were some hardware demands, specifying standards of graphics, operative system etc. To equip the project- and experimental-schools with sufficient hardware the Ministry of education, through the Task Force, paid 75% of the costs. Only two computers, TIKI and SCANDIS, were approved for use under the programme.*
3. *Access to sufficient software was defined as one of the most important tasks and software development and testing was given high priority. The software was made for the two approved models. (Schools in general which were free to buy whatever computers they wanted had to stick to TIKI or SCANDIS if they wanted this software.)*
4. *Another field of high priority was teacher training or competence development. This included building of networks, mutual co-operation between schools of same and different kind, institution within and outside the school system and establishing national resource centres for the whole school system.*

It was stressed that implementation of computers had to support the major values of education in Norway by preventing emergence of new class divisions; social or gender differences, support critical thinking etc. Furthermore the programme should

develop the education system's own expertise, stimulate trial teaching and debate, and stimulate collaboration across the school system, with homes and with trade and industry. The technology should be used to seek better ways of teaching and learning, and mentioned elsewhere; special education was given priority. To stimulate experiments, collect, systematise and disseminate information on the experience in this area were also to be done.

The project approach was based on schools with previous project experience. Participation in the programme was supposed to be on a voluntary basis. To be accepted as an *experimental* school the whole staff had to support the application, which the School Board then must approve, because local support and local resources were needed. *Project schools* could participate on a narrower basis, with just a few teachers. In this way accountability and ownership should be secured. The evaluating agency had several contacts with each experimental school, and to some extent had a kind of action-research element as project strategies were introduced through the first surveys. The project-leaders were made aware of important issues to discuss with their colleagues. To some extent schools may have felt the evaluation teams' survey as clarifying, and as a support to their projects. White Paper 39 (83/84) does not say that this was an intention or a purpose of the evaluation programme, a role of IMTEC. The Ministry seems to be aware of the need of guidance (CERI -report 1987: 22):

> "A programme of action must have the character of a set of government measures which can provide guidance in the desired direction for the development in different areas of the school's activity and within all branches of the school system."

And there was a process for the evaluation between the Ministry and IMTEC before the programme started (Report no. 15 1989: 17). IMTEC underlines as important that:

> "The actual or perceived assumptions behind a program will often tend to restrict the possibilities of development. To conduct a genuine dialogue on the structural aspects will therefore contribute to establishing greater freedom of action, thereby increasing the possibilities for the project to provide results as originally envisaged"
>
> (ibid.: 22 -23).

The plan of action had both an element of top-down approach and a bottom-up strategy. The programme had defined their goals and aims nationally in White Paper 39 (83/84), but the schools by invitation defined their own projects, processes and goals. The Ministry itself expresses this in this way according to the CERI -report (1987: 13):

> "What seems to emerge is that an action programme which is either based solely on a central controlled model for development, or alternatively on a completely decentralised model, would have little chance of success."

An action programme, however, does not have to be either completely centralised or solely decentralised. On the contrary, both elements can be represented in an action programme. The Ministry itself describes such a model (top-down combined with bottom up) in a White Paper on Research and Developmental work (No. 79 1982/83). Locally managed projects need to be more emphasised, with a growing activity as a predicted result. However, there can be two different kinds of developmental work: i)

locally initiated and managed and ii) centrally initiated and guided developmental work. Information technology was defined as a national field of priority, which is centrally, initiated projects, but they were open to locally managed projects. In the CERI-report 1987, page 13 this is taken into account in this way:

> *"On the other hand, the development will demand so much concentrated effort in in-service training and at the same time extend regional and central measures which ensure quality, continuity and learning experience across the boundaries of different kinds of schools and different regions."*

Without going into it here, it does not seem that all schools were aware of their relative freedom in defining their own projects. I participated in some seminars, representing a school owner and witnessed several requests for more detailed, centrally defined instructions both on content and processes of projects. One of IMTECs' conclusions points out that maybe the most critical factors for success is the school's ability to master the trial process (IMTEC, 1987: 78). The panel at the closing session of the IFIP working conference 'Exploring a new Partnership: Children, Teachers and Technology' made about the same conclusions stating that introducing IT faces the same challenges as every other innovation project, there is nothing special about IT (Røsvik, 1994: 290). The challenge is to tackle teaching and learning strategies in an appropriate way. We will not go into the running of the programme or special details concerning courses, software developments etc. This will just be mentioned as below.

Fields of priority were special education and the development of adaptable hardware and software, special keyboards etc. Vocational training was also focused upon as the Ministerial Task Force was engaged in developing software, hardware and suitable technology to increase the level of competence in the field. The main project was MI-2000, mechanical industry towards the year 2000, developing hardware and software for the mechanical line in vocational education. Computer assisted construction and manufacture (CAD/CAM) for models and machinery was part of it. During this period the Nordic countries established a close relationship in the field, still existing, exchanging software by special arrangements and by publishing pedagogical and methodological experiences in a mutual organised educational magazine. The Task Force was very active in participating at international conferences and congresses presenting the programme, and promoting educational software for sale. Programme development was initiated through ministerial design courses (starting out as Norwegian but later became Nordic courses) and by buying and distributing other software developed by individuals or small private firms. In total the Ministry could list close to 100 programmes, mostly educational software but also some software tools.

Even though the programme period of the Task Force came to an end in 1987, its work continued till 1st August 1990. In some respect, transferring the personnel to the Ministry extended the period of the Task Force. The programme itself including the work of the project schools was ended. Final evaluations of the Task Force were conducted by IMTEC and OECD and presented to the Ministry of Education and the Parliament in 1988. Based on the evaluation reports new initiatives were suggested, referred below in the next chapter.

During these years there were a number of teachers who were eager to introduce use of computers in their own teaching. In 1986 some of these started to establish an educational computer society and in 1987 the Norwegian Pedagogical Computer Society (NPeD) was founded. The aim was both to address policy initiatives to introduce computers to schools and to run practical help and courses for teachers in the classrooms. Special education was given priority and had a focus in courses and policy initiatives. During the first years the board had members representing special needs programmes. Another purpose of the society was to inspire teachers by organising study trips to Denmark, in cooperation with their sister organisation Datalærerforeningen. The founding chairman in Norway was inspired by the Danish organisation when joining their study trip to Boston and WCCE 1985 in Norfolk (USA). During the first year NPeD organised several conferences where national policymakers and politicians were invited to present new initiatives and to be challenged on lack of initiatives and given input by classroom teachers. However, most focus was given to hands-on courses for use of computers in the classroom, raising pedagogical challenges as well as subject issues. The members of NPeD were computer pioneers and teacher enthusiasts that had high expectations for computers in education and wanted to push the development to improve and modernize education for their students, preparing them for the immediate future.

3. Intermediate Period 1988 - 1993

The second phase started when the plan of action was fulfilled. White Paper 37 suggested continuing the work of the Task Force by establishing a new administrative unit called DATOPP. The experiences of the project schools were to be disseminated by the National Councils and regional bodies. Finally it was suggested that the ministerial capacity for strategic planning should be strengthen. Special education and vocational training had been emphasised during the project period and this work should also be continued. But the Parliament did not approve the establishment of a new unit, and this led to a situation that meant that the Ministry had to continue the work within the existing organisation. The personnel of the Task Force continued working, within the Ministry.

During the period 1988 to 1993 several of the field relevant White Papers were passed to the Parliament. They will not be mentioned at all or commented upon in this paper. In the first part of this intermediate period, 1988 to 1990, there were some organisational changes within the Ministry of Education. However, the central persons of the Task Force continued working with IT programmes, supporting software development and some other limited programmes, directly or through other national educational bodies (National Councils, regional school programmes etc.). The National Councils were closed down, and personnel and tasks moved into the Ministry. There had been tensions between the different parts of the national organisation for some time.

A third phase was introduced by White Paper number 14 (1989 -90) formulating a plan for information technology for school and training for the period 1990 - 93. During these years some of the earlier initiated programmes were followed up. Some

of these programmes must be mentioned especially, namely an ambitious project of distance learning through telecommunication: MI2000 and PEGASUS, giving birth to WINIX. Great expectations were put upon the WINIX concept, a sophisticated software concept handling telecommunication in an advanced way. MI2000 was developed within the vocational part of the programme and attracted attention from outside the school system. This could also be said about some other programmes that were presented internationally, and distributed within the Nordic programme of co-operation.

Without going into details, the WINIX-project turned out to be a stumbling stone for the Ministry, almost costing the Minister his seat. The media paid growing attention to critical voices attacking the concept and the Ministry's handling of it. In the end the Parliament demanded a special report on 'Certain sides of the Educational Ministry's IT-programme', also named the WINIX-case. The mixture of ministerial administration, business and policy came to an expensive end, leaving the Ministry of Education an unpleasant bill to pay. In spite of lots of good and useful work done by, or assisted by these programmes, the reputation was severely damaged by this case. Some of those involved were even reluctant to tell that they participated in the programme.

This was the background of this White Paper on information technology in education. The words of the Minister at the conference in October 1993 can be grasped in a deeper way being familiar with this political scenery. It makes it even possible to understand why this White Paper over and over again underlined that IT should be 'normalised' and that no 'special' money would be required or paid, to carry out this new programme of action. But it could not deny questions to be raised if there was a programme; with no extra money, and if the interpretation of the 'normalising' programme was that no special focus should be given to IT in education. Some of the programmes that still kept running were stopped, before, or without, any substitute programme introduced. Other programmes would no doubt have profited from some financial input to be more widespread, known and used by Norwegian schools. Once more, however, it must be underlined that the Minister heralded that a plan of action was to be worked out during the year to come. The interpretation of intentions and consequences of White Paper No. 24 (1993-94) might turn out to be different from this described scenery of withdrawal of ministerial efforts and recourses.

4. Continuing Initiatives 1993 -94

The intention of this White Paper was first of all to report from the previous programme of action (1990-93); secondly to answer questions raised by the Parliament. Finally, and what ought to be the most interesting part, was presentation of strategies for further work within the sector of education. This strategy should have been the contribution of Ministry of Education to the National Plans of Action concerning IT; completing plans of action of trade and industry, and public administration. A plan like this had been awaited, and announced, for more than a year when the Ministry of Education finally informed that there would not be a

similar plan of action for information technology in education. White Paper no. 24 was launched and produced very fast, in what seemed to turn out to be the normal way for this Minister. The writing process started in October 1993. On the 24th of October the Ministry invited about 100 people from different educational and information technology milieus to a meeting where the Ministry, with the Minister in front, announced their intentions about this White Paper and the production schedule. They invited the participants to comment upon the outlines of the paper in the meeting, and eventually to contribute with proposals in writing. On the 14th of January 1994, White Paper no. 24 (93/94) was released, in print and by Internet, immediately accessible to everybody. By the 20th May the White Paper passed the Parliament, and the Ministry, co-operating with the Norwegian Computer Society, had a one-day conference presenting the White Paper and further plans to work out a plan of action. In this process the Minister invited everybody to participate in the process by giving his e-mail address. Later the Ministry confirmed that they wanted to have an open process, willing to listen to professional groups such as the Norwegian Educational Computer Society and the Norwegian Computer Society.

A main conclusion was that the work concerning IT in education was to be financed according to the ordinary administrative levels. The Royal Ministry of Church and Education prescribed that there was a normalisation of IT in education, with no extra money, no dedicated people responsible for IT at any level, if not the institutions will give priority to the field, which some will do and some will not do. The national level worked out plans and guidelines, and thereafter information and advice. Special attention might be paid to IT in education in this respect, but mainly it seemed that the Ministry would rely upon institutions, universities, and municipalities to follow up and keep in line, being responsible. But what if a municipality failed, overloaded with other local tasks, like taking care of the elderly? What if a teacher college continued to be out of line? A national plan of action ought to consider questions like these. To follow the situation in the schools the Ministry developed a system of information-collection, and also did some special investigations.

The normal management model had to be the basis in every educational matter and any plan of action. Responsibility was distributed to the different levels, where there should be a system of support and development, to spread information and link specialists, specialists and schools, and projects together, taking care of the head-milieus and facilitating international co-operation and development. With no extra money, this was to be done with 'normal money' within ordinary budgets. Lifelong learning for individuals is based on a lifelong learning society. The Ministry of Education would execute this task through its administrative body, National Learning-aid Centre (NLS).

Throughout the chapter on practical organising (chapter 9) each section had a state of art and an initiative paragraph. The initiative paragraph should give instructions or information on actions. Mostly there was a list of aims, giving little information of actions. According to the Ministry's' presentation of the White Paper on the 24th of May this was intentional, and the Minister, therefore, heralded that a plan of action that was to be published within a year.

The White Paper also reported to the Parliament on previous ministerial work and projects on IT in education, and presented outlines of future plans. It did not intend to prescribe resources or give any details of projects or plans of action. This would be a

ministerial work and responsibility. The Ministry seemed open to ideas and proposals from professionals and others who wanted to contribute to a national plan. There were many open ends and issues to be considered and decided upon.

The main keyword in the White Paper was normalisation. This meant normal distribution of responsibility and work between the different levels of educational administration, according to what was normal in other educational matters. There would be no special ministerial task force. There would not be any extra IT resources, money of personnel. There would be no special software or hardware development conducted by the Ministry of Education. The change from the Data secretarial period was clear and significant. The ministerial culture signalled to be reversed from the view of IT projects as extraordinary to the ordinary. It was back to normality. But the Ministry, underlined by the Parliament, wanted to pay attention to IT in education to make sure that education kept up to date. There was an understanding of the role and importance of IT in society, and education. The will to be active at a national level was still considerable. A plan of action was to prove that. There could then be some final questions: What a normal allocation for developmental purposes on IT in a modern society would be like? Could a growth in resources to development and innovation be expected? Was it likely that municipalities would, and were be able to finance such development and innovation programmes? Would there be new initiatives for innovation and development or to support existing milieus, network building, in this respect within and outside formal institutions?

The intentions and basic principles of this White Paper seemed in some respect to be sound and reasonable concerning what should be done. But looking into how it should be done it was not so clear, what in fact was to be done, if anything would be done. The education minister was considered to be a man of action, good at slogans. He had put forward major structural reforms changing the school system from kindergarten, primary and secondary education to higher education. When it came to ICT, however, initiatives and actions were slowed down.

The municipal economy, however, was tightening. A growing elderly population required an increased share of public care and money. The municipal financial order in Norway is mainly based on lump sum allocations from the state. However, the municipalities do not have full freedom in economic priorities. The Parliament from time to time may give attention to some special fields or tasks, offering dedicated resources to, for instance, elderly care (more and better institutions, more personnel), provided that the municipalities are spending an equal amount to the tasks. During the nineties the task programmes have been elderly care and school reforms etc. Such special reforms unbalance the municipal budgetary systems, reducing the power of local authority to set its own priorities. Still, priorities are to be done, even if it sometimes is mostly focused to get hold of state-money. The educational system might consider IT to be as important as it was in society, and act upon it, but within given economical budgets. The point here is that White Paper 24 (93/94) or state budgets didn't offer extra, dedicated resources for IT in schools which meant that this programme had to compete within ordinary municipal budgets.

A plan of action on IT in education should reflect and answer the challenge in a proper way. The Norwegian plan of action on IT in education was to be based upon White Paper 24 (93/94). If, or to what extent, it would meet future needs and challenges was to be seen. The indication, however, was that no extra money could be

expected. The strategy outlined, in some respect, seemed to stress harder that this White Paper represented a different course then that from the Task Force, the one that lead to WINIX-case. In a way one could be reminded of the, at that time, on-going transition of Eastern Europe, where politicians for some time had been more clear about the *change* of policy, making it different from the previous regime, then about what to do. The ingress of the White Paper by the end stated this philosophising on IT (KUF 1995, IT in Norwegian Education. A Plan for 1996 – 1999, English version: 4):

> *"It is, therefore, becoming more and more difficult to imagine how we could manage without it, and to imagine how far it will take us. But it is because of this very development, and the speed at which it is taking place, that it is so essential both to increase the knowledge of the opportunities and our skill in availing ourselves of them. It is of paramount importance to use the learning opportunities which information technology provides, and to see that it creates a stronger sense of community not wider gaps."*

It was not possible to tell any future results for sure. The Ministry might follow up the stated intentions put forward in the White Paper, but what this was to be seemed quite open ranging from special initiatives, to nothing especially. What would count in the end were what operational steps that were taken, and the force of these actions. Some of the plans and guidelines in this White Paper seemed unclear about concrete actions as well as willingness of central authorities to invest, set resources aside to promote IT developments in education. The main impression though, was that there was both an understanding of importance, and a will to act according to the intentions of the White Paper. The intentions and will seemed present, but the ability was uncertain both concerning resources available and the concrete strategic steps to be taken. It was considered to be a challenge to make the whole school system able to deal with IT in a constructive way. It was supposed by many that this would request a proper way in allocating resources, in supporting and stimulating innovations, in disseminating experiences and knowledge to make the implementation of IT support learning. Machiavelli the famous medieval counsellor said something like: "Nothing is as dangerous as initiating change." In this respect it could be added and changed to: "Nothing is as dangerous as initiating change, except, not to do it."

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