



KIRKE-, UTDANNINGS- OG
FORSKNINGSDEPARTEMENTET

Action plan

ICT in Norwegian Education Plan for 2000 – 2003



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○ This plan supersedes "IT in Norwegian Education. Plan for 1996–99". It is intended for decision-makers and administrative and technical personnel throughout the education sector. It covers all levels from primary school to higher education and adult education, and affects students, parents, workers and various bodies in the local community.

Background

Over the last 15–20 years, there has been a number of national and international initiatives and plans focusing on the increased and systematic use of IT in business and administration. Internationally, much attention has been lent to the American Clinton-Gore initiative regarding the "information superhighway" and EU initiatives such as the Bangemann Report. This has been followed up in Norway through a report from the Cabinet Minister's Committee for IT: "Den norske IT-veien – Bit for bit" (IT development in Norway – Bit by bit) from 1996, and "Norge – en utkant i forkant – Næringsrettet IT-plan 1998–2001" (Norway – on the edge, at the leading edge – business-oriented IT plan 1998–2001) from 1998.

○ Since 1983, the Ministry of Education, Research and Church Affairs has issued a number of documents discussing the development of ICT in the education sector. Some of the most important documents are:

- White Paper No. 39 (1983–84), "IT in Schools"
- White Paper No. 37 (1987–88), "IT in Schools and Training"
- White Paper No. 14 (1989–90), "IT in Schools and Training"
- White Paper No. 42 (1989–90), "Organisation of Training and IT in Schools"
- White Paper No. 125 (1991–92) "Aspects of the Ministry of Education, Research and Church Affairs' IT Programme"
- White Paper No. 24 (1993–94) "IT in Education"
- "IT in Norwegian Education. Plan for 1996–99"
- "Annual Plans for IT in the Norwegian Education System", 1996, 1997, 1998 and 1999.

○ Mr. Ola Erstad assessed and summarised the Ministry of Education, Research and Church Affairs' action plan for 1996–99 in "Innovation or tradition? An Assessment of Project Work as Part of the Ministry of Education, Research and Church Affairs' Action Plan: "IT in Norwegian Education. Plan for 1996–99"" (ITU 1998), and this was also done in Report No. 2 from the Office of the Auditor General "Action Plans as a Controlling Tool of Central Government". The Auditor General concludes that the plan is very clear with regard to the target structure and the distribution of tasks, that it is being implemented effectively through various bodies including the national education offices and that the steps in the plan reconcile well with follow-up and planning at the municipal level. In 2000, the plan for 1996–99 will be assessed.

ICT¹ in Education. Plan for 2000–2003. Principles and structure

When drawing up the new plan for ICT in education for 2000–2003, we must bear in mind the steering documents relating to the education reforms made at all levels in the sector (see Chapter 5).

○ White Paper No. 28 (1998–99) "More Ambitious Goals" discusses the strategy for assessment and the development of quality in teaching in primary and secondary education. The aim of the paper is to create a basis on which to build a development-oriented education system emphasising the teaching role of these institutions and cooperation between them. It would also view ICT as an important investment area – both as a pedagogical tool and as a means of enhancing the development of expertise, collaboration, co-ordination of activities, internationalisation and the retrieval of information. In its treatment of White Paper No. 28 (1998–99), the Storting (Norwegian parliament) resolved that a nationwide plan should be drawn up for ICT equipment and supplementary courses for teachers in primary and secondary education. This ICT plan is an expression of the Ministry of Education, Research and Church Affairs' follow-up of this resolution.

¹ European education establishments are now commonly using the expression "ICT" (information and communication technology) instead of "IT" (information technology) to emphasise the increasing importance of communications in the subject.

○ White Paper No. 36 (1998–99) "Principles for the Structure of Higher Education" discusses how universities and colleges are to behave in the current situation where enrolments for many traditional primary subjects are falling, while the need for continuing distance education and training is increasing. It was stated that the institutions would have to adapt ordinary studies for new groups by using new technology and distance education. The Paper also emphasises the need for assessing a further increase in ICT instruction and continuing education and training, and for promoting ICT as an integrated part of many subjects and courses.

○ The "Plan for ICT in Education 2000–2003" discusses the challenges, targets and measures for ICT in education that the sector is to work towards. It will have consequences for the Ministry and for the central government agencies answering to the Ministry. It will also represent a foundation on which the Ministry can control ICT in the education sector over the next four years.

○ All planning of ICT in education assumes that ICT will be adapted to suit different requirements – in particular those of people with special needs.

Structure of the plan

Chapter 2 provides a general description of the current situation of the most important priorities relating to ICT in education.

Chapter 3 outlines the important challenges facing the education system, the targets of ICT in the system and the main priorities that will be initiated based on this plan.

Chapter 4 describes all priorities, the state's latest involvement, and the scope of measures carried over and refined from the previous plan.

Chapter 5 summarises the principles concerning the distribution of responsibility and duties between the Ministry, relevant state agencies and the sector itself.

Chapter 6 describes the financial parameters.

SITES – Survey

The Second Information Technology in Education Study – carried out between autumn 1998 and spring 1999.

Twenty-six countries took part in a survey of primary and secondary schools. Not all countries participated in all areas. The survey was run under the aegis of the IEA – the International Association for the Evaluation of Educational Achievement.

The equipment ratio (number of students per computer) in both primary and secondary school is better in Norway than in the majority of other countries, though the computers are not necessarily the latest models. Norway is somewhat behind in processor capacity, the availability of CD-ROM drives and networking.

Far fewer schools in Norway than, for example, in Iceland, Denmark and Finland have their own home page on the Internet.

In the field of general pedagogical practice, however, Norwegian schools are way ahead with regard to meeting special needs, letting students work at their own pace, and project work. On the other hand, Norway is somewhat behind compared to other countries regarding expectations in the use of ICT and more modern applications of ICT (that is, in the use of statistical programs, modelling tools and measuring tools, etc., rather than merely word-processing, spreadsheets and the use of the Internet). Norway also has lower expectations of what students should be able to achieve in the field of ICT.

Norwegian teachers have many opportunities to undergo basic training in ICT, but less emphasis is placed on refresher courses than in other countries.

Norwegian primary and lower secondary schools regulate students' access to undesirable content on the Internet less than in other countries. Upper secondary schools, however (where access is greater and has been available for longer), are more careful to regulate Internet access.

www.mscp.edte.utwente.nl/sitesm1/

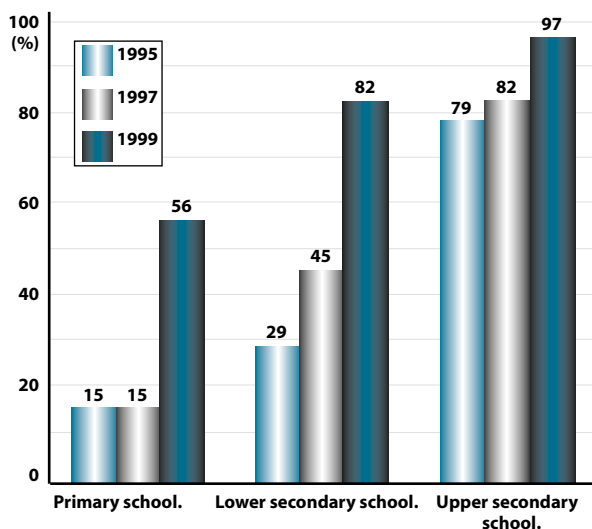
The identification of challenges and the selection of priorities and measures in this plan are based on the current situation of the areas determined in the previous planning period. This section provides a short description of the situation in a number of key areas. The description is based on Statistics Norway's surveys "IT in schools" (1995 and 1997), "IT in teacher-training" (1998), the international survey "SITES" ²⁾ (1999), the annual status reports from the national education offices, and Mr. Ola Erstad's report "Innovation or tradition" (ITU 1998).

Pedagogical facilitation

The new curricula at primary and lower secondary school level are intended to teach students how to use word-processors, spreadsheets and the Internet in a variety of subjects. Upper secondary schools offer a separate subject in general studies programme to provide ICT skills and ICT experience in addition to ICT integrated in general education. At the higher education establishments, ICT is integrated in the overall plans for the various teacher-training courses.

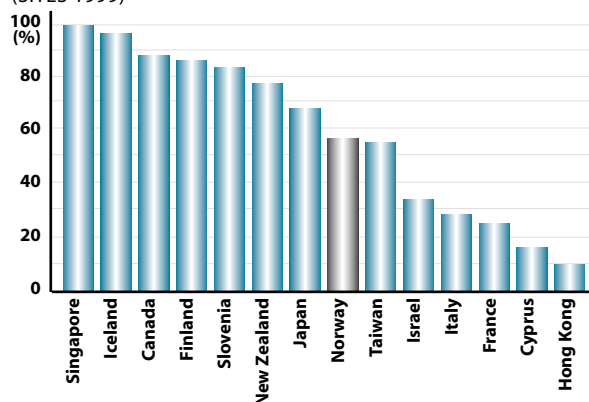
There has been a significant increase in the provision of Internet-based teaching for higher education students. This has been supported by various bodies including SOFF (Norwegian Executive Board for Flexible Learning in Higher Education). Digital learning methods are also being developed and a number of rela-

Percentage of pupils attending Norwegian schools where pupils have access to the Internet at school. (Statistics Norway 1995 and 1997, SITES 1999)

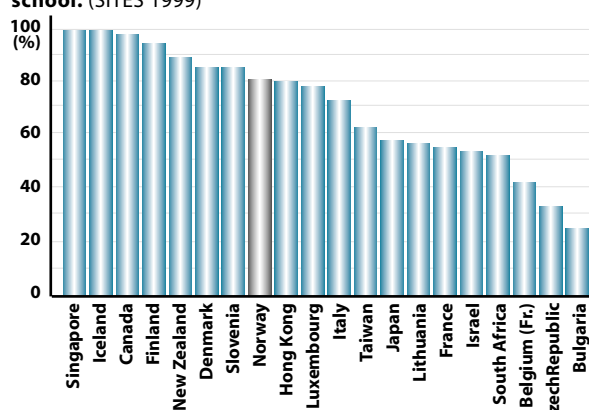


PRIMARY SCHOOL: Percentage of pupils attending schools where pupils have access to the Internet at school.

(SITES 1999)



LOWER SECONDARY SCHOOL: Percentage of pupils attending schools where pupils have access to the Internet at school. (SITES 1999)



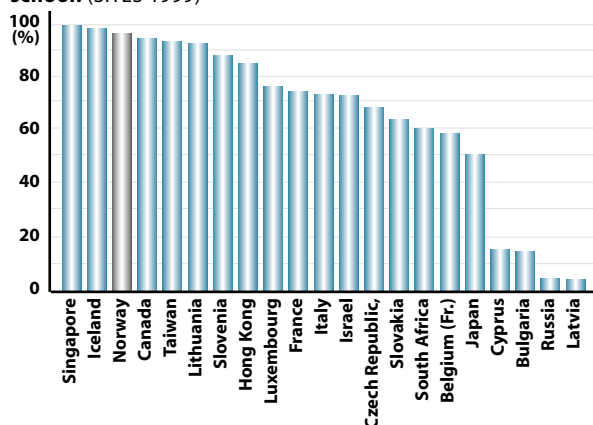
ted issues such as copyright and digital library services are being considered.

The surveys by both Statistics Norway and SITES reveal that word-processing is the most used tool at all education levels. The surveys indicate that the use of pedagogical software and the application of ICT in related subjects are less widespread. Statistics Norway's 1997 survey shows, however, that over 80% of schools use ICT equipment in connection with special needs education. Even though the SITES survey indicates that the schools have a positive attitude to the use of ICT-based tools and that the schools can see new and exciting potential for the learning environment, much indicates that they are far from exploiting such potential. This is confirmed in Mr. Ola Erstad's report. This report concludes that while many schools are testing and gaining experience in the use of ICT, there is a long way to go before ICT is integrated in the day-to-day activities of schools and other education institutions.

The development of electronic learning methods and the adaptation of content and services on the Internet were a major priority for the plan "IT in Education. Plan for 1996-99".

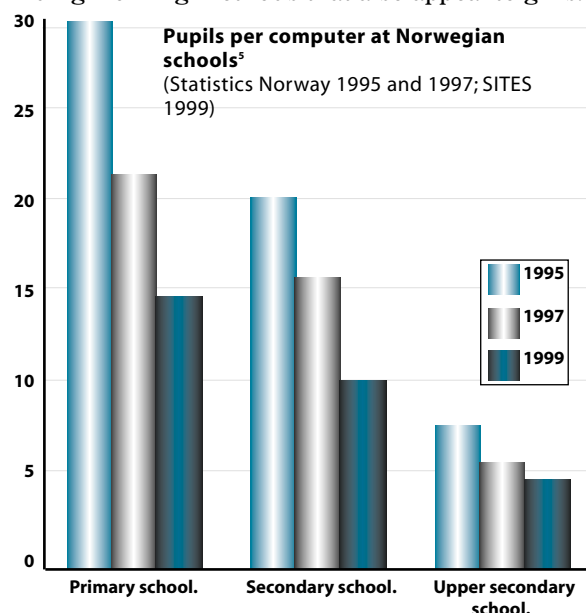
²⁾ SITES (The Second Information Technology in Education Study) was carried out in 26 countries by the International Association for Educational Achievement (IEA) (see box on page 3)

UPPER SECONDARY SCHOOL: Percentage of pupils attending schools where pupils have access to the Internet at school. (SITES 1999)



For primary and secondary schools, some services have been set up via, for example, "Skolenettet" (The Norwegian School Net).

○ The survey by Statistics Norway in 1995 showed consistently that boys were more interested than girls in computer technology and that they used it more. There were differences in the way boys and girls used ICT. The Norwegian Institute for Urban and Regional Research (NIBR) showed in its 1998 survey ³⁾ that both boys and girls were enthusiastic about the possibilities of communicating with other people through the Internet, but that it was the girls who were most interested in the communications aspect of ICT. A survey financed by IBM and carried out by Norsk Gallup in 1999 showed, however, that Norwegian girls are the poorest of the Nordic countries at using ICT. Further efforts should be made, therefore, to balance the disparity between the sexes by various means such as finding working methods that also appeal to girls.



ICT as a subject and ICT integrated in other subjects

There are three important aspects to integrating ICT in education: the use of ICT as a pedagogical tool, ICT as a stand-alone subject at different levels, and ICT as a tool used in other subjects and areas. Most of the work will relate to ICT as a pedagogical tool, though the other two areas must still be given due attention. As a stand-alone subject, ICT will involve everything from systems development and programming to software engineering and communications. ICT as a tool used in other subjects will involve working with, for example, spreadsheets and databases, as well as constituting a tool which will change the traditional content of courses – for example in graphic design and automation. This last area is a particular challenge for teachers at different levels due to the need to keep abreast of developments.

○ Following the 1994 reforms in upper secondary education and training, known as Reform 94, the subject business and information processing became obligatory in the foundation course General and Business Studies (the foundation course is the first year of study at upper secondary level in Norway). ICT also became an important component in many of the subjects in vocational disciplines. Within the study area General and Business Studies, information technology has become popular and approximately 30% of the students taking advanced course one (the second year of study at upper secondary level) choose ICT-oriented subjects. This represents a slightly greater number of students than those who choose, for example, chemistry at the same level. In autumn 1999, a new vocational course was introduced: ICT operations. This course is intended to teach students to carry out business tasks in the field of ICT – such as the installation of software, user support and training. In the largest ICT subjects at Advanced Course One, nearly 40% of the students are girls. However, this figure drops to below 20% for more advanced studies. Final statistics for ICT operations 1999 / 2000, show that less than 10% of the students are girls.

○ In higher education, the 1990s saw an increase in the number of places available for ICT studies – particularly in 1998. Since then, education institutions have been allocated further places to promote this development. Universities and colleges have also further increased their capacity through re-allocations. Due to the uncertainty of future needs, it is difficult to know whether the increased capacity will meet the demand for skilled ICT personnel, in terms of both numbers and technical competence.

3) Guri Mette Vestby: "Girls, boys and IT concepts. A survey of young people's understanding of Information Technology" (NIBR 1998).

Fewer women than men study technology, science, business and administration. Despite the fact that recruitment and information campaigns over the last few years have had a positive effect on the recruitment of women in certain subjects, there is still a need for recruitment drives to attract women to a number of subjects. Nationally, there are only about 2,000 girls from upper secondary school who have the necessary science background to be able to seek a place on a course of study in ICT. This also means that the recruitment process should be expanded: more girls must take science subjects at upper secondary school. It is also important not to overlook other factors that may lead to an imbalance in recruitment: where people live, social inequalities and disparate cultures.

Developing teachers' competence

The successful introduction of ICT in the education system is totally dependent on adequate teacher expertise. According to the new framework for teacher training, student teachers must receive training in the pedagogical use of ICT for use in their subsequent careers. There is also a need to increase the expertise of existing teachers.

Over 80% of the Norwegian schools covered by the SITES survey claim to have given the teachers a thorough introduction in the use of ICT. On the other hand, only 20% of compulsory schools (that is, primary and lower secondary schools) and 40% of upper secondary schools have given the teachers regular refresher courses to update their knowledge and skills. In terms of basic training, Norway is ranked well internationally. In terms of refresher courses, Norway also holds its own at upper secondary level. However, the country comes out badly if we consider compulsory level.

A survey carried out by the Norwegian Trade Union Centre for Social Science Research (FAFO) in January 1999 shows that half the teachers had participated in courses concerning the use of IT tools such as spreadsheets, word-processors and the Internet. Less than 20% stated that they had received training in the use of IT as a pedagogical tool in actual teaching. Four out of every five teachers said they needed such training.

With the implementation of Reform 94, ICT became an integral part of the continuing education of teachers. In a number of subjects, ICT formed part of the didactic and/or the technical part of the in-

struction. In many subjects where ICT was not formerly an obligatory part of the course, it was necessary to increase the skills of the teachers to enable them to use ICT in their teaching.

With the implementation of Reform 97 - a major reform of education at primary and lower secondary level in 1997 - ICT was given priority in the continuing education of teachers, and a special plan was developed in this area. The use of ICT is presented in the introduction to the curriculum - in the goals, in the main points and in the teaching methods for each subject. Guidelines including ICT have been developed for each subject, and special guidelines for the use of ICT have also been prepared.

Several surveys have underlined the need for an increase in expertise relating to pedagogical use of ICT. In 1997, Statistics Norway indicated that the majority of teachers had some knowledge of using word-processors, but that less than half were able to use ICT as a pedagogical tool. The SITES survey showed that Norwegian teachers in primary and secondary school - to a greater extent than the teachers in many other countries - felt they were insufficiently trained in the use of ICT in teaching and learning.

Statistics Norway showed in 1998 that ICT was little used as a tool in teaching, student work, guiding students in general teacher training, and in practical pedagogical studies at the universities. One of the reasons the students gave for stating that it was difficult to use ICT for pedagogical purposes was the lack of access to relevant software. The Statistics Norway survey of teacher training revealed that teachers in higher education also need to increase their skills in respect of ICT use - which hitherto has been limited to simple word-processing and Internet searches.

To increase female teachers' interest in continuing education within ICT, a six-month ICT course was started in 1996 for female teachers at Oslo College (Høgskolen i Oslo). The College's internal assessments showed that the provision of separate classes for women had a positive effect on the teaching environment and the students' results. A major challenge in the future will therefore be to work on increasing ICT skills of female teachers.

Research and development (R&D)

International comparisons show that Norwegian investment in R&D is generally lower than in a number of countries usually selected for purposes of

comparison. White Paper No. 39 (1998-99) "Research Reaches a Crossroads" signposts a major effort to increase research efforts in various fields including ICT.

○ To strengthen research and development work in the pedagogical use of ICT in primary and secondary schools and in teacher training, a network was established in 1997 called "The Research and Skills Network for IT in Education – ITU". At the same time, funds were also given to a number of small, local research and development projects.

○ Over the last few years, the Ministry has initiated several major test and development projects focusing on the activities in the classroom – activities which include a significant amount of ICT. "Project Differentiation and Preparation in Upper Secondary School Education" encompasses all the upper secondary schools in the country, while "Project Innovation in Teaching, Organisation and Technology" (PILOT) encompasses many primary and secondary schools in nine counties.

○ There is much activity internationally in the field of ICT and education, and Norway is involved in the activities of many bodies: the IT policy group at the Nordic Council of Ministers, the European Schoolnet, the EU and EEA, the SITES survey (Second Information Technology in Education Study) under the auspices of the International Association for the Evaluation of Educational Achievement (IEA), and various OECD projects.

Organisation

To promote the use of ICT by students and teachers in ordinary education, computers, peripherals and infrastructure must be readily accessible. Statistics Norway's 1997 surveys show that computer equipment is usually kept in the classroom at primary level, while at lower secondary and upper secondary levels there are specific computer rooms.

○ Over the last few years, there has been an increase in the number of flexible study arrangements on offer: distance education, decentralised studying and part-time studying. These arrangements are directed towards those in initial education as well as those in continuing education and training.

○ Universities and colleges have become increasingly involved in the development of distance education and Internet-based study. This has come about partly through their networks of collaborating partners that include a number of institutions in the area of higher education. The largest of these is the Network University (formerly NITOL), which, in autumn 1999, encompassed Bergen University, NTNU and seven state colleges. Other institutions include ODEL (Colleges in the western region of Vestlandet), Midt-Norsk Nettverk (The Mid-Norwegian Network), and

Bedriftsuniversitetet (The Business University).

○ The Norwegian Council of Universities and the Norwegian Council of State Colleges have set up a network called the Norwegian University Network for Lifelong Learning (Norgesuniversitetet) to enhance collaboration between education institutions and the business sector in respect of continuing education and training. The Ministry has provided some funds to establish the Norwegian University.

○ Development of ICT-based distance learning and Internet-based education have received some financing from the Ministry through SOFF and the Work Group for Digital Study Aids (Arbeidsgruppen for digitale læremidler). These forms of study, however, still constitute only a limited part of the activities of education institutions. A number of private companies are operating in this market in addition to the public education institutions.

Equipment and infrastructure

Several surveys have revealed a positive trend in the availability of equipment at primary, lower secondary and upper secondary level in Norway. Between 1995 and 1999, the ratio of computers to students has improved considerably from approx. 30 students per computer to 13 in primary schools, from 20 students per computer to 9 students per computer in lower secondary schools and from approx. 8 students per computer to 4 students per computer in upper secondary schools. Norwegian schools are amongst the best in the world for this ratio. The great majority of schools have access to the Internet, but too many computers at these schools – especially at primary and lower secondary levels – still have only limited access.

PRIMARY LEVEL: Students per computer ⁴⁾.
(SITES 1999)

Canada	8.1	Japan	28
Slovenia	23	Iceland	12.7
Finland	12.2	Taiwan	81
Hong Kong	25	New Zealand	14
Singapore	12.3	Italy	88
France	25	Israel	16
Norway	12.6	Cyprus	183

○ The SITES survey revealed major disparities between the regions in respect of equipment and infrastructure – even though the scale of these disparities fell considerably from 1997 to 1999.

○ A new scheme for schools to use more modern, second-hand computers discarded by the private sector has been adopted and is being managed by the National Centre for Educational Resources (Nasjonalt læremiddelsenter). The computers must meet specific quality criteria so that they can be used for the majority

4) Computers available for students and teachers. This makes the figures comparable to those of the TIMSS (Third International Mathematics and Science Study).

of teaching purposes. The aim is to transfer 8–10,000 computers to schools every year. Experience from the previous planning period has shown that the allocation of duties and responsibilities drawn up in White Paper No. 24 (1993–94) "Information Technology in Education", in which the owners of the schools were given responsibility for the acquisition of hardware, software and infrastructure, has worked. School owners have, especially in the last few years, assumed responsibility for planning and strengthening efforts to improve equipment.

LOWER SECONDARY LEVEL: Students per computer ⁴⁾
(SITES 1999)

Canada	6.5	Iceland	12
Hong Kong	23	Thailand	62
New Zealand	7.5	Luxembourg	12
Belgium (Fr.)	25	Lithuania	90
Singapore	8.2	Israel	14
Taiwan	25	Russia	121
Norway	8.9	Japan	14
Hungary	25	South Africa	123
Denmark	9.1	Italy	16
Slovenia	25	Cyprus	216
Finland	10	France	17
Czech Republic	34	Bulgaria	238

In the field of higher education, the establishment of UNINETT and the Nordic collaboration through Nordunett have contributed to a good technical infrastructure in the university and college sector. All teaching establishments have access to the Internet and local networks. The university and college sector has been one of the leading players in the use and development of the Internet. The challenges now facing the sector are the development of a high-speed network and the new Internet services – on a par with the ideas of other leading ICT countries.

UPPER SECONDARY LEVEL: Students per computer ⁴⁾
(SITES 1999)

Singapore	3.4	Italy	14
Norway	4.0	Slovakia	16
Canada	6.3	Cyprus	18
France	6.6	Hong Kong	22
Taiwan	9.2	Belgium (Fr.)	26
Czech Republic	10	Latvia	33
Iceland	11	Bulgaria	4
Slovenia	11	Lithuania	76
Japan	12	South Africa	111
Luxembourg	12	Russia	121
Israel	14		

Summary

Based on the experience gained during the implementation of the previous plan, and on developments in the various areas, the Ministry has determined that the new plan should cover the following issues:

- increased emphasis on the pedagogical use of ICT (i.e. on forms of work, organisation and assessment, as well as ICT as a tool in such development);
- continued emphasis on the development of teachers' expertise – especially in respect of the pedagogical application of ICT in initial and continuing education and training;
- new ICT possibilities and adaptation of ICT for the physically handicapped
- the needs of the private and public sectors and individuals for general skills and top-level expertise in ICT, how ICT affects the subjects in general and the impact ICT has on determining the content of education and the offers of education made available;
- continued emphasis on girls/women and ICT, and how training is given, in order to avoid disparities between the sexes and to promote the recruitment of women to science subjects and ICT subjects;
- maintaining the current distribution of responsibility in respect of the acquisition of hardware, software and infrastructure and, by means of state initiatives, promoting cheap and good offers of infrastructure.

Students per computer. County distribution ⁵⁾
(SITES 1999)

Region	Primary Level	Lower Secondary Level	Upper Secondary Level
Østfold	19,1	11,9	3,8
Akershus	16,3	11,3	6,2
Oslo	17,0	12,7	5,4
Hedmark	13,1	10,2	5,8
Oppland	13,4	9,4	4,0
Buskerud	12,7	10,5	4,7
Vestfold	14,4	9,3	3,8
Telemark	15,4	8,9	4,8
Aust-Agder	17,6	9,9	3,8
Vest-Agder	16,7	10,9	4,6
Rogaland	15,6	9,8	5,5
Hordaland	11,6	9,9	4,5
Sogn og Fjordane	9,7	9,1	4,3
Møre og Romsdal	14,5	10,3	4,8
Sør-Trøndelag	16,4	11,6	5,4
Nord-Trøndelag	14,3	10,4	4,1
Nordland	12,3	8,8	4,2
Troms	14,7	10,2	4,4
Finnmark	15,7	9,4	3,6

5) Computers available to students. This corresponds to the estimates given in Statistics Norway 1995 and Statistics Norway 1997.

3.1

CHALLENGES

○ Competence has become an important element in competitiveness for the business sector, both in Norway and internationally, as well as for the individual. Competition and the need to raise the level of expertise, to increase flexibility and to adapt to the labour force are all making increasingly tough demands on the business sector. This situation is due to: increasing globalisation of the economy, internationalisation, technological development and the demand for greater adaptation of production and organisation.

○ Various official reports and political documents⁶⁾ written in the 1990s state that competence development is vital for future job creation and social welfare. It is claimed that highly skilled individuals find it easier to acquire new skills, and that this type of flexibility and the ability to learn are qualities that are going to become ever more important in the job market. Competence development in a life-long perspective will therefore become an increasingly important issue in education policy.

○ In order to face these new challenges, the education system must adopt new methods, develop new content, new types of teaching, new organisation and new methods of collaboration. Research and project results show that ICT can function as a catalyst for change and the development of new roles for pupils, students and teachers. The development of ICT as a subject, as a catalyst for change and as a resource in various subjects will not be easy, however. Traditionally, Norway has been one of the leading lights in many areas of ICT (so-called "object-oriented programming" – a cornerstone of modern ICT – originated in Norway). The country cannot be at the vanguard of development of all areas, but it is important that we systematically co-ordinate our research input concerning ICT in selected areas.

○ ICT is also very important in a number of subjects and fields. For example, map production has changed completely since the advent of digitisation and ICT. The use of ICT requires constant updating and supplementary education for teachers. The growing application of ICT in education will thus be one of the most important elements of the government's education policy in the coming century.

○ The challenges raised by the use of ICT in education also have social consequences. While the education system will have to help meet the requirements of the private sector, schools and

education also have to fulfil a critical and analytical role. The use of ICT has significant social consequences. It is vital that schools and education help pupils and students develop a critical and analytical attitude to the application of ICT in order to ensure that no social divisions develop in mastering technological challenges as a result of physical ability, sex, geography or social status.

3.2

OBJECTIVES

○ The 1996–99 IT plan urged the development of individuals' ICT ability. In determining the goals for the next period, it will be natural to take things a step further. As mentioned above, we can now see that the potential and the demands to exploit ICT in teaching, learning and in competence development are greater and developing faster than anyone could have imagined when the previous plan was drawn up just five years ago.

○ In the light of this, the goals for the coming period have been defined thus:

"ICT is to be used in education in order to contribute to better organisation, greater skills and pedagogical competence within an education system that develops and exploits ICT as a subject. The potential of ICT is to be exploited within teaching and learning so that the skills requirements of the individual and the society as a whole can be met."

The goals have been defined in such a way as to make it clear that ICT is not something marginal that can be isolated from the development of the education system, but that it is an integral component – together with other measures and strategies. ICT in education is to contribute to:

- equal opportunities for competence development in and access to ICT, regardless of sex, geographical location and social situation
- flexible and user-compatible training arrangements
- new forms of collaboration, work, learning and assessment, both nationally and internationally
- ensuring that those with learning difficulties and/or physical handicaps are given equal opportunities to improve the quality of life, their learning and their participation in society and the working community.

NOU 1997:25 "New Competence – The basis for a total policy for continuing education and training for adults".

NOU 1992:26 "A National Strategy for Increasing Employment in the 1990s". White Paper No. 35 (1994–95) "Welfare – Towards 2030".

White Paper No. 4 (1997–98) "Long-Term Programme 1998–2002". White Paper No. 42 (1997–98) "The Competence Reform Report".

3.3 CENTRAL GOVERNMENT'S PRIORITIES AND THE DISTRIBUTION OF RESPONSIBILITIES AND DUTIES

Integrating ICT in education cannot be done in just a few simple steps. It is essential to have a fully functioning infrastructure with access to computers and a computer network, though even this is far from sufficient to be able to use ICT in teaching and learning. More accurately, it needs comprehensive and well-planned involvement in a variety of areas. The priorities selected in the previous ICT plan were followed up, but with an adjustment, where research and development became a priority in its own right. This move indicates recognition of the major significance that research and development work has on promoting dynamic ICT development. This plan therefore has the following main priorities:

- **pedagogical facilitation**
- **ICT as a subject and ICT integrated in other subjects**
- **development of teachers' competence**
- **research and development (R&D)**
- **organisation**
- **infrastructure and cooperation**

In determining the priorities and measures, it is important to remember that, in all teaching and learning, it is the learning party (pupil, student, apprentice, or adult in a skills development situation) who must be the focus of attention. The learner is the subject, not the object. Various measures and priorities in this ICT plan have been designed to achieve the goal of developing and exploiting ICT in teaching resources and learning environments to create the best possible learning situation for the learner. However, since the actual tool, ICT, is the core part of this work, the plan must promote the learning and teaching of ICT as a subject and the use of ICT within other subjects. ICT development and pedagogical exploitation and preparation must be considered together when assessing ICT in teaching and learning. Technological development creates the basis and conditions for pedagogical exploitation, while expectations and requirements for pedagogical exploitation form the basis of technological development.

In considering work relating to ICT development and the preparation of measures in education, it is important to have a thorough understanding of the distribution of responsibility and duties in the education sector. Different duties and responsibilities are allocated to schools, teachers, school owners, institutions within higher education and the Ministry. Technological development has been so fast that there is a need for new initiatives, but this should not obviate the need for general distribution of responsibility and duties within the education sector. The distribution of responsibilities and duties provided for in White Paper

No. 24 (1993–94) "Information Technology in Education" is to be continued in this latest plan (see Chap. 5 "Principles Governing the Distribution of Responsibilities and Duties").

3.4 NEW AND CONTINUING NATIONAL MEASURES AND PRIORITIES

In drawing up a new ICT plan for education, two approaches are important. On the one hand, the formulation of measures in the plan and the description of long-term priorities that the respective parties can relate to need to be fairly general. With the pace of change being as fast as it is, the above formulation and description must be kept on a general level. The purpose of this is to lay the foundation for long-term and sustainable ICT development in the education system, where national, regional, local and institutional responsibility can be safeguarded.

On the other hand, it is necessary to establish certain autonomous measures to function as supports, or catalysts, in the development of the plan. These measures have merited extra emphasis by the state.

Next, we describe the most important new and continuing state initiatives in the period covered by the plan. Chapter 4 provides a more detailed description of the challenges and measures in each priority area.



Pedagogical facilitation

The state is to establish a National Learning Net for the education sector

A number of networks have already been established, or are currently being established, for specific areas of the education sector. These include, for example, Skolenettet (the schoolnet) for the school sector, Tunet for Voksenoppl ring (adult education centre), SOFF's Internet home page for higher education, and series of networks for individual institutions and groups. The country needs an overall network to provide uniform access to information and study resources, and where individual parties can have their own site and collaborate with others. The national network is to be organised as a portal for the education sector in Norway, but will also be set up to help international users. It will safeguard national opportunities, such as pedagogy for special purposes, and various digital library services. It will also contribute to the co-ordination of different Internet-based study resources and act as a catalyst for introducing new technology and forms of study. Finally, the Learning Net must be sure not to overlook the importance of analysis, and the critical assessment, of ICT development.

Development of new methods of examination and assessment

The priorities and practical arrangements of teaching and learning are determined by examinations and assessments. The use of ICT has direct consequences for the way schoolwork is organised. With the aid of the Internet, pupils and students can capitalise on new opportunities to obtain material and can copy or order complete essays and exercises. This creates the need to develop new testing and assessment methods where ICT resources form an integral part – a major challenge for schools and higher education. Initiatives are now being taken to focus more on this issue.



ICT as a subject and ICT integrated in subjects

The development of ICT as a subject and the integration of ICT in subjects in higher education and upper secondary school education is to be researched. The report will form the basis of a national strategy for ensuring that Norway remains up-to-date internationally in selected ICT areas.

As a result of the developments in the labour market and the need for technological skills in different areas, the last decade has seen the establishment of a great many new study places and a wealth of new subjects in the field of ICT. ICT is thus gaining an ever-greater role in all subjects and areas. An assessment is now required to ascertain the position of Norway in this field in relation to other countries and research environments that the country is normally compared with. Important questions that must be answered include: What do we think future requirements will be? What technical arrangements and skills do we need? What goals and ambitions should Norway have in this field? How can we increase the number of female students on ICT courses?



Developing teachers' competence

All student teachers must complete activities in their course of study that equip them with ability and experience in the development and use of ICT in teaching and learning as well as in the use of ICT as a tool in open and flexible study methods.

ICT provides new opportunities for practising open and flexible study methods. Prospective teachers will have to be able to make use of the opportunities – to develop their own skills and to be able to advise students in school situations

where learning and teaching become ever more learner-directed. A basis for such skills must be created during the study period by employing new study methods and by project work. The teacher training institutions must overcome these challenges. Use of Internet-based teaching and learning in teacher training will secure the development of further opportunities, the development of the study environment and the development of the skills of the personnel.

Internet-based continuing education and training opportunities for teachers must be promoted and co-ordinated

In connection with the major education reforms, a comprehensive range of continuing education and training courses for teachers were developed and introduced. The country needs to set up new courses in ICT and refine existing courses by making greater use of ICT and the Internet. Furthermore, Internet-based opportunities need to be exploited better and should be incorporated into a comprehensive system, then co-ordinated with practical, institution-based development measures. It is still one of the goals of the plan that institutions promote their courses, but new technological opportunities need to be co-ordinated and exploited better. The Ministry will be co-ordinating developments in this area.



Research and development (R&D)

The establishment of "Tomorrow's School" aimed at strengthening and organising research and development efforts in the field of ICT in education.

Systematic and comprehensive research still needs to be carried out on how ICT can be exploited in the development of the schools of tomorrow. The Ministry has initiated the project called "PILOT" to see how primary and secondary schools in nine counties capitalise on the pedagogical and organisational opportunities that ICT provides for in their studies. This work must be reinforced through co-ordination with other projects, new initiatives and measures such as the development of scenarios for the schools of the future, the development of ICT at schools in urban districts with social and cultural challenges, the development of a new role for teachers, and the evaluation of the significance ICT has for the various subjects and for the composition of teaching. All the work carried out in this field goes under the title "Tomorrow's School".

Local ICT development work in schools is to be strengthened.

Local and state initiatives are required for the successful development of ICT in schools. Local initiatives and measures, local involvement and the determination to persevere are essential requirements for ICT development. Local development work will be co-ordinated with development environments at colleges and universities. The new ICT plan thus emphasises the need to promote development opportunities in schools. Local development work and the enhancement of teachers' competence in ICT must be considered together. ICT knowledge must be exploited, developed and secured through project work and the development of new methods of working for teachers and pupils alike.



Organisation

Meeting places for ICT in education shall be established.

The business sector and public administration view education and skills development as highly important. We can see increasing interest in the development of schools and education. Many people wish to inform the Ministry of their views. This is a positive development. This provides the Ministry with an opportunity it wishes to exploit by establishing meeting places where representatives of different sectors may have the opportunity to meet, put forward ideas and opinions, and discuss the challenges facing education – especially the challenges represented by ICT

A strategy for international cooperation in ICT in the education sector is to be developed.

ICT is being developed throughout the world. It brings many parts of the education society face to face with new international challenges. Higher education has always enjoyed international cooperation. Now, schools and education at other levels are beginning to follow. Norway must learn from and keep abreast of international developments. The international contact network must be exploited, developed and prioritised. Representatives from the Norwegian education system must not only be present but also conspicuous and active promoters of selected areas of international development. In the light of this, the Ministry will develop an international ICT strategy for the education sector.



Infrastructure and cooperation

Refreshment of partnership schemes between the education sector and the business sector.

It is important to exploit the involvement in school and education that is becoming increasingly prominent in the business world. Telenor, for example, is offering schools an upper limit for costs relating to use of the Internet. Another example is the cooperation between schools, parents and the business world in work on the NetD@ys project. It is important to continue work on the development of more systematic cooperation methods which lead to increased contact, increased understanding of each other, exchange of knowledge and agreements on the accessibility of equipment, software and lower prices.

Future Internet services in Norwegian education and research – a development project

The university and college sector has been the driving force behind Internet development in Norway. This development has been handled by Uninett A/S. Many initiatives continue to be taken to advance this development – from Norwegian projects in telemedicine via a Nordic Internet2 Project to schemes to promote use of the Internet in schools. A strategy and measures are required for the development and organisation, for offers and services, which accommodate all the requirements of the education sector. It is especially important that the infrastructure is prepared with adequate functionality and capacity, so that use and development are as independent of current technological limitations as possible.

The European Schoolnet

The European Schoolnet (EUN) is a collaboration project between 19 European countries. Its aims are to:

- promote cooperation between schools in Europe;
- offer electronic study resources as a supplement to those being developed under the aegis of the national school network;
- give teachers opportunities to develop their skills;
- increase the cooperation between public and private institutions involved in the development of ICT in schools.

The Ministry of Education, Research and Church Affairs and the National Centre for Educational Resources represent Norway.

<http://www.eun.org>

The main aim of the action plan relates to the use of ICT for the development of new studies and assessment methods, new organisation and collaboration methods and new student and teacher roles. Also important, however, is the development of subject content to accommodate the requirements of individuals and society as a whole for new skills. To change and improve the study situation at education institutions, there is a need for measures at both national and local levels. Another important aim is to increase the opportunities for the physically handicapped to exploit ICT in teaching and learning. In the previous planning period, work was systematically carried out to promote girls' interest in the use of ICT. This work will be continued in the current planning period through various measures including the recruitment of girls for ICT studies and ICT expertise for female teachers.

Chapter 3 described the existing and new state initiatives. In this chapter, we provide a complete overview of the initiatives taken at national level. Work on these initiatives is intended to stimulate the sector in general and to strengthen local input to realise educational goals relating to ICT and education.

Advisory Centre on the Internet

The advisory centre on the Internet was set up to help school leaders, teachers, ICT advisors, instructors and other people responsible for teaching. The centre contains resources such as technical articles, commentaries and reviews concerning teaching software, discussions of ICT projects and plans of local and regional municipalities. The centre is run by the National Centre for Educational Resources.
<http://vs.nls.no>

ENIS

ENIS stands for European Network of Innovative Schools – a project run by the European Schoolnet. The aim of this project is to create a network of schools that have built up broad experience in the use of ICT in teaching. The network consists of several hundred schools from most of the countries in Europe. Twenty-three schools from Norway have been selected for inclusion. The National Centre for Educational Resources coordinates the work for the Norwegian schools. More details are available at the website of the Norwegian ENIS Network and that of the European Network of Innovative Schools.
<http://www.en.eun.org/enis/set-enis.html>
<http://enis.nls.no/>

The curriculum for primary and secondary schools promotes student involvement in their course of studies. International surveys show that use of ICT as a pedagogical tool increases motivation and concentration and improves results. This is also the case in higher education and in adult education. Pedagogical preparation and the use of ICT will thus be a major priority in the coming planning period. The use of ICT in education, however, will present many challenges, though it is important not to exaggerate the difficulties. Simple use of word-processing, presentation tools, Internet information and electronic mail in relatively traditional contexts can represent new and exciting opportunities for teachers and students alike.

National challenges

- Increased focus on how ICT can help improve the quality of teaching and learning.
- Greater access to learning materials and the development of new and varied learning methods to stimulate activity, autonomy and cooperation.
- Increased exploitation of new ICT-based opportunities for cooperation and the exchange of knowledge and experience at all levels of the education system.
- Increased focus on how ICT can help the critical thinking of pupils and students in relation to the use of ICT in teaching and learning and society generally.
- Increased focus on how to prevent further disparities between girls' and boys' use of ICT.

Central government's priorities

Chapter 3 mentions the following priorities for the state sector:

- **The state is to establish a National Learning Net for the education sector.**
- **Development of new methods of examination and assessment.**

General measures

Furthermore, the following general measures will be initiated and pursued

- When the curriculum and framework plans are revised, ICT is to be integrated as a pedagogical resource in keeping with the subject's/area's character and compatible with the technological possibilities this offers.
- During the plan's period of validity, a technology and competence base must be created in order to ensure the goals relating to ICT in curricula and framework plans are reached.
- Prepare the ground for the use of ICT in teaching, by:
 - developing a national network for the whole education sector, to make resource material available and to establish meeting places and discussion forums,
 - developing measures concerning access to undesirable content on the Internet;
 - refine the Internet-based pedagogical advisory service made available through the Advisory Centre at the National Centre for Educational Resources;
 - offering Internet-based teaching for project work, emphasising organisation, cooperation and presentation in connection with the use of the Internet;
 - developing content that focuses on analytical and critical attitudes to the use of ICT.
- Preparing for, and encouraging, the further development of electronic study material, and contributing to information and guidance in its use.
- Pursuing the plan's aim to improve pedagogical teaching resources for special purposes.
- Establishing a national database for information relating to local self-assessment and quality development in schools and vocational training
- Using ICT and the Internet in interdisciplinary work.

The Norwegian Schoolnet

The Schoolnet is the gateway to the Internet for all schools. It was launched in October 1996 and is intended for use by teachers, employees in the school administration system, students, parents and other interested parties. The Ministry of Education, Research and Church Affairs has assigned responsibility for the Schoolnet to the National Centre for Educational Resources. The Schoolnet offers study resources for primary and secondary school teaching, and for special pedagogy. It also provides a number of other services, such as "The Competence Database", which offers the latest information on supplementary education for students at compulsory school, "YoU" – an electronic information bank about occupations and education, and the Internet magazine "Klikk".
<http://skolenettet.nls.no>

4.2

ICT AS A SUBJECT AND ICT INTEGRATED IN SUBJECTS

The growth of the global information society subjects the education system to demands for new subjects and the development of subject content. In the business sector, demands for adaptability and competence development increase constantly; new subjects and occupations emerge, others disappear. In this kind of situation, the education system has to be able very quickly to perceive new requirements and offer the business sector and the individual up-to-date and relevant courses of study. At the same time, it is important that ICT as a subject, and ICT integrated in subjects, is not developed hastily and without purpose. The development of ICT is of major social significance. At all levels of the education system, we must be sure to base ICT development on the values society is founded on.

National challenges

- to meet the requirements of society and individuals for general and specific skills in ICT;
- to integrate ICT in teaching and in the subjects;
- to develop skills on an international level in prioritised ICT areas;
- to base ICT development on the values society is founded on;
- to promote recruitment to ICT-related subjects, ensuring a balance of male and female students and ensuring against disparities due to geographical location and social background.

Central government's priorities

Chapter 3 mentions the following priority for the state sector:

- **The development of ICT as a subject and ICT integrated in subjects in higher education and upper secondary school education is to be researched. The final report will form the basis of a national strategy for ensuring that Norway remains up-to-date internationally in selected ICT areas.**

General measures

The following general measures will also be initiated and pursued:

- examination of the curriculum and framework plans to ensure relevance and continuity in ICT education;

- research, by means of different research and development activities, for example on how extensive use of ICT affects the content of courses and the composition of courses, and on the needs for new, or changed, vocational courses in upper secondary and higher education;
- further development of Internet-based study opportunities for adults in ICT as a subject and ICT integrated in subjects;
- recruitment of students to ICT courses in upper secondary and higher education;
- women's applications to follow ICT courses, and the use of ICT as a tool for learning, through such channels as conferences and development projects;
- ensuring against new disparities in access to and use of ICT due to the users' sex, geographical location or social background.

Future educational resources

Do you wish you had better resources for science subjects on the Internet, so that you could use them at school? Do you need help in making atoms and molecules an exciting and easy-to-understand topic to teach? Would you like your students to work with other students in the Nordic region and the rest of the world? Do you believe a combination of games and study can improve results?

"Molekult" is an Internet-based, multi-user game developed by the National Centre for Educational Resources, Nordic partners and the Norwegian computer games manufacturer, Funcom.
<http://www.molekult.org>

Work group for digital study resources

(Arbeidsgruppen for digitale læremidler)

The group was established in autumn 1996. Its aim is to introduce new technology and new study media in higher education in Norway. More specifically, the group is seeking to develop digital study resources and make them readily available and is assessing and making available digital study resources developed by other parties. It also aims to develop, retrieve, and spread knowledge about pedagogical practices relating to digital study resources. The group has already designed various development programmes, including a programme to train teachers in the use and development of digital study resources.
<http://www.uio.no/klokt/>

4.3

DEVELOPING TEACHERS' COMPETENCE

The competence of teachers in the use of ICT must be developed and kept up-to-date if ICT is to be integrated successfully into courses and used in teaching. Primary and secondary schools have worked hard to increase teachers' basic ICT competence. The challenge now is to apply ICT pedagogically. Measures must be established to help new teachers through their basic training and to provide teachers in primary and upper secondary schools, teacher training institutions, adult education centres and higher education with continuing education and training.

National challenges

- to encourage student teachers to use ICT in their studies and to encourage teacher training institutions to integrate ICT in their teaching and advisory work;
- to provide teachers with opportunities to develop their skills in relation to:
 - the basic use of ICT,
 - the use of ICT as a pedagogical tool, and
 - ICT integrated in subjects;
- to ensure that work to integrate ICT in teaching constitutes part of the skills training of school leaders.

Central government's priorities

Chapter 3 mentions the following priorities for the state sector:

- **All student teachers must complete activities in their course of study that equip them with ability and experience in the development and use of ICT in teaching and learning as well as in the use of ICT as a tool in open and flexible study methods.**
- **Internet-based continuing education and training opportunities for teachers must be developed and co-ordinated.**

General measures

The following general measures will also be initiated and pursued:

- improvement of the competence of teacher training institutions in the use of ICT as a technical and pedagogical resource;
- preparation of the ground for interdisciplinary cooperation between teacher training institutions and other professional environments;
- encouragement of county and municipal authorities to carry out skills development in ICT for teachers and school leaders, and preparatory work to this end.

One of the state's most important aims is to promote an education sector which, at all levels, is progressive and quick to adapt to change. Promotion of local and national research and development activities will boost local involvement and competence development and strengthen the contact between local enterprises and authorities and higher education institutions.

Research and development work provides information on the development of the sector and creates a stronger foundation on which to determine policy. Knowledge and use of ICT must be developed through the promotion of systematic research and development work – especially in connection with the pedagogical and organisational opportunities ICT provides and the consequences ICT will have for the various disciplines and the content of instruction. Research and development work will also provide teachers, leaders and other personnel at all levels with the opportunity to develop their skills by participating in trials and development measures.

National challenges

- to increase knowledge of, and experience in, ICT in education at all levels through research and development.

Central government's priorities

Chapter 3 mentions the following priorities for the state sector:

- **The establishment of "Tomorrow's School" aimed at strengthening and organising research and development efforts in the field of ICT in education.**
- **Local ICT development work in schools is to be strengthened.**

General measures

The following general measures will also be initiated and pursued:

- research and development work directed towards the use of ICT in teaching and learning;
- development of scenarios for studying the possibilities of using ICT in education, and the consequences if used;
- research into flexible education and study methods for all students including adults;
- ICT-based development measures directed towards pupils and students with special needs;
- development measures directed towards increasing the use of ICT by girls and women

- development and testing of new technological applications, electronic study methods and new assessment and organisation forms;
- to gain and exchange experience from international research and development projects in the area of ICT in education;
- measures at higher degree and doctorate levels to boost expertise in ICT and education nationally;
- strategy for evaluating the various measures in this plan.

The Research and Competence Network for IT in Education (ITU)

The ITU aims to obtain and provide knowledge and research in the field of ICT and education. The network's work area covers primary and secondary school, adult education and teacher training. The network was established in autumn 1997 at the Faculty of Education Science (Utdanningsvitenskaplige fakultet), Oslo University, on the initiative of the Ministry of Education, Research and Church Affairs.

In 1998–99, with funding from the ITU, seven research projects were started under the aegis of Bergen University, Oslo University, Stord/Haugesund College, Lillehammer College, Tromsø University and Telenor Research and Development. The ITU has established a national forum at higher degree level with higher degree students from all universities and a selection of colleges in Norway. It has its own journal and annual conferences are held to develop and maintain the network as well as to exchange experience in the field. <http://www.itu.uio.no>

Nordunet2

Nordunet2 is a research programme set up under the auspices of the Nordic Council of Ministers. It focuses on the innovative use of networks and network-based applications. The programme was inspired by the initiatives called "Internet2" and "Next Generation Internet" in the USA. The main ideas of Internet2 are the development of new services on, and usage of, the Internet. Research has concentrated on four areas:

- distance learning and lifelong learning
- telemedicine
- digital libraries
- infrastructure

The secretariat for the research programme is at the Centre for Information Technology, Oslo University. <http://www.nordunet2.org>

ORGANISATION

The education system must be able to meet expectations and requirements concerning technical advances and it must be able to adapt to meet the needs of individual teachers. The exploitation of ICT requires careful organisation at all levels of the education system. Strategies must be developed, and cooperation forums must be established locally, nationally and internationally to bring together parties such as libraries, museums and other cultural institutions.

National challenges

- Development of new forms of organisation in schools, vocational training and higher education, to make instruction more flexible and accessible for different target groups.
- Establishment of good cooperation forums nationally and internationally to discuss ICT and education.

Central government's priorities

Chapter 3 mentions the following priorities for the state sector:

- **The establishment of forums to discuss ICT in education.**
- **A strategy for international cooperation in ICT in the education sector is to be developed.**

General measures

The following general measures will also be initiated and pursued:

- development of flexible Internet-based study opportunities at all education levels;
- encourage municipalities and counties to investigate new forms of organisation in schools;
- a national initiative to establish/refine digital library services for higher education;
- a national initiative to develop and co-ordinate open and flexible study in higher education.

The PILOT project

In order to acquire broader experience and more scientific knowledge on ICT in education, the Ministry of Education, Research and Church Affairs has initiated a number of major research and development projects. One such project is the three-year project called "PILOT" (Project Innovation in Learning, Organisation and Technology), which began in four counties in 1999. The project was extended to include three further counties in 2000. The aim of the project is to develop and exploit the pedagogical and organisational opportunities that the use of ICT in education offers and to develop and share this knowledge. Information about the project is available on the Schoolnet: <http://pilot.nls.no/>

Project: "The New School Route"

The aim of this project is to see whether new media, combined with local teaching and greater parent involvement, can help maintain and develop small local schools. The pupils are equipped with their own laptop PCs and two of the schools hold some of their instruction by videophone.

The project is to run from 1997 to 2001 and encompasses three schools of different size in the municipalities of Bjarkøy and Karlsøy in Troms county. It involves the researchers not only observing what happens, but also participating and influencing activities. The project conducts research at the schools with the active involvement of the schools themselves. In this way, it can reveal barriers to, and opportunities for, development. Two reports have been written on the project so far. It is being run by Unikom, Tromsø University.

Kidlink

Kidlink is a foundation, registered in Norway, to promote global communication between children and young adults. Since its inception in 1990, over 175,000 children and young adults from over 130 countries in all continents have participated. They communicate mainly by electronic correspondence and conferences, but also use conversation rooms, various types of web-based dialogues, standard letters, fax and videoconferences. Kidlink offers activities in 16 languages, some of which are: Arabic, English, Hebrew, Macedonian, Norwegian, Sami, Slovenian and Spanish.

Kidlink dialogues start with four questions:

- 1) Who am I? 2) What do I want to be when I'm older?
- 3) In what way do I want the world to be a better place to grow up in? 4) What can I do to make it a better place?

<http://www.kidlink.org>

The goals specified for ICT in education can only be achieved through access to modern equipment and good technological infrastructure. While the equipment situation is improving rapidly, even in primary and lower secondary schools, there is still a need for good, cost-effective solutions and for the acquisition of equipment and software. There is also a need for appropriate solutions relating to costs and the use of the Internet. The establishment of a satisfactory technological infrastructure will also increase demands on service and support. Equipment and service will continue to be the main responsibility of the owners of schools and institutions (see Chapter 5). The establishment of a well functioning cooperation with the business sector in this area is of great importance, aiming at exploiting available resources and competencies.

National challenges

- Satisfactory availability of equipment for both students and teachers and fulfilment of the requirements of users with special needs.
- Good access to the Internet.
- Good arrangements for operation, maintenance and technical support in educational institutions.
- Better reciprocal exploitation of skills and resources between the education sector and the business sector.

Central government's priorities

Chapter 3 mentions the following priorities for the state sector:

- **Refinement of partnership schemes between the education sector and the business sector.**
- **Future Internet services in Norwegian education and research – a development project.**

General measures

The following general measures will also be initiated and pursued:

- national arrangements and agreements to secure reasonable operating costs and good access to the Internet;
- framework agreements and purchase schemes for equipment, software and new services;
- arrangements for transferring used, but up-to-date, equipment from the business sector to schools;

- arrangements for operation, maintenance and technical support in education institutions – also for the physically handicapped.

Second-hand computers for schools

A scheme administered by the National Centre for Educational Resources is designed to pass on second-hand computers from the business sector to schools. For the year 2000, the centre entered into an agreement with Alternativ Data (operator of the scheme) and Microsoft (supplier of the operating system and other software). The former has broad experience in recycling computers in the business sector and has supplied the education sector with second-hand equipment for many years. When the scheme started in autumn 1999, the computers were to have the following minimum configuration: Pentium 90/100, 16 MB RAM, 500 MB hard disk, keyboard, mouse, network interface card, SVGA video card, screen. This would allow the computers to be used for the majority of school tasks and projects. The scheme aims to deliver 8,000–10,000 computers in the first year.

<http://www.alternativ-data.no/>

School Surf...

Following an initiative taken by the Ministry of Education, Research and Church Affairs, Telenor is now offering all primary and lower secondary schools ISDN access to the Internet at greatly reduced prices. The School Surf scheme means that Telenor sets a ceiling on the schools' costs of line use.

Higher education on the Internet

An increasing number of higher education courses are being followed by students who rarely attend the actual place of instruction but who participate by using the Internet. New opportunities are being developed by both individual institutions and by groups of collaborating institutions.

The Norwegian Executive Board for Flexible Learning in Higher Education (SOFF) operates Villvinveven – an electronic forum for IT and flexible higher education. The Internet has become the dominant technology in the projects that SOFF supports. SOFF is to present a report on the use of the Internet in flexible education in 2000.

2000 will also see the inauguration of a database of all continuing education and training opportunities in higher education. It will be administered by the Norwegian University Network for Lifelong Learning (Norgesuniversitetet) – a collaboration project between the Norwegian Council of Universities, the Norwegian Council of State Colleges and organisations in the business sector. It is financed by the Ministry of Education, Research and Church Affairs.

GIRLS AND ICT

Several projects of the 1996–99 plan related to girls' use of ICT in primary and secondary school, general teacher training and universities.

"An IT journey to a better school"

This project, run by Tjøme Lower Secondary School, aimed to find out how girls' and boys' attitudes to, and use of, PCs would change as a result of the systematic use of ICT in education and communication. It also sought to establish how this would affect the work and learning process in terms of the quality of teaching, learning and the results of learning.

See: <http://region.hive.no/tjome/tusk/> or Telenor Research and Development's reports on the Norwegian Enisnet: <http://enis.nls.no/>

Internet – GirlNet?

A qualitative survey carried out at lower secondary schools in 1997 ("Internet – GirlNet?") supported results from Tjøme. It corroborated the view that the majority of girls are not as interested in machines as boys are. According to this survey, the girls wanted to use the computer to retrieve information relating to schoolwork. Even if they also wanted to use it as a toy, their playing involved to a lesser degree computer games. Rather, they were fascinated by the communications facilities that ICT afforded through the Internet and e-mail.

"Girls, boys and IT concepts"

In 1998, NIBR carried out a survey on behalf of the Ministry of Education, Research and Church Affairs and Telenor R&D. The aim of the survey was to analyse young people's (15 year-olds') knowledge and understanding of information technology. It revealed that the boys in the survey consistently had greater knowledge than the girls. It found that the greatest differences related to concepts concerning technology and computer games. However, it also found that there were many boys who were not particularly well acquainted with the exact meaning of the concepts. Only a very few boys were able to give precise technical definitions.

Integration of ICT in schools. A project for female teachers at upper secondary school

The main aim of this project was to find measures for integrating ICT into teaching for female teachers teaching courses attended predominantly by girls at an upper secondary school in northern Norway. It focused on the teachers' role-model function. The project report can be viewed at: <http://www.dep.no/kuf/proj/it/skole-it/>

Oslo College (Høgskolen i Oslo)

The teacher-training course at Oslo College has received project funding from the Ministry of Education, Research and Church Affairs to provide ICT courses for female students and teachers. One of the two classes (first semester course in infor-

mation technology for teachers) consists solely of female students. This class focuses on issues more appropriate to women. Many of the participants stated that they received more support and care as a result of the class being exclusively for women.

Recruiting women to ICT studies

The NTNU and Oslo University have carried out projects to increase the ratio of women on ICT courses. In 1997, the NTNU introduced a special quota system for women on their computer technology courses. In 1998, a national information and recruitment campaign was started to motivate women to follow computer courses at the country's four universities. The Institute for Information Technology at Oslo University has been developing strategies to increase the ratio of women on its main courses. This initiative has been supported by various parties, including the Ministry of Education, Research and Church Affairs. A description of the NTNU project can be found at: <http://www.ntnu.no/datajenter>

Women in Academe

The Ministry of Education, Research and Church Affairs is worried about the low number of women students and women in senior positions in technological fields in the university and college sector. This is the case particularly in the field of ICT. Information technology courses need to be promoted much more constructively towards women; it must rid itself of the image of being a "nerd" subject. The Ministry held a brainstorming session on this issue in 1999. An interesting report on the subject can be viewed at:

<http://www.helix.nature.com/debates/>.

"D@mer og D@ta" conferences (Women and computing conferences)

The Ministry of Education, Research and Church Affairs arranged three large, national conferences under the title of "Women and Data" in 1996, 1998 and 1999, the first two in collaboration with Telenor R&D, the third in collaboration with the ITU. The main target group for the conferences was women teachers and student teachers. A great deal of interest was shown in the initiative.

"One click and you're hooked"

Results from projects carried out in primary and lower secondary schools in the current planning period have been compiled into the brochure "One Click and You're Hooked". The brochure is intended to inspire girls to use data technology at school to the same degree as boys do. It can be viewed at: <http://odin.dep.no/kuf/proj/it>.

Background documents

Over the last few years, many documents have been issued which deal with the distribution of work and responsibility between municipal, county and state bodies:

- White Paper No. 37 (1990–91) – Organisation and Control in the Education Sector
- White Paper No. 75 (1991–92) – Organisation of the Administration of Education
- White Paper No. 23 (1992–93) – Relationship between the State and the Municipalities
- White Paper No. 24 (1993–94) – Information Technology in Education
- White Paper No. 38 (1997–98) – IT Competence from a Regional Perspective
- White Paper No. 28 (1998–99) – More Ambitious Goals
- Plan for IT in Norwegian Education 1996–99

○ White Paper No. 24 (1993-94)

"Information Technology in Education" discusses the principles relating to the distribution of responsibility and duties in the field of information and communication technology between the various bodies in the education system. The proposals for the distribution of responsibility and duties in the paper follow the principles laid down in White Paper No. 37 (1990-91) "Organisation and Control in the Education Sector". These proposals assume that the organisation of ICT will adhere to the same organisational principles as those that apply to other areas in the education sector.

Duties at the municipal and county level

It is stated in White Paper No. 24 that municipalities and counties are responsible for the organisation and pursuit of the national goals in the different areas within the framework of the laws, regulations and rules governing the areas. It also gives the municipalities and counties the following responsibilities in respect of ICT:

- purchase and organisation of equipment and software;
- employment of ICT staff and those with responsibility for the system;
- continuing education;
- guidance;

- work on local curricula;
- municipal and county cooperation and net work organisation.

Duties at the central government level

In White Paper No. 28 (1998-99) "More Ambitious Goals", the government proposes setting up a national centre for learning and development with responsibility for:

- research;
- state-initiated testing and development work;
- information;
- curriculum work;
- examinations.

○ The work performed by the National

Centre for Educational Resources (NLS) will also be done in the new centre. The NLS is responsible for the following areas of ICT:

- sales and software distribution;
- user support and information for the school system in respect of software developed under the aegis of the Ministry;
- development and refinement of pedagogical software within prioritised areas;
- infrastructure and Internet access;
- international cooperation in the area of ICT;
- electronic teaching resources;
- development of the School Network;
- development of an Internet-based advisory network.

○ The national education offices are

responsible for:-

- guidance and information supplied to the municipalities and counties;
- co-ordination of activities between the various education levels, including co-ordination relating to local development projects;
- reporting;
- inspections;
- status assessments.

○ The state-run competence centres for

special needs education have important duties related to: software and curricula in the field of special needs education.

○ Universities and colleges are to provide

graduates with the ICT expertise required by the education sector. The institutions are also responsible for continuing education and training. Universities and colleges must establish an organised supplementary education system for candidates and other people using ICT in schools who feel they need a refresher course.

○ The Research and Competence Network for IT in Education (ITU) at the University of Oslo is to use the benefits of its research and participation in development projects to help pupils, students and teachers become users of ICT and thus co-developers of ICT in a pedagogical perspective.

○ Teacher training institutions have a special responsibility to increase the competence of teachers.

Central government management tools

The state can employ different tools to ensure that municipalities and counties achieve the goals the state has laid down for them. The plan for ICT in education is not a direct control tool in respect of the municipalities and counties, but it does function as a guideline to inform the sector of the goals and measures the Ministry has set regarding the application of ICT.

The plan outlines the priorities of the Ministry throughout the sector during the plan period. It will thus form the basis of the Ministry's management of ICT over the next four years.

The Viking Network

The idea to create the Viking Network was first mooted in the summer of 1993. A teacher by the name of Wigo H. Skråmm wanted to exploit the opportunities that electronic communications afforded his school. He chose the Viking era as the project's theme. Interested parties in various countries were able to use electronic communications to provide information on, and discuss, traces of the Viking era in their respective areas.

The Viking Network has now become an important teaching resource in history. The Viking Network Website contains ideas for projects and activities that schools can collaborate on across frontiers to stimulate use of electronic communication in teaching – especially in history. An international group of teachers is also associated with the project. Further information and details on how to participate in any of the projects are available at: <http://viking.no/>.

The National Budget for 2000 provided for a package of measures for schools. This represented a comprehensive investment in ICT in the education sector over four years. NOK 150 million per year was allocated to the ICT part of the package. This is in addition to the ICT funds budgeted for in the previous planning period and totalling NOK 39.3 million per year.

Total funds for the new ICT plan are thus NOK 757 million for a four-year period. In addition, there are other ICT funds which, every year, are allocated to different parts of the budget. This four-year plan will be followed up by annual plans.

The ICT funds for the four-year plan have been allocated to developing teachers' competence, ICT in teacher training, electronic study resources, research and development work, and infrastructure – as shown in the table below.

Area	Allocation 2000 NOK	Total 2000–2003, Nok
Developing teachers' competence	45 million	180 million
ICT in teacher training	30 million	120 million
Electronic study resources	20 million	80 million
Research and development	35 million	140 million
Infrastructure	20 million	80 million
Continued allocation to ICT	39.3 million	157 million
Total	189.3 million	757 million

APPENDIX

ICT initiatives in other countries

Norway is not the only country to invest in ICT in the education sector. Over the last few years, many countries have increased dramatically their investment in hardware, software, Internet content and communications infrastructure. These investments have created much better access to PCs and the Internet, but the resources are unevenly distributed both inside and between countries.

○ The OECD issues an education policy analysis every year. The 1999 issue contains a separate chapter on technology in education. Four problems are highlighted here:

- 1. Finance** .This is an important problem. In addition to initial investment costs in technology and content, the service and updating of technology and software will incur continuous costs as they change so rapidly. A key issue is whether investment in ICT in education leads to reduced costs in other areas. Based on experience so far, it appears this is not the case.
- 2.** Development of software and content should be prioritised. Countries and schools that have invested heavily in computers and infrastructure should consider changing their focus of resources towards increasing funds spent on development of teachers' competence, multimedia content and software. Other important issues relate to the exploitation of the Internet in different learning environments and the exploitation of multimedia and software in learning.
- 3.** There is a clear need for a regulatory framework governing software and multimedia. This could be created through cooperation between public and private parties. The framework could cover such factors as copyright, tax rules, contractual issues, privacy issues, etc. Another important issue is whether such rules would have to be national or based simply on international agreements.
- 4.** The development of the Internet raises the issue of how it can be used for the distribution and use of high quality content and to provide opportunities for lifelong learning. The traditional coursebook market is under great pressure from this development, and the issue of how to safeguard teaching resources of high quality is of considerable importance in this changing process.

Plans of other countries

- Finland has drawn up a "Kunskapsstrategi för utbildning och forskning 2004" – a strategy for education, training and research up to the year 2004.

The programme is divided into four areas:

- the preparation of everyone for the information society;
- the various uses of networks in studies and teaching;
- the increase of digital capital;
- more robust structures for the information society in teaching and research.

The programme will have an annual budget limit of some FIM 300 million.

- Sweden has decided to invest around SEK 1,500 million over a three-year period. This investment is expected to improve access to the Internet for schools, provide competence development for 60,000 teachers focusing on IT as a tool in teaching and learning, and equip teachers participating in competence development with a PC at home.
- Denmark is channelling its investment through information and communication technology in the education system ("Informations- og kommunikationsteknologi i uddannelsessystemet"). This is a plan for the period 1998–2003 and is broken down into the following main areas:
 - pupils/students and ICT;
 - teachers and ICT;
 - courses and ICT;
 - equal and flexible access to lifelong learning;
 - coordination of ICT-based research and education.
- In the UK, the government has emphasised that it is focusing on ICT in education. Over a four-year period, it will allocate over GBP 1,000m to ICT in education. This investment involves the launching of the National Grid for Learning (NGfL) which will focus on the ICT competence of teachers, school access to the Internet, the development of Internet content in private and public partnerships and access to learning resources for everyone.