Nordic cooperation on Communication and Information Technologies and didactics in education

Peter Bollerslev

Director

Center for Applied Informatics in Teacher Education

Peder Hvitfeldts Straede 4,3

DK-1173 Copenhagen K, Denmark

Tele + 45 33 91 40 96; Fax + 45 33 91 46 96

E-mail: peter.bollerslev@sembosc.dk

Abstract

Implementing and applying each new development in Information Technology (IT) in education is a task requiring considerable resources. At the same time it is obvious that investment in IT is crucial for the development of any nation. The Nordic countries are very small. However, they share cultural backgrounds and educational traditions. Together they constitute a strong block capable of creating and building up expertise in the field of IT. The Nordic Committee on Educational Software and Technology, and, subsequently, IDUN have coordinated the Nordic collaboration during each phase of IT in education.

Keywords

Capacity building, competencies, developed countries, software, teacher education

1 INTRODUCTION

The five Nordic countries - Denmark, Finland, Iceland, Norway and Sweden - are situated farthest north in Europe. The Nordic Council of Ministers, a

committee responsible for collaboration between the governments in the Nordic countries, was established in 1971. Greenland, the Faroe Islands and the Aland Islands also participate, and the Nordic Council of Ministers makes decisions which are binding for all the countries when the decision has been taken unanimously.

In 1986 the Nordic Council of Ministers for Culture and Education entrusted the Nordic Committee on Educational Software and Technology with planning and organization of a broadly based Nordic collaboration on new Information Technologies (IT) in schools scheduled to start in 1987. The initial mandate was to develop competence in the use of IT in schools and develop high quality educational software.

In 1988 the committee's terms of reference were expanded to encompass all aspects of new technologies in education - information and documentation, development work and questions of standardization, product development, teacher education, and increased international collaboration. The mandate given by the Nordic Council of Ministers in 1988 emphasized that such activities should apply to the entire education system from primary and lower secondary schools, grammar schools, and vocational education and training to teacher education and adult education. The mandate of the Nordic Committee on Educational Software and Technology expired on 31 December 1994.

From January 1995 the IDUN project has continued the collaboration established by the Nordic Committee. This discussion explains how the Nordic Committee on Educational Software and Technology has carried out its work, describes the results achieved and how the work has influenced the collaboration between countries. The discussion will also describe how the collaboration has influenced the development of IT planning and implementation in each of the countries. Finally the activities the IDUN project has scheduled and already implemented are described.

2 STARTING POINT AND WORKING METHODS

Nordic collaboration on IT hardware and software issues for education has undoubtedly had the advantage of drawing on a shared fundamental view of education since the similar educational traditions provide a solid foundation for collaboration on the development of competence.

The Committee's objective was to exploit the potential of IT both as a means of renewing teaching individual subjects, and as a tool to amplify and complement teaching, especially with the help of sound educational software programs.

Nordic collaboration in the new and demanding field allowed the countries to effectively exploit the resources made available for the use of each new technology in education, for example by sharing the development costs of new software products or by coordinating research in a new area instead of carrying out the same work in parallel in all the Nordic countries. Another objective of the Committee's work was to build up a shared Nordic experience through reasonable contributions from the individual countries.

Coordination of the whole range of activities was carried out by the secretariat of the Nordic Committee. The working methods used to implement

the various projects varied depending on the size and nature of the project in question. A project was often the result of a joint effort with the aim of achieving a result or product which could be of use in the entire Nordic area. In other cases projects were implemented by sharing tasks among the countries. The final product was later made available to all the countries. A third working method was based upon the exploitation of a special, national competence.

The case of jointly-implemented projects applies principally to the information and documentation area, agreements and standardization, teacher education, and international collaboration. A real division of labour occurred when it came to major competence-based projects and to the product development area.

It should be noted that a basic aim in such a collaboration is that national, public agreements which were previously applicable to an individual country should, wherever possible, cover the Nordic area. Agreements of this kind for the Nordic area mean, amongst other things, that services and products can be licensed in the Nordic area on the same conditions as in the country which was originally part of the agreement.

It is also important to note that the rapid expansion of the exchange of information and experience in all the areas accorded priority had a number of positive consequences when viewed from a national perspective. The intensified exchange of information, both centrally and at the regional level, led to common trends in the framework and developments within the IT area in the Nordic countries, both from a technical viewpoint and an educational one.

The increased exchange of information has even contributed to the avoidance of errors at national level in areas undergoing rapid development as countries have been able to take advantage of research and insights gained in other Nordic countries. For example, the advanced studies in Expert Systems, which were carried out in Norway in cooperation with MIT in USA, has given valuable input to the Nordic research in the area generally. In this connection it is important to emphasize that the budget of the Nordic Committee only covered the marginal costs for the implementation of most project activities. The lion's share of the costs was borne nationally. However, thanks to joint project planning, a division of labour among the member countries and the exchange of software products has led to savings at national level.

Activities and Achievements

When the project started in 1987 the ministers gave priority to the work with information about and documentation of the results of projects on the introduction of IT into education, issues of standardization of hardware as well as software to be used in education, research and development in IT in education, competence in teachers using IT and development of educational software, agreements and contracts for the common Nordic use of software developed in one of the countries, teacher education, and international cooperation with specific reference to IT in education.

The following categories will be used in the description of the results of the Nordic cooperation: information and documentation; research and development,

and competence initiatives; product development, standards and agreements; teacher education; and international collaboration.

Information and documentation

The exchange of information and experience in their various forms has been one of the main initiatives throughout the entire collaborative process. Central authorities in each of the member countries send all relevant material - acts and regulations, agreements, reports, informative publications, educational materials and educational software relating to IT - on a regular basis to the Secretariat. Incoming materials are usually distributed at monthly intervals to the appropriate national bodies in the Nordic area. In many cases, the exchange of material has enabled the countries to use each other's suggestions and reports at the national level thus saving both money and duplication of effort.

A second activity under the aegis of the Committee has been study visits to member countries. Central authorities, institutions, schools and individual teachers have received contacts and suggestions concerning proposed study visits in various Nordic countries from the Secretariat.

The study visits took place at all levels from ministry to schools. Political and administrative experiences as well as classroom experiences were exchanged. The results are reported having been very helpful and sometimes having avoided repetition in other countries of failures already experienced in one country. Of course, projects with positive results have been copied from one Nordic country to another.

For a number of years, the exchange of information and experience has been followed up by an annual meeting of decision makers in the field of educational software and technology. Discussions at their three-day meetings have covered Nordic collaboration, development trends and guidelines for future work. As collaboration took root, annual meetings were replaced with national advisory panels who recommend on proposals for project activities through the Committee members.

The Committee's twice-yearly Nordic journal *Nytt om data i skolan* (*News on Computers in Schools*) is an important component of information-sharing activities. The journal was necessary because most member countries lacked a journal which regularly provided information on developments in IT in the various educational sectors. Rather than start five national journals in this field, a Nordic journal providing relevant Nordic and national content was felt to be a cost-effective alternative.

The Committee has also promoted Nordic catalogues of educational software for the entire educational field. Such catalogues did not exist at national level nor was there a standard for software description. For this reason the Committee commissioned the drafting of a joint Nordic standard for the description of software covering both the product and its hardware requirements in detail. The standard was then used to prepare Nordic catalogues, which were produced in collaboration with national institutions specializing in IT. As a result, the structure of the catalogues is identical in each Nordic country and is easy for teachers to use. Each country's catalogues cover both publicly and commercially-developed educational software, either written in or translated into, the language of that country.

The Committee has also produced many publications over the years in order to disseminate ideas and experiences about educational opportunities afforded by the use of IT in education. The publications vary in content and objectives. In some cases they are summaries and lists, for example covering research and development projects in the Nordic area. Some of them are general analyses or scenarios in various sectors, for example educational software requirements in schools, new technologies in adult education or the use of expert systems in education. They may also be reports from workshops and seminars, or course material. Publication is either by the secretariat, often in collaboration with appropriate national institutions, or via a private publisher who takes on the task of publishing the materials on a commercial basis.

Major reports are printed in sufficient numbers and are sent to member countries for distribution under national supervision. Reports with a more limited readership are distributed in the form of master copies, one per country. The individual countries can thereafter decide on the printing run and the distribution pattern themselves.

A by-product of collaboration, which had not been anticipated in the action plan but which has become an important part of information exchange among the member countries, was that the more the work of the Committee became known, the more the Committee's secretariat functions metamorphosed into a Nordic resource centre for the use of IT in education. In addition to coordinating formalized collaboration, the Committee's secretariat now acts as a resource centre which can promote informal cooperation in the Nordic region.

Research and Development and Competence Initiatives

One of the main initiatives of the Committee was to increase Nordic competence and expertise in the field of IT in education. The Committee had very little experience on which to base its work. While countries such as France, the United Kingdom, USA and Canada launched major initiatives in IT in the early 1980s, the Nordic countries were taken by surprise by the rapidly expanding development of IT in education. Concerted planning was initiated in the Nordic countries at about the same time as guidelines for Nordic collaboration were being written. The shared problems of the member countries did, however, constitute a good foundation for Nordic collaboration. While there were doubts as to the thrust of the programme there was agreement that IT had come to stay and it would be necessary to keep abreast of the educational and technical aspects of international achievements in the field. The Committee used an international conference, organized by the Swedish Ministry of Education and Cultural Affairs, as its point of departure. Some of the most prominent experts in the field of IT in education from France, England, Scotland and USA were invited to the conference, which took place in Sollentuna, Sweden in 1986.

The Committee then commenced work on developing Nordic competence and expertise with the Nordic teachers who had participated in the conference in order to place the Nordic region at the forefront of international developments in IT. A key objective was that IT not be seen exclusively as an aid but also as a means of facilitating the renewal of education in a wide range of school subjects.

To increase Nordic competence with software design, multimedia, interactive video, computer-aided tools, expert systems, system dynamics, databases,

telecommunications, collaboration on icons, music, curriculum development and emerging technologies the Committee engaged in many different activities. Previously member countries had built up their expertise by sending representatives to conferences or on study trips. There is no doubt that this is still a viable approach. But a rational and cost-effective solution proved to be the use of Nordic experts with the required international expertise who provided information about international developments and trends, and also contributed their expertise to their peers from all the Nordic countries. This expertise could afterwards be disseminated more widely through national workshops.

The dissemination effect has been very high - especially when it comes to courses in software design. From the start, the Committee's views on the development of educational software for many subject areas and school levels was that the initiative and much of the design work should come from teachers themselves. For this reason the Committee organized a number of general and tailor-made design courses for teachers. The software design courses were a mix of general design courses, design courses for special education and subject-related design courses. More than 60 joint workshops, seminars and other competence building sessions were held within the Nordic community. Over 800 teachers from the Nordic region have participated in the design courses.

The Committee developed a specific tutor training model for the courses. The venue for courses alternated among the member countries so half of the tutors and programmers on a course were from the host country. The remainder consisted of experienced tutors and programmers from the remaining Nordic countries. The new national tutors were intensively trained with the aid of skilled experienced Nordic tutors for the week of the course's duration. Tutor training continued during the design course itself by getting a new and an experienced tutor to work as a pair for a fortnight, the duration of the course. Over the years more than 100 Nordic tutors and programmers have been trained through this process, and the training of experienced national teams has facilitated the transfer of Nordic design courses for teachers to national contexts.

Courses in software design held at the national level based on the Nordic courses and the training of national tutors and programmers soon emerged to intensify the building up of expertise and software development. Experienced speakers and tutors were soon being exchanged far and wide across borders.

Nordic work on program design has developed a new kind of software development culture in the Nordic countries and has been adopted by a number of private publishers. The philosophy of open educational software such as the 'marketplace' model (Crossley and Green, 1985) has been the starting point for most of the software programs produced at Nordic level.

When staffing workshops, seminars and other staff development sessions, the Committee wanted to study new areas subject to increasing development at the international level at the earliest stage possible to assess their significance for education. The Committee was interested not only in the pedagogical aspects of international developments but also in developing Nordic expertise for the common good and for private enterprise - a justification for carrying out advanced workshops in the various sectors of computer technology as Nordic pilot projects, after which achievements and results could be disseminated at the national level.

From a financial point of view it is evident that workshops are cheaper to arrange as joint Nordic initiatives than to do so on a country-by-country basis. The costs of international expertise needed in a Nordic development programme are already so high that a joint initiative benefits all countries involved. Coordinating development in a specific field is a good example of rationalistic profits for all Nordic countries. The cost effectiveness cannot be accurately accounted for but there is no doubt that software development paid for once and coupled with costs of translation, is far cheaper than developing costs multiplied by five Nordic countries. When you add to that what you may gain from cooperation over the borders with no need to convert software and even the fact that the same tools may be used for development of educational software, the advantages of the model chosen become even more apparent. There are undoubtedly cases where national workshops in priority areas are required and in such cases the Committee has given the other member countries the opportunity to take part with a limited number of participants per country through a separate agreement.

Product Development, Standards and Agreements

The area of product development, which understandably has been the most expensive of the Committee's activities, has had a major influence on the division of tasks among the member countries. In this area it is imperative that countries make full use of each other's capacity and, with the aid of agreements, ensure that educational products are inexpensive to use across borders. Agreements on joint standards have also supported national adaptations of each other's productions. The commissioning and production of Nordic software for education was one of the main priorities of the Council of Ministers. A model for exchange of software emerged, as a result of which more than 100 programs of good quality are available to the educational sector in the Nordic area.

The basic concept is simple. Since 1987, representatives of the member countries meet on an annual basis at workshops designed to evaluate the previous year's production of publicly and privately produced educational software. On average some 50-60 programs are shown each time. After the presentation the member countries rate the programs they are most interested in, and on the basis of this expression of interest, enter into a Nordic agreement covering programs to be used in all member countries. Normally the contract covers 4 programs from each country, which means that each country receives 16 programs from the other countries for this investment.

The Committee also arranges an adaptation workshop on an annual basis some months after the Nordic software contract has been signed. Software authors or persons with the necessary knowledge are brought together with programmers from each of the countries to work on translations and adaptations. The result is that a majority of programs covered by the agreement can be translated to all five Nordic languages in 4 days. An additional and significant advantage is achieved in connection with the workshops. In the course of work on adaptation one can see where the problems lay and, on a joint basis, agree upon common standards and models for future software development.

The Nordic model for software development has been most advantageous for the countries involved and has been adopted at European level by the European Union in Brussels. The EPES-project (European Pool of Educational Software) was begun

in the summer of 1992 under the aegis of ORFEUS, Denmark. A workshop was arranged in Aarhus, Denmark in which 12 European countries participated. A European agreement covering two programs per country was signed and a yearly translation workshop has been arranged.

Teacher Education

Teacher education has also been an area accorded high priority by the Committee in order to increase expertise in areas such as multimedia, expert systems and system dynamics. Many of the initiatives have been described above but the Committee has also held many courses for teachers and teacher educators in a range of subjects with the objective of showing how IT can be used in the classroom.

The Committee's work on the development of special Nordic software was based on the hope that individual teachers would become interested and then generate ideas for software programs in many subjects and levels. This was why the Committee began its activities with special design courses for teachers.

In the general design courses as many as 120 teachers from primary and secondary schools, vocational education and training, adult education, teacher education and tertiary education took part in each course. Training took place over a two-week period in the summer through combined lectures in plenum and group work under the leadership of tutors and programmers who were themselves being provided with ongoing training at Nordic level. Teachers worked intensively with their ideas in groups of two to four. Towards the end of the course, the first draft designs could be tested with the aid of programmers. The major objective of the courses was to obtain a useable draft design which could form the basis of a finished piece of software. The objective was achieved in that out of the approximately 30 groups of each course eight to ten of the groups reached a draft which lent itself to being implemented as a finished product. A second objective, of which the participants were hardly aware, was to promote discussions of IT's potential for education. With 100 or more teachers from different countries, and with a variety of backgrounds, subjects and levels, spontaneous and intense discussions occurred around the clock. A new awareness of the advantages of IT emerged among the teachers who took part in the courses.

Courses in software design held at national level based on the Nordic courses and the training of national tutors and programmers soon emerged to intensify the building up of expertise and software development. Experienced speakers and tutors were soon being exchanged from far and wide across borders. When all member countries had launched their own teaching programmes the Committee discontinued general design courses in favour of subject-related courses.

Teacher educators are among the weakest links in the effort to integrate IT into Nordic education. In every country teacher educators are key determinants of the success or failure of IT's impact on the school of the future. But teacher educators have a more limited knowledge of the educational potential of IT than classroom teachers. So the Nordic Committee arranged pilot courses in IT which brought together national policy-makers and administrators to put together an action plan for teacher education. The target group was teacher educators for primary and lower secondary schools, upper secondary schools, and vocational education and training. The best method was practically-oriented workshops on the presentation and use of educational software in the teaching of all relevant subject areas.

Bringing together teacher educators from different institutions on a subject-by-subject basis provides not only national networks forming the foundation for future work but also Nordic contacts for the exchange of ideas and experience.

International Collaboration

At first the Committee's work aimed at the consolidation of Nordic collaboration. At the same time the Committee believed that the task of following international developments in computer technologies was a clear and important one. To be continually informed of educational and technical developments covering both software and hardware is of importance to the Nordic countries. The Committee continually intensified its relations with other countries and international organizations and has presented its work and results at a number of international conferences (Bollerslev, 1995).

Evaluation

In 1993 the Committee engaged the services of an international expert, Mike Aston, from the Advisory Unit, Computers in Education in the United Kingdom, who was given the task of assessing both activities and achievements in an international context. Aston's evaluation was clearly positive. Amongst other things he noted that 'The collaboration between the 5 Nordic countries is unique in this field. Neither the European Community nor the Gulf Cooperation Council, comprising 6 nations, have achieved anything like the degree of human networking and sharing of research, development and product generated by the Nordic Committee on Educational Software and Technology. This is in itself an asset which could be exploited' (Aston, 1993).

In its conclusions the report notes that 'The cooperation achieved by the programme in the fields of technology, the development of software and know-how in education has been remarkable, given the economic and human resources made available' (Aston, 1993).

3 CONTINUING THE COLLABORATION: THE IDUN PROJECT

The mandate of the Nordic Committee expired in 1994 but the work was continued in the IDUN project (IDUN was the goddess of renewal in Valhalla who was responsible, amongst other things, for the apples the gods ate so as not to age) with the same project director and the same secretariat.

The Council of Ministers gave priority to six main areas in the action plan for IDUN: Information Technology and educational policy; implementation; the development and exchange of educational materials including educational software; distance education; shared access to data networks and databases; and intellectual property rights and agreements in connection with software, databases and data networks.

IDUN's role is the follow-up and transferal of the activities previously conducted by the Nordic Committee but the rapidly growing areas of distance education and networking have also become focal points. The plan of operations for IDUN also notes that special emphasis should be put on the implementation of teacher

education and says surveys of research and development should adopt a European perspective. A look at the completed and scheduled activities for 1996/97 shows that we still have a very intense Nordic collaboration in the field of IT in education. Recent activities for IDUN include a wide variety of planning meetings, workshops and continuing work with software development.

Three Nordic planning groups, each comprised of one person from each Nordic country, have planned and conducted conferences on IT and pedagogy, pedagogical/didactic issues in distance education, and IT and the library. A Nordic group has drawn up a plan for national courses for teacher educators on the use of IT and pedagogy. The courses are to be tested at a number of teacher education colleges in each country and eventually they will become compulsory in the training of teacher educators in the Nordic area.

Other IDUN activities include a Nordic group that has planned a course programme aimed at teacher educators on the subject of the computer as a tool in teaching. The course is to be carried out on the Internet and is operational with participants from all Nordic countries from March 1997. Other planning groups are working in the areas of special education to generate strategies for Nordic software development and exchange among the Nordic countries. Similarly, planning for a multimedia design course aimed at both commercial publishers and public companies is occurring, and a planning group has prepared a course for editors from publishing companies on the subject of IT, educational materials and subject related didactics.

The 1997 program evaluation and exchange workshop has taken place, and 20 new programs will be ready for distribution in the Nordic countries in the summer of 1997 and, as a result of a seminar, 15 titles from the Nordic software agreement have been translated into Greenlandic, the Faroe and the Lapp languages. Finally reports on adult education and information technology, Nordic research and development and intellectual property rights have been issued.

4 CONCLUSION

The Committee's results - both through the Nordic Council's work and then through the IDUN project - can be considered an exceptional success as interviews of key persons from ministries, educational authorities and other agencies in the Nordic countries, and a few other countries show. For example, one participant said, 'Software has been developed on the basis of Nordic ideas. Cooperation has led to an understanding of what it is really all about. And paradoxically it has given us resources at national level as well' (Bollerslev, 1991). Another participant said, 'Taking part has been a challenge. It [the collaboration] has created an inter-Nordic forum and it has influenced national development. Many problems which would have been difficult to tackle on your own, have been solved successfully' (Bollerslev, 1991).

5 REFERENCES

- Aston, M. (1993) Nordic Council Committee on Educational Software and Technology. Evaluation 1993. Copenhagen, Denmark.
- Bollerslev, P. (1991) Evaluation of The Nordic Committee on Educational Software and Technology. Copenhagen, Denmark.
- Crossley, K. (1985) *A Practical Guide for Teachers: Designing Computer Lessonware*. Lessonware Services Incorporated, Ontario, Canada.

6 BIOGRAPHY

Peter Bollerslev has taught mathematics and informatics at colleges of education for many years. He was Her Majesty's Inspector in Teacher Education for more than 20 years. He is now director of the Center for Applied Informatics in Teacher Education. Peter Bollerslev has authored and co-authored more than 250 textbooks for schools and colleges, and has been involved in IFIP since mid 1970s. He has served as chairman of WG 3.1 for six years and for another six years was chairman of TC3. At present he is the Danish representative to the IFIP General Assembly. In his spare time he is a keen golfer and bridge player.