# COMMISSION OF THE EUROPEAN COMMUNITIES

SEC(89) 19 Brussels, 6 January 1989

## PROGRESS REPORT ON THE INTRODUCTION OF NIT IN EDUCATION SYSTEMS FROM 1983-1987

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(Commission Staff Working Paper)

CONTENTS

## INTRODUCTION

The new information technology that is spreading rapidly across industry and the economic and social sectors has, to an increasing extent, become the driving force of our modern society.

The Community is aware of the need for an urgency in taking concerted action soon and is therefore getting mobilised.

The Commission has made the promotion of the competitive nature of European industry the key to the general Community strategy and five complementary projects - ESPRIT, BRITE, RACE, DELTA and COMETT[1] - are currently being implemented.

Human resources are of prime importance in this challenge to new information technology, as education and training in this field have to be very broadly based. The role of the school is considerable. It has to give young people a grounding whereby they can master and exploit NIT in their particular professions and enable them to adapt to this new technological culture in their everyday life.

It also has to exploit the enormous potential of IT for assisting in the processes of teaching and learning.

Once trained in this way, young people will make an effective contribution to the development of NIT throughout the Community and throughout industry. The Commission is working towards these objectives with a variety of measures related to:

- vocational training and NIT (1985)
- cooperation between the universities and industry (1985)
- student mobility (1985)

The ministers for Education were anxious to give a Community dimension to NIT and so, on 19.9.1983, adopted a resolution on "MEASURES RELATED TO THE INTRODUCTION OF NEW INFORMATION TECHNOLOGY IN EDUCATION" (O.J. No 256 of 24 September 1983).

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(1) - ESPRIT: European Strategic Programme for Research and Development in Information Technologies.
- BRITE: Basic Research in Industrial Technologies for Europe.
- RACE: Research in Advanced Communications for Europe.
- DELTA: Developing European Learning through Technological Advance.
- COMETT: Community in Education and Training for Technology.

The Ministers were particularly concerned with certain aspects of the inclusion of NIT in the teaching timetable

- the aims and the methods of introducing young people to NIT
- the application of NIT to the various subjects in the curriculum
- the contribution of NIT to the education of children with special needs
- girls' involvement in educational activity in which NIT plays a part
- the essential links between school and vocational training.

The Commission has been invited to implement a number of schemes to introduce NIT by 31 December 1987. This will mainly involve collecting, exchanging and disseminating information about the introduction of NIT into schools in the Community and, in particular

- running meeting programmes so that the Member States can pool their experience
- setting up a programme of study visits aimed, as a matter of priority, at teacher trainers
- instituting a specific NIT data exchange process (along the lines of the Eurydice network).

a) <u>The action programme</u>

On 14 December 1984, the Community adopted an action programme[1] for the period 1985-1987, in implementation of the resolution of 19 September 1983. This programme

- lays down the areas in which the Community should intervene
- specifies how the programme itself should be implemented
- provides for a specific NIT information network to be established
- suggests closer collaboration with the international organizations.

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(1) COM (84) 722 final

This work programme focuses Community action on four main strategic topics:-

1 the introduction of NIT in teaching methods and curricula

2 training for teachers and teacher trainers

3 software, courseware and hardware systems

4 economic aspects and development strategies.

It lays down the various aspects to cover and action to be taken for each topic.

In November 1986, the Council adopted a specific work programme for 1987.

b) Implementation of the work programme

A group of national leaders responsible for incorporating information technology into education has been set up to pilot the Community's action. These people are coordinating and planning the introduction of NTI into the education systems of their particular countries. They meet in Brussels periodically and the aim is to advise the Commission on the running and continuity of Community schemes and to help make for proper coordination of these schemes and any initiative taken in the Member States.

The group has played an active part in preparing the Community schemes since 1985

- discussion of the programmes for the European seminars in Newcastle, Bologna, Berlin and Enschede. In particular, it was involved in forming the delegations for the seminars

- discussion of the programme "Young People and NTIs Week" held in Turin (1985), European Visits (France 1986, United Kingdom 1987): summer schools held in Liege (July 1985), Ghent (July 1986), Glasgow (July 1987), Liege (September 1987) and Tubingen (October 1987), Madrid Seminar and Teacher Training (November 1987) and in Soest (Dusseldorf) on using data-processing in class (December 1987)

- organization in conjunction with National Coordinators of study visits on NITS

- advice on what prior studies were required

- advice on priority scheme to be run in 1988.

The nationally responsible bodies have also been asked to prepare and update the national reports on the progress made in the insertion of the NIT in teaching since the adoption of the Resolution of 19th September 1983.

c) Creation of a specialized NIT network: the Euryclee network

This comprises one or more centres in each Member State.[1] These centres are open to anyone interested in the incorporation of NIT in education, i.e. to people who spread their information (teacher trainers, inspectors, headteachers, teachers and students).

The aim is to select, store and exchange information (relating to the strategy applied in the particular Member State) on NIT incorporation in education with a view to enabling the different people involved in the educational process to familiarize themselves with new technology. The idea is also to find out about and ascertain the quality of existing courseware and to contribute to any other courseware data banks in the Member States of the European Community.

The information centres are also intended to consolidate the Community activity envisaged as part of the work programmes by producing, say:
- dossiers for those benefiting from the study visits
- information dossiers in preparation for seminars and meetings
- a list of key people involved in NIT applied to education
- the coordination of research.

They can obtain technical assistance from the Eurydice central unit with problems of educational data processing and documentation and with the production of dossiers in particular.

Cooperation between the national Eurydice unit and the other centres will be defined and organized in the light of the specific characteristics of the education system in each Member State. The Commission invited the heads of the specialized centres to attend meetings of the group of national leaders and gives them the opportunity to meet the day before if they wish.

The first meeting of heads of centres took place in March 1986 with the aim of establishing priorities for data exchange within the network and defining the best way of organizing this exchange.

The exchange of data between the Euryclee network centres operates by means of electronic messaging. A booklet describing the Euryclee network centres has been produced in all languages by the Eurydice European Unit.

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1 Annex V

d) Cooperation with international organizations

Cooperation with the national and international organizations that are active in the field of NIT and education took practical shape when representatives (of the OECD, the Council of Europe, UNESCO and IBI) attended the various European seminars in Marseilles, Newcastle, Bologna, Berlin and Enschede. The organizations also observe at meetings of the group of national leaders with a view to coordinating some of their own schemes and thus avoiding any duplication.

Lastly, the Commission gave financial support to a meeting which CERI (OECD) ran in 1984 to discuss the new duties of teachers and the implications with regard to qualifications.

e) The COMETT Programme - The universities and industry cooperate on training

On 24 July 1986 , the Council adopted Commission proposals on a new action programme to boost cooperation between the universities and industry on training in new technology (COMETT)[1]

COMETT has three aims:-

1. to promote a European identity, in particular by encouraging students to take in-service courses in firms in other Member States

2. to encourage economies of scale through the joint organization of new training programmes to remedy the shortage of specialized labour attendant on the speed of technological progress

3. to encourage the Member States to exchange their experience on university-industry cooperation on training.

COMETT will provide Community support - estimated at some 45 million ECUs between 1986 and 1989 - for actions coming within these targets. In 1987, over 1000 projects were submitted of which 750 were retained, 217 students received grants to spend a period of their study time in other countries. 15 (fellowships) were allocated to work in other member States universities. The COMETT programme works on an essentially cooperative basis in so far as it always involves several member States.

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1 COM (85)431 : Action Programme of the Community in Education and Training for Technology

f) ACTIVITY REPORT

In accordance with the Resolution, the Commission is bound to submit to the Education Committee and the Council a report on the state of progress of the work. An intermediate report has been adopted by the Council in November 1986. An overall report covering the whole period from 1983 - 1987 is now presented. This report consists of an update of the first intermediate report which went from 1983 to 1985.

The present report is in two parts:-

1. A synthesis of the activities undertaken in the Member States based on the national contributions prepared by those in charge nationally

2. an outline of Community action (details of schemes being run appear in Annex I.

Each part covers the topics in the 1985-1987 work programme.

## I SUMMARY OF ACTION BY MEMBER STATES TO INCORPORATE NITS INTO EDUCATION

### A. Introduction of NIT in educational practice and content

#### A.1 Measures taken

##### 1. Public authority programmes

In the Member States where the first initiatives in this area came mainly from teachers and heads having an interest in information technology - and which were consequently not very widespread - it seems today that the drive and management of the introduction of the new technologies into education come more and more from the public authorities and training organisations.

The latter, being now convinced of the need to introduce computers into schools, have set up supportive structures, have set the levels and define the major options for their use, while still favouring a certain decentralization.

The UK Government established the Microelectronics Education Programme (MEP) for England, Wales and Northern Ireland and the SMDP in 1980-81. Thus the UK already had substantial experience in this field by 1983 and has obtained more since then.

The MEP was completed in 1986. The government then established the Microelectronics in Education Support Unit to build on the MEP and consolidate and integrate the use of information technology in schools. The tasks of this Unit are:-

1. to provide curriculum materials which will help teachers use the computer across the curriculum where this is appropriate

2. to provide an information service that informs about such things as available software and hardware, curriculum materials, examples of good practice, conference and training opportunities and curriculum development work in hand (and anything else that we are told might be useful)

3. To support in any way possible the activities of the pre- and in-service trainers

4. to continue and develop the work begun by MEP in Special Education.

It covers both primary and secondary years and also meets the needs of teacher training establishments.

The government also provides substantial grants to local authorities to increase their hardware stocks, to train staff and to employ advisory teachers to help with the integration of IT in the actual classroom.

Since May 1967, the English local authorities have been receiving Central Government grants to increase their hardware stocks and recruit teachers who will be trained in the use of NIT in their special subjects.

In Scotland, the SMDP in 1983 became an integral part of the SCET (Scottish Council for Educational Technology).

Close links have been established with the regional unit: a study of "Learning and Teaching in Scottish Secondary Schools" has been completed, while another, on the same subject in primary teaching is at present under way.

In most of the Member States, the introduction of NIT into education is now better structured and better use is made of the means available.

In July 1984, in Belgium (Dutch speaking) a ministerial committee on education and information technology was set up to advise representatives of the Cabinet of the Ministry of Education, the cabinets of the Flemish Community and the three teachers networks, the universities and the Belgian radio and television. The committee was appointed to define a suitable policy for the introduction of NIT in education (Dutch speaking).

Following the 1983 plan to introduce 100,000 microprocessors, France drew up its "Computers for everyone" plan (PIPT) in 1985.

The existence of the operating hardware for "Computers for everyone" constitutes an extremely important bonus for the educational system because its use can be mastered progressively.

This is why a certain number of targets and general principles have recently been stated:

In schools and colleges, the idea that information technology is not taught as a discipline but approached as a teaching and learning tool has been reaffirmed.

Alongside what is normally referred to generally as "computer-aided teaching", used to support the traditional subjects, the accent is placed on the need to prepare pupils for what will be their environment in their professional lives. With this in mind, two teaching uses of computers are to the forefront: a tool for simulation on one hand and for database handling on the other.

In both secondary and primary classes computer studies are pursued as well as the use of the computer in the teaching and learning of other subjects. These studies are optional and an optional examination in the subjet will be offered in the baccalaureate from 1988.

Information technology is compulsory in all classes preparing for the scientific and technical colleges from the beginning of the 1987 school year and for other major colleges beginning with the 1988 school year.

In 1985, Spain set up the experimental projects ATENEA and MERCURIO. The former for the introduction of the microcomputer in education, the latter for the introduction of video. In 1987 both projects merged into the New Information Technology and Communication programme which was at the time established by the Ministry of Education. In 1985, different plans for introducing the computer into the classroom were set up by the various self-governing communities. These are: the Educational Computing project in Catalunha, the Basque plan for the introduction of computers into education, the Alhambra plan in Andalousie, the Abaco project in the Canaries, and the Abrente project in Gallice.

In 1983 in Greece, a Standing Committee was appointed in the Ministry of Education to create a programme for the introduction of informatics in schools. A pilot programme was decided on putting the whole scheme in the frame of the computer as a new tool for Learning-Teaching. This pilot programme started in 1984. It was decided that the first step should be the teaching of informatics in upper secondary level schools, especially the technical lyceums, multi-discipline lyceums and comprehensive schools.

The topics addressed were hardware, teacher training, software and changes in the curriculum. The hardware used was IBM compatibles mainly manufactured in this country. The software used was mainly available from the producers, as the main topic was the teaching of informatics. Teaching and practice of 4-6 hours per week has been incorporated into the curriculum.

Italy launched a national plan to introduce NIT into upper secondary schools in October 1985. The plan provides for introducing the theoretical basis of information technology by teaching mathematics and physics.

In 1984 in the Netherlands an information promotion plan (INSP) was launched. It is five-year promotional plan, of which teaching is one aspect. Concerns all sectors of education, except universities. The research plan has already produced concrete results. Development projects have been launched on a more or less wide scale in all sectors of teaching. These have also been provided with hardware.

For the INSP, a special project exists, put in hand both within and without the Ministry of Education and Science. For the external planning of each educational sector a project planner is nominated. He implements the annual plans and works closely with the Ministry through a 'follow-up' plan. Following a pilot scheme conducted in 1984-85, Portugal introduced the national MINERVA programme[1] in October 1985.

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(MINERVA) - Moyens informatique dans l'enseignment: Rationalisation, Valorisation, Actualisation

In the year 1985-87, the second year of its pilot phase, the MINERVA project structured its network around five nodes placed at the universities of Coimbra, Minho, Porto, Aveiro and Lisboa. The teacher training colleges located in the regions of influence of these universities have now been integrated into the nodes, providing wider geographic coverage and closer support to the schools.

In the Federal Republic of Germany, the joint Federal Government-Lander Commission for educational planning and the promotion of research (BLK) adopted a general programme on information technology in education and training on 7 December 1984.

The BLK outline plan provides the basic guidelines for the introduction on NIT in education in the Lander of the Federal Republic. To encourage this, in 1984 the BLK established a policy encouraging pilot projects jointly financed by the Federal Government and the Lander.

Various Lander have published new study programmes for information technology teaching (Berlin, as an obligatory option in the lower secondary level, in Bavaria, for the basic and supplementary courses at "Kolleg" (education for young adults) level, Bremen in the form of outline directives and for a course at upper secondary level. Bavaria has published a communication opening the way to the introduction of basic information in information technology in ordinary schools at lower secondary level).

Several Lander (Lower Saxony and Rheinland-Pfalz among others) have enabled the school authorities to purchase suitable computers by drawing up new recommendations for the purchase of the hardware or by selecting computers suitable for the requirements of the schools (Bavaria). The Lander Commission for planning of education and development of research was able, in March 1987, to synthesize the experience acquired throughout the country in a revised version of the recommendations on equipment.

Pilot experiments for the introduction of information technology training at lower and upper secondary levels, the new study programmes published, the extra teacher training courses and the arrangement of the necessary infrastructure with the advisory departments and specialist bodies have supplied all interested parties with clear and certain information to pursue the development of information technology training.

In Belgium (French-speaking), the job of introducing NIT into education is basically done by the national authorities, but they have considerable support from the university OSE (Computers for Education) network, which has taken over preparation of the documentation, and the information and training of teachers.

2. More effective follow-up

Several Member States have made provision for national councils to monitor the introduction of NIT in schools.

In Belgium (Dutch speaking) under the Ministerial Committee of Education and Information Technology, seven working parties have been set up to prepare plans of action and to provide support.

In Denmark, since 1983, a ministerial committee on teaching NIT has examined the possibility of relating this subject to the other subjects taught in primary school.

In the Grand Duchy of Luxembourg, pilot experiments in pre-school and primary classes are coordinated by a working group consisting of several members of the inspectorate as well as the instructors. The "New Technology and Education" department of the Ministry of National Education and Young People, which is directly involved in this working group, provides evaluation of the experiment.

The programmes relating to the introduction of NIT into the lower levels of secondary education are prepared and evaluated by the Ministry in cooperation with the National Commission for computer programmes.

This also applies to programmes relating to professional training, which, furthermore, benefit - at the level of training leading to the CAIP - from the advice of the professional Chambers consisting of representatives of employers' and salaried staff associations.

In Spain, modelled on the Athena and Mercury projects, a follow-up plan is provided for, which will commence in 1988 in order to gather data permitting conclusions to be drawn on the process of experiments in schools and on the programme as a whole.

At present, the schools which have participated in the ATENEA project are distributed as folllows:-

-Primary Education Centres:287
-Secondary Education Centres:298
-Special Education Centres:30
-Training Centres for Teachers:90

In the Federal Republic of Germany, the BLK and the Standing Conference of Land Ministers of Education deal with questions concerning the coordination and promotion of NIT in education. All the Lander equipped schools and other educational establishments with NIT and teaching programmes. The Munich Institute for audio-visual media in science and eduation will now serve as a documentation centre to establish guidelines for the Lander and is available to them for consultation on any information problems that overlap between Lander.

In Ireland, a Curriculum and Examinations Board was established in 1984 to review the structure and content of programmes so that they could be better adapted to pupils' needs.

In Italy, the Directorate-General for technical education has introduced systematic assessment systems which are run by the research institutes and technical committees which prepared the draft reform.

In the Netherlands, the Centrum voor Onderwijs en Informatie-technologie (Centre for Information Technology and Education (COI) was set up to stimulate the use of computers in schools. The COI collects and distributes documentation concerning NIT. This Centre will continue its activities in privatized form from 1988.

As the computer stimulation plan (I N S P) comes little by little to maturity, a "follow-up" operation has been under way since 1986. This operation consists of a set of measures aimed at perpetuating the outcome of the computer introduction plan. In order to do this, the Ministry has analyzed the present (1986) and future (1990s) situations in the field of the new information technologies.

In Portugal, the follow-up of the MINERVA project is carried out by a Central Steering Committee which receives advice from a National Coordinating Council on which the various nodes of the project are represented.

The suggestions of better ways of introducing information technologies in the curricula, as well as recommendations concerning curriculum development, are discussed at school and regional level, with the participation and stimulus of the university and teacher training college teams, who put them forward to the Steering Committee, either directly or through the National Coordinating Council.

In Greece, the Standing Committee, together with a special team of specialists, followed up the realization of the pilot programme. Moreover, applied research programmes started in Greek universities for the development of software tools for education and teacher training. A good number of conferences and workshops were organized by the universities, the technological institutions and the teachers' unions. There were suggestions and discussions about the introduction of new technology into schools from the technological and paedagogical points of view.

3. Creation of bridges between industry and education

The fact that some Member States are creating institutional structures involving bridges between industry and education is also worth noting.

In French-speaking Belgium, for example, it is hoped, through the creation of the "Club Athena Technologies-Education", to give education the benefit of the results of applied NIT research and to see that firms get staff who are better suited to new technological demands.

Teachers in Belgium (Dutch-speaking) have been able to follow "in-firm" training courses of 2, 4 or 8 months since 1982. One week courses have been organized since 1985/86 by the Vlaams Economisch Verbond with the support of the Ministry of Education (Dutch-speaking).

In the Grand Duchy of Luxembourg, for all matters regarding the introduction of the NIT into the education system, the Minister benefits from the advice of a consultative commission which, as well as representatives of public administrations, includes representatives of the private sector.

Italy, has opened four inter-regional centres - CILEA (Segrata), CINECA (Bologna), CSATA (Bari) and SOGESTA (Urbino) - which will provide a link between education and the software-materials production industry and the software publishing houses.

In the Netherlands, the NIVO project, which is associated with the country's main computer firms, has been set up to introduce NIT into lower, general and technical secondary schools starting in 1985. The introduction of NIT in technical education is a first priority. In nearly all sectors of technical education, projects have been launched to find ways of creating better links between education and the requirements of working life. Since 1986, the NIVO project has been developing as expected. The first sponsors have come forward. In vocational secondary education, schools have been able with the help of local companies to provide a full complement of equipment. The implementation of projects is the task of the teaching bodies and companies. Three of these projects are already being developed: one in the area of office computers, another in the field of artificial intelligence and a third in the area of the development of computer training.

In Portugal, the establishment of links between the educational system and the entreprises develops at two levels: on one hand, the individual nodes of the project are in touch with a number of firms interested in distributing university-developed educational software and materials, or in producing software and materials according to specifications and evaluation processes provided by the project; on the other hand, and particularly in the regions where the sense of local community is more developed, some of the schools are establishing links with local enterprises. Both forms of exchange are, however, at a rather early and prospective stage.

In the Federal Republic of Germany, on-the-job training courses and guidance are provided for pupils in Hauptschule and Realschule by computer firms and firms in commerce and banking with suitable equipment. This gives young people an opportunity to obtain a working knowledge of information technology.

In the UK there is substantial cooperation between industrial and local authorities/schools; the grants that local authorities receive for IT are in part determined by what they have been able to raise from local industry. The MESU and the SCET both support projects aimed at developing cooperation between education and industry.

In Greece, a great effort was made for the creation of bridges between industry and education, together with standardizing the operating system and the keyboard, which should be available in both Greek and Latin.

4. Spread of NIT to all branches of education

Most Member States have started or are continuing to introduce NIT into their education systems.

Secondary education (lower and upper levels) - a rapidly expanding programme of introduction

Most Member States have concentrated their efforts on the introduction of NIT in general secondary education, and the results have been very encouraging in most countries.

In French-speaking Belgium, a first year computer course is being created. This course will be based on the use of applications software rather than on learning programming.

All the State schools have been equipped with WANG P.C. micro-computers connected to the central computer of the Information Processing Centre (CTI). The network thus formed is at present used mostly for administrative purposes.

The French community has also equipped 30 schools with a network of eight COMMODORE 128s plus printer and disk drive.

in Dutch-speaking Belgium, the computing technology theme has been integrated into the lower secondary school and the training of technology into each of the three levels of education. By the end of 1990, every school will be provided with the necessary equipment. In the upper level of secondary education, computing is a compulsory field of knowledge as part of the state education.

A more specialist computing course is introduced in the third level of private education, as a compulsory field, and as an optional course in state education.

In Denmark following a period of educational experiments NIT is integrated across the curriculum in the upper secondary school.

An introductory course of 30 lessons in the first year is followed by at least 100 hours of compulsory integration of the computer across the curriculum during the second and the third year.

In France, NIT is to be extended to all levels of education. When the 9th plan is completed in 1988, it is planned that NIT will have been introduced throughout the school system which will have more than 100,000 microprocessors at its disposal.

In Greece, the pilot programme was extended to 100 schools of lower level secondary education (1987) covering schools not only in the area of the capital but in the regions too. The problems arising from the difficulty of training teachers from the regions and the servicing of equipment were faced.

Each of the fourteen single multi-discipline upper schools has since 1986 a computer laboratory equipped with 8 IBM compatible micro-computers and to this was added in 1987 one more set of 8 micro-computers connected to the local network.

These schools will all benefit from this laboratory. Moreover in 1987 there was a project for the introduction of new technology in the administration of the schools. Thus the offices of the fifty-two regions into which Greece is divided, were equipped with hardware and software as well as training of personnel.

In Ireland, the programme to provide all secondary schools with microprocessors, which began in 1980, was completed in 1985 and now every school has a complete microprocessing system and the relevant educational software. A further development programme to update the school equipment was implemented for 1985-86.

In the Netherlands, the concept of a continual general education is determined by the NIVO[1] project. This project consists of the collective activity of three bodies, the educational institutions, the departments of Education as well as the Communities and Economic affairs organisations. The project involves the supply of equipment, the circulation and development of "courseware".

Every school in general education and primary education (1.900) receives a central computer provided with 9 terminals for a network of classes. In addition a "Stand Alone" P.C. is provided. These computers are 16 bit machines running MS-DOS. There are three trained teachers per school (of which one is female).

1 New information technology in secondary education

The development of "Courseware" is set up as follows:-

-every school receives a free package to start with made up of general software: word processing, structured programmes, spreadsheets, graphics programmes

-every school receives a software sample compatible with the commercial firms' products selected by a committee

-the principal basis is to give every school and those in the first two years of study the use of computers. To this end, methods are being developed by editors

-the opportunity of introducing a compulsory computer studies subject into the 3rd and 4th year is being looked into followed by the integretion of this discipline into final year exams (physics, economics, social studies)

-there are different development projects. The products are distributed by educational editors.

In Portugal, in 1986-87, the MINERVA Project covered systematically 55 middle secondary schools (ages 12 to 15) and 10 lower secondary schools (ages 10 to 12).

In the UK there are on average 23 microprocessors per secondary school and 2.5 to every primary school. Schools offering CGE A levels have considerably more computers. It appears that all secondary schools are familiar with the use of NIT.

In Scotland, the spread of NIT to a teaching system is also being fully developed. The Microelectronics in Education Committee (SCET) is especially responsible for the integration of innovations in all educational sectors in Scotland.

In the Grand Duchy of Luxembourg the introduction of NIT is to become compulsory from 1986-87, for all pupils from level 5 of Secondary School and for those from level 9 of Technical Secondary School (14-15 years old). Every pupil is taught for up to one and a half hours per week.

NIT is developing fast in upper secondary education in most of the Member States.

Italy is planning to give all upper secondary schools a data-processing laboratory with eight to ten computers. There are also plans to build 150 local centres in the provinces to provide direct back-up for the schools and train the teachers. The number of centres will be brought up to 750, so that the whole country is covered later on.

Note also the "Videotel school project" which can transmit educational and administrative data. This project has been running since 1984 in the Nistri lower secondary school and the Medici del Vascello Institute of Technical Studies, Commerce and Surveying. In 1985-86, it was decided to extend the equipment to 10 lower secondary schools and 22 institutes of technology in Rome. By 1986-87, Videotel should affect 200 schools.

The schools have been divided into two main groups:-

- the basic schools, of which 11 participate progressively in the experimental application of computer studies in the mathematics and physics disciplines

- the Polo Schools, which are reference schools for the basic schools with regard to technical and teaching assistance in case of need.

In the Federal Republic of Germany, some 85% of the academic secondary schools and 50% of the Gesamtschulen have a computer. Equipment of the Hauptschulen and the Realschulen differs considerably depending on the Lander, but is progressing rapidly.

According to conservative estimates, the number of computers available at the beginning of the 1986-87 school year in general education establishments was of the order of 50.000 with very great disparities in the situation depending on the type of school and the region. In general, it can be said that the "Gymnasien" (long course education) have between 7 and 11 computers, the "Realschulen" (professional school) on average 7 computers and a number of the "Hauptschulen" (elementary level) around 5 computers.

Lastly, higher education in most of the Member States offers more or less complete courses in NIT in the form of first degrees in computer studies.

- Vocational secondary education - Computers are being phased in

  Much is being done in vocational secondary education to spread NIT to the various branches so as to provide the best response to the specific demands of industry with respect to training staff in new technology

- Primary education - NIT introduced recently

  In most Member States, primary schools are still the weakest link in the chain when it comes to the introduction of NIT

Generally speaking, the authorities are aware of the importance of introducing NIT at primary level, but progress varies from one country to another and is still slow.

The Minister for Education for French-speaking Belgium has come down in favour of introducing NIT into basic State education and thence throughout the education system. From 1986 it is noted that 8 pilot centres equipped with an Econet network have been created: 10 micros, information retrieval service, disk drives and printer.

A 50-days' training course has been organized in conjunction with the OSE network, at the request of some 20 heads of pilot centres.

In Belgium (Dutch-speaking) in-depth studies have been carried out on a number of pilot schools at primary level and in special schools.

In Denmark, experiments have been conducted in the 8th and 9th years where computer studies are integrated with the teaching of arithmetic, mathematics, physics and geography.

Since computer studies have become optional, some 40% of the 8th, 9th and 10th years have chosen them. The coming years will be dedicated to preparatory work permitting decisions to be taken later on with regard to the content of the computer programs, the classes in which this teaching should be given and the organization of the compulsory courses on this discipline. This work will be carried out partly by the schools throughout the country, giving as an experiment, obligatory courses, for example in class 5.

The inquiry carried out in 1986 found that each school had approximately 6 computers. However, as extra computers have been bought during school year 1986-1987, each school will now have about 7.

A problem arises from the point of view of both quantity and quality with regard to teaching material. The secondary teaching establishments have the same problem - the programs are produced by the production companies as well as by the public departments, at the initiative of the national and local authorities.

In Ireland the Department of Education started a pilot programme in 1984 to evaluate the potential use and the efficiency of microprocessors in primary schools. An interim report was issued in 1985 and a final report is expected in 1986.

In Italy, the introduction of NIT in primary schools is still in the experimental stage. There have been many initiatives, but particular attention should be paid to the

scheme run by Umbria and the inspectorates of Perugia and Terni. This involves 62 elementary school classes, a hundred or so teachers and 1,107 pupils. It will last another two years.

In Luxembourg, where education is bi-lingual, there is a high percentage of migrant children who are not yet fully integrated into the system and in view of the budgetary constraints, NIT has not yet been generally introduced at primary level. From the 1986-87 school year, several pilot experiments have been implemented in a dozen classes (pre-school, primary, supplementary, Logopaedia Centre). Outside these classes, which will take place over the 1986-87 and 1987-88 school years, projects are being organized in other classes by teachers taking part in training with machines belonging to the Institute Superieur d'Etudes et de Recherches Pedagogiques (ISERP).

In Netherlands, in the INSP, a policy is introduced in which the possibilities offered by the computer into basic education are being investigated in a number of specific in-depth projects. An introduction in the wider sense has not yet been anticipated. Schools did not wait for this action but, on their own initiative, equipped themselves with machines of all sorts mostly for hobby purposes.

At the end of 1987, the Education Minister has let it be known that he wished by the year 1990, every basic school to be provided with computers in an integrated activity comprising the circulation and development of the courseware. In this context standard equipment will be installed.

In Portugal, during the period 1986-87, the "MINERVA" project has systematically covered 12 primary establishments (ages from 6 to 10).

In the Federal Republic of Germany, general education provides a grounding in computer studies at secondary level. The introduction of NIT at primary level is not yet envisaged.

Thanks to the stimulus of the MEP (1) and SMDP (2), primary schools in the United-Kingdom are very much involved with NIT and there are two computers for each primary school, on average, at the moment (one micor-processor for every 130 pupils).

Although most primary schools are still only teaching elementary techniques, the lessons tend to be stimulating.

(1) Micro-Electronics Education Programme: transitional programme currently completed.

(2) Scottish Micro-Electronics Development Programme in the context of the MEP Primary project.

A.2 Strategy

The strategy in the Member States is to spread NIT to the whole of the system of education in the long run.

In Denmark since 1984, the integration of computer studies in the programmes of all secondary second level establishments is compulsory. It is carried out on the basis of experiments carried out earlier. All the students have 30 computer introduction lessons during the first year of the 3-year cycle, followed by approximately 100 lessons when the computer is integrated across the curriculum.

The object of this project is not to make the students into professional programmers but to deal with the effect of the new information technologies from the point of view of the social sciences, the arts and the natural sciences.

Every year the Ministry of Education establishes a summary and sends all the schools the reports submitted by all the teachers. Minor changes have been made in order to give the teachers more freedom to give the initiation courses and to give more importance to the role of word processing machines, electronic calculation sheets, databases, etc. The initial complete reports covering a 3-year cycle will appear this year (1987).

Within the scope of reforming the second cycle secondary teaching establishments, Parliament has just issued a law which provides for the inclusion of computer studies in the optional subjects as well as the integration of this discipline in the programme. This option can be chosen from 1989 and will consist of 4 courses a week for one year.

At the level of upper preparatory education, the computer studies continue to have a great success and are no longer given only as an experiment.

In Spain, the NIT and communications programme is covered by the General Education Secretariat of the Ministry of Education and Science.

The remaining projects of the independent communities usually depend on a general directive and do not at present integrate themselves in the general structures of education planning.

The central services for the various programmes coordinate the dissemination of the projects, are in charge of the equipment for the centres (software, programs), the development of materials, the training of teachers as well as the follow up and evaluation of experiments developed in the centre.

In the case of the Atenea and Mercurio projects, the training of active teachers in NIT takes place in 90 different teacher centres run by teachers specially trained for this task. Only a certain number of schools selected every year on a tender basis, take part in this plan. The schools which are interested submit a teaching project and the selected schools receive the corresponding training and grant.

In the Grand Duchy of Luxembourg, the efforts of the National Ministry of Education and Young People are concentrating on introducing NIT into the classes at the end of the lower level of secondary teaching and technical secondary (pupils aged 14 to 15). In the first stage it is a matter of enabling all the young people in the 1st year of compulsory schooling to benefit from an NIT introduction course. This target has now been achieved for the secondary and secondary technical education (some 90% of the school population) who have the necessary equipment (adequate hardware and software). These courses are adapted and extended to the extra teaching classes so that, from 1988-1989, all young people will be able to benefit from an introduction to NIT.

The object of the course is to give the pupils a basic training with the following extensions:

- computer workshops outside school hours on the basis of voluntary participation

- vocational training for the majority of technical secondary education pupils.

Furthermore, the NIT introductory courses will prepare the insertion of the new technologies into the branches of general education such as mathematics, languages and sciences.

In France, the 'Computers for Everyone' plan has the aim of introducing pupils at every level of education the use of computers as tools, giving priority to pupils disadvantaged as regards their access to computers, opening computer workshops to everyone and training teams of teachers.

Since 1986-1987, the accent has more specifically been placed on the mastery of the computer tool, by means of simulation and databases, in particular.

In the United Kingdom the aim is to increase the use of IT as appropriate across the primary and secondary curriculum. Strategies are in place which allow this aim to be achieved.

Belgium, which has no hardware of its own, has opted for a deliberately slow start with NIT. The aim here is to cut down on the anarchic introduction of different computer equipment by feeding into the education system all the available information on the capacity of hardware on the market, on the characteristics and limitations of existing computer languages, on the results of experience and on methods of producing courseware.

In Netherlands, the aims of the INSP are:-

- the reliability of information technology for the "citizen"

- the creation of a human capital in favour of the consolidation of the market sector as well as in favour of a better and more efficient running of the supply for society.

The strategy introduced is strongly diverted from all this. It has given priority to the introduction of computing technology to the professional education body. In relation to professional practices, computing technology influences the content of nearly all sectors towards the professional field. Thus, a large number of projects have been developed. For the supply of some expensive equipment, regional centres called "higher studies" have been set up.

Because of the NIVO project, it is also possible to introduce computers in general education not only for computing classes purposes but also for the use of computers in other sectors. For basic education and special education a limited amount is introduced in which the potential offered by computers in these sectors are analysed. Priority is then given to the recycling of teachers of all sectors and the set up of an infrastructure allowing the development of the programming.

In Portugal, the stragegy of the MINERVA project contemplates

- establishing an effective administrative and technical group to support the Central Steering Committee in the areas of educational planning, curriculum development, teacher training, project evaluation, software and materials, records/information/communication and public relations

- strengthning the support to the introduction of information technologies at all levels of education, including pre-primary education and special education

- broadening the geographic coverage of the country (another two nodes have already been created, at the universities of Evora and Algarve, to start active operation in October 1987, in close cooperation with the surrounding teacher training colleges)

- increasing the rate of growth of the number of schools covered (it will double to 155 in 1987-88), so as to comply with the objective of covering all the country's secondary schools and 25% of the primary schools by October 1992)

- sustaining the current emphasis upon the use of a systems approach to project development, reinforcing the concern with evaluation (at micro and macro system levels)

- improving the mechanisms for obtaining advice and feedback from teacher trainers, teachers, students, parents, regional committees, industry, services, and other relevant parties

- promoting the gradual transfer, to the appropriate central and regional organs of the Ministry of Education, of the duties concerned with field implementation of the project, so as to free the MINERVA infrastructures and manpower for improved strategic planning, research and development, evaluation and higher level training.

In the Federal Republic of Germany, the Lander agree that all pupils should receive basic training in NIT as part of their compulsory education. Training should include the acquisition of basic knowledge about the significance and possible uses of NIT, and the basic skills needed to use a computer to collect and process data.

B. Teacher training

At the European Symposia, the national leaders always insisted on the importance of teacher training, which they considered to be the key to any expansion of NIT in education. A number of teachers and head teachers have of course channelled their enthusiasm and their knowledge into helping NIT, but in the early 1980s most of them remained on the outside.

Since 1983, the Member States have made a huge effort to train teachers in NIT. Many teachers, however, feared they would lose their jobs or feared there would be a change in their traditional role as transmitters of knowledge. Since then, most teachers consider that following the introduction of NIT, there is no question of abandoning their teaching duties.

Many are currently attending training courses in NIT. Training needs are still largely unsatisfied.

There are three types of training:-

- basic

- in service

- teacher training

Participants at the Bologna Symposium on training teachers in NIT on 7 May 1985 said that at least 10% of teachers in each school should have received specific training. Not all the Member States had reached this percentage, but appreciable results had been achieved.

1. In-service training

Genuine progress has been made here. The initial effort was aimed at providing teachers with continuing training to get them used to using NIT in the classroom.

In Denmark, a three-year programme with a budget of some 6 million Kr. has been set up for the period from 1984-87 in order to permit the integration of computers into the programme. In the upper secondary school, The Royal Danish School for Teacher Training has set up similar programmes for the primary school.

Since then, almost all teachers (98%) have followed computer introduction courses and a one-week course designed especially to enable them to give students the "30-lesson course" mentioned above.

In half the schools, 3 teachers (of social sciences, the arts and natural sciences) have had 5 weeks' special full-time training time for 5 weeks in cooperation with the local universities to become "advisers" in computer studies in their establishments. This programme will be continued in the rest of the schools during the next two years.

In each school the task of computer counselling is entrusted to one teacher. He receives the equivalent of one fifth of a full time post to aid his colleagues, on both technical and teaching levels, to use the computer. Several continuous training programmes have been designed especially for advisers.

In French-speaking Belgium, basic training has been organised for some 200 teachers who will be responsible for the information technology course given in the first year of secondary education.

In technical and vocational education, specialist training in robotics, programming, numerically controlled machine use and use of programmable automatic devices has been organised for some 40 teachers in the electromechanics and electronics sectors.

In Dutch-speaking Belgium, computer teachers (secondary education) receive a training of initiation of about 250 hours. Additional training is of 30 to 90 hours duration. The Ministry of Education has taken the initiative of organising a further written course aimed at all teachers regarding the interactive technologies in collaboration with the Ministry of the Flemish Community and with the Belgian Broadcasting Radio and Television. Regional training centres will be set up for participating teachers. The course starts in 1989. The course is primarily open to teachers, (approximately 70.000) but is equally available, subject to inspection, to the management and all those interested (including parents).

France has developed 28 training centres for the implementation of NIT centres (training, training of instructors, resource centres). There is one centre per academy. Located in university environments, the centres receive teachers well placed to pass on what they have learnt to other teachers where they are introduced to NIT and the practical use of equipment and software.

In Greece in 1985 a training course was organized for the teachers responsible for the teaching of informatics. For those who had not had basic training there was a course lasting for 6 months. These teachers covered the teaching in the technical lyceum and multi-discipline schools.

Since 1987, teacher training takes place in five regions in the country in special centres. The training in these five centres has the same programme and the same equipment. For this purpose the Ministry of Education collaborates with universities and technological institutions of the regions which are providing the training personnel. The teachers selected for training have already had basic training in informatics and the courses have a duration of four to five weeks. Moreover, there are a lot of courses for teacher training organized by scientific unions which can be attended by teachers in service or by unemployed teachers. These courses have similar programmes, they incorporate practice with equipment and they last for 16-20 weeks. Teachers of secondary schools (lower and upper level) obtain their educational programme training in informatics by changes in the curricula of the universities and technological institutions. It is aimed to use trained teachers as instructors for training of other teachers as well as for software development in the regions.

In the Grand Duchy of Luxembourg, in the pre-school and primary sector, in-service training is by means of:

- retraining courses
- refresher certificate courses
- specialist certificate courses.

Some 20% of the teaching personnel have been able to follow a computer introduction course within the scope of the retraining activities. Primary school teachers taking part in the pilot experiment have received an extra preparation of 60 hours in 1986-87 and will be able to follow seminars of a total duration of 60 to 80 hours in 1987-88.

In secondary and technical secondary education, the integration of NIT in the branches as well as for computer teaching and information sciences, two types of profile can be seen:-

- teachers wanting to go into information sciences and computer teaching (in particular in the upper cycle of secondary education)
- teachers of other areas who are required to use the computer within the scope of their teaching.

In order to comply with these two types of needs, two training levels are provided for at continuous training level:-

- heavy training

- light training

At present, 22 secondary teachers are following the heavy training which corresponds to a volume of 600 to 650 hours (one year). Two teachers are following this training abroad, the other 20 are benefiting from a discharge from a semi-teaching task and are receiving their training at the University Centre over a period of two years.

The light training is organized in the form of modules of 8 and 16 hours which take place in part during the afternoons from Tuesday to Thursday and in part during working hours. These seminars are attended by teachers in all areas; in 1985-86, some 200 people registered and there were the same numbers of registrations in 1986-87.

In Spain, teacher training for the Atenea project:

a) training of instructors which is part of the teachers' centres. The training of NIT Programme begins at Alcala de Henares (Madrid).

Duration 360 to 440 hours

Content:

- general insight into the possibilities and limits of NIT in the classroom

- operating systems

- LOGO

- word processing and other programs to be used in the language sector

- data bank and its applications in the social sciences and experimental sciences

- spreadsheet and its use with regard to the various curricular fields

- number of specialised trainers of both sexes: 110

- number of teachers who receive the training: about 4.500([1])

([1]) the Autonomous Communities should be added to these statistics

In the Federal Republic of Germany, instructors were given training in information technology and data-processing in August 1983. Since that time, the majority of Lander have in addition included the new technologies in courses of study at Hochschulen (higher education institutes) and a subsequent period of practical training.

All the Lander have amplified the extra training of teachers who started in 1985. Generally speaking, these activities start with an intensive in-service training of the instructors who then proceed with the extra training of the specialist teachers in the information technology centres set up for this purpose at regional level. The procedure has been well proven and is developing in the Lander (Bavaria, Lower Saxony, Rhineland and North Westphalia).

As a result of the CIP programme, any student of an upper school who is preparing for the teaching vocation can be initiated in to information technologies. More and more lines of study now include compulsory courses in this area. Due to the low foreseeable teacher recruiting levels in the Lander over the coming ten years, the emphasis will above all be placed on the offer of extra training.

The development and experience of various models of training in information technology have been undertaken by the associates of the study programmes commissioned in 1986 to ensure the harmonious transposition of the proposals relating to basic education (in Lower Saxony, for example). Certain Lander have also called on the experience of councillors in matters of information technology who have been working in the area since the 1970s. Outside the traditional training, some Lander (such as the Land of Rhineland Palatinate) make teachers participate in pilot experiments so that they will acquire an extra training based on practice.

Industry, for its part, is used to supporting the extra of the teachers within the framework of a certain number of initiatives taken in particular by the "Arbeitsgemeinschaft Schule/Wirtschaft" and the Fordergemeinschaft "Computer und Bildung", providing, among other things, participation in design and backing the public measures including the mutual preparation of the study programmes.

In the United Kingdom about half the teachers have received some training in the use of computers in school. Under the LEA Training Grants scheme LEAs receive funds specifically for the training of teachers in the use of IT. The MESU also provides the support and material both for initial and in-service training.

In Scotland, the training emphasis is on computer studies, the use of the computer in the curriculum and on the contribution of professional and academic qualifications in the use of

computers. Parallel to the training taking place on the central level, other training is being carried out a local authority level. The emphasis is placed on educational training.

In Ireland, three levels of in-service training courses are provided viz.elementary, intermediate and advanced. These courses are well-attended by teachers and a noted feature is the large percentage of female teachers who attend. For example. in 1984 over 55% of teachers who attended intermediate level courses were female.

In Portugal, in-service teacher training remained one of the areas requiring greater effort and particular care, so as to ensure a qualified propagation of the project.

During the year 1986-87, the university and teacher training college teams provided 2500 hours of in-service training, at various levels, to about 2000 school teachers. In-service teacher training is viewed by the MINERVA project in a rather broad sense, so as to include follow-up support to the schools throughout the year.

This support takes the form of counselling aimed at further improvement of the teachers' ability to develop sound educational practices based upon the use of information technologies. A clear effort is put in stressing, as primary concerns, the learning process and the aims of education, so as to avoid any deviations that might materialize in activities where technology is exploited just for the sake of technology.

It is in this light that commercial applications software (such as word processors, spreadsheets, data base management packages, or computer aided design tools) are used, together with carefully evaluated educational packages, and with programming languages intended for educational purposes (namely Logo and Prolog).

An effort is made to view educational research, not just as a background task to be carried out by full time specialists, but also as a concern of all teachers involved in the use of information technologies, so as to enable them to evaluate their own progress, to improve everyday practice and to make them aware of their changing role in an information society. The cognitive and affective impacts of the changed classroom dynamics made possible by the use of information technologies, the implications of the use of computers at the level of known, and of still to be known, cognitive processes, the acquisition of new strategies by pupils, the risks of deteriorating existing intuitions at the expense of the reinforcement of new ones, are a few examples of aspects that are put under close scrutiny.

## 2. Pre-service training now being introduced

Teacher training colleges in most of the Member States are now providing introductory courses in NIT in both primary and secondary schools. Plans have been made to start these for general and vocational education in 1986, as in Luxembourg, and some countries have them already.

In French-speaking Belgium, an information technology course has been set up for all future teachers. This course covers programming, use of software and teaching applications of the computer.

The volume of this course is:-

- 2 hours per week for future secondary school teachers
- 1 hour 30 minutes per week for primary school teachers
- 1 hour per week for kindergarten teachers.

Regardless of the efforts made and the spectacular results in some Member States, it has to be admitted that there are still considerable schortcomings as far as teacher training is concerned, for the following reasons:-

- there is still only a small number of teacher trainers
- too much time goes by between the writing of the courses and their use in the classroom and this prevents enough teachers being trained in NIT
- Although the software is improving a lot, it is still not absolutely what is needed for the training courses.

For all these reasons, the authorities in most of the Member States began implementing various training schemes in 1985.

In Portugal, the use of information technologies in educational practice is now being introduced in the curricula of some of the universities and teacher training colleges where the prospective teachers graduate. However, the rate at which this introduction takes place varies quite drastically from institution to institution.

In the UK a working party has been established to ensure that new teachers are properly informed about the use of IT in their particular phase or subject.

## 3. Training of instructors

In Belgium-(Dutch speaking) experienced teachers are trained in courses of two to eight months with the collaboration of the university. New experiments are under way.

In the Grand Duchy of Luxembourg, instructors are recruited from the most experienced teachers who have, within the scope of their initial training, been prepared for NIT. Given that these instructors work exclusively in teams, they benefit from exchange with their colleagues in the areas in which they are less competent. The in-service training of the instructors is however above provided by means of courses and seminars abroad.

With the NIVO project, the Netherlands has increased the number of instructors by allowing a number of them (about 40) to receive instruction in the latest developments of firms participating in the NIVO project. These 40 instructors in turn were able to train another 150 instructors so that they too would be able to give in-service training courses.

Soon this group will give an introductory course to 7,000 secondary school teachers. For the time being, it is planned to provide basic training for about 90,000 secondary school teachers.

In Spain, the training of teachers for the Atenea project is conducted in 90 Teacher Centres (CEP) distributed in different zones. Intensive training is given to CEP instructors at the Institute of Educational technologies (ITE), central headquarters for the programme of new technologies, situated at Alcala de Henares.

Since September 1985, courses have been organised for instructors in Italy with the aim of enriching and harmonising the preparation of people who have already had computer and teacher training and can therefore work as instructors. Courses have been organised and will be again at specialist university training centres such as CEDUIC at Perugia, CILEA in Milan, CSATA in Bari, CINECA in Bologna and SOGESTA in Urbino.

Figures for the year 1985/86:

- 44 Polo schools
- 239 basic schools
- 158 teachers prepared to work as instructors
- some 2000 teachers in basic schools trained to carry out the task.

Figures for the year 1986-87:

- 49 Polo schools
- 751 basic schools
- training of 158 instructors
- training of approximately 4500 teachers.

In 1985/86 and 1986/87, 254 courses were organized.

The forecasts for the 1987/88 school year are as follows:

- 1060 primary schools
- 63 Polo schools
- 240 courses for training of teaching instructors
- 756 continuous training courses for teachers

In France, the system which has been operating at several levels for a number of years (training of INSTRUCTORS for one school year or by means of progressive 3-month modules over a period of several years, who in turn will go on to train TEACHERS in schools) makes it possible to:

- build up a large body of training instructors and teachers in the informatics field
- increase the awareness of teachers on a large scale enabling them to make choices of software
- develop experience know-how in matters relating to the export of educational engineering.

Here again the aim is not to train informatics experts but to enable teachers to use the software products placed at their disposal in their daily practice. For these reasons, the entire system has been maintained and expanded for the year 1988.

In Portugal, the training of teacher trainers is currently being provided in two ways:-

- through specific training courses, with lengths between 3 and 8 months, provided by the university teams
- through post-graduate studies and research (Masters' level) at the universities. This method is the one to be favoured in the future.

In the Federal Republic of Germany, some Lander have introduced intensive training courses for instructors who will pass on their knowledge. They are released from teaching one day a week over a long period of up to one year.

Further steps have also been taken in the United Kingdom to boost the already large number of instructors - 500 primary advisers and teachers have received advanced training and can now pass on their know-how to other teachers. The Open University has been asked to produce home study courses for all teachers who are not able to attend establishments where the training is offered.

Other types of training are also provided.

Some Member States, Italy for example, are also stressing the need to make head teachers aware of NIT and to train people to produce courseware with the help of computer firms.

Each Member State must of course take the high cost of this training into account.

In some countries, there is a need for Community action to generate reflexion on the objectives and, once these have been defined, on the content of the training courses to be offered.

This training process, whichever it is, will, of course, take a long time.

C. Software, courseware and hardware systems

None of the Member States has a dirigiste policy that would lead to software and hardware being standardised. Quite the contrary. They have all tended to encourage the proliferation of software as far as they can. This desire not to standardise has resulted, in particular, in the development of many small local and regional initiatives by teachers who, as has happened in Belgium (Dutch-speaking), Ireland, the Netherlands, the Federal Republic of Germany.

In the United Kingdom the production of software has been supported under the MEP, the MESU and the SCET. A government scheme assists LEAs, schools and teacher training establishments with software purchase.

One of the basic problems remains the nature and content of the courseware.

Since 1986, implementation can be noted in a certain number of member countries of national information technology programmes and suitable software.

It should also be pointed out that since that date, applications software has occupied an ever greater place in the introduction of NIT into schools.

In Denmark, to respond to the demand for high-quality courseware and teaching accessories, an initiative has been taken by the various local authorities who are at present creating a national aid centre for the preparation of computer programmes intended for education and teaching materials, with an annual budget of several million Kr. This is in addition to the numerous initiatives already taken in particular by the "Landscentrale for Undervisiningsmidler" (approximately 2 million Kr per annum), the "Danish centre for education and information technologies" (approximately 1 million Kr per annum) etc.

This new set of initiatives is aimed at perfecting software in the areas which are not already covered (e.g. large scale projects), to support local initiatives technically and to permit schools to have better access to data banks and bases.

In Belgium (French-speaking) some ten courseware packages have been produced in cooperation with the Free University of Brussels (PLATO system) and the University of Liege (APPLE II) and with the participation of teachers temporarily released from a part of their usual work.

The subjects dealt with are Biology, Physics, Geography, Economics and Latin.

Software has been produced in cooperation with the Mechanical Manufacturing Industries Research Centre Centre (CRIF). This covers the mechanical parts production.

The Government has organised an inquiry into the information technology equipment in use in the secondary education establishments. This inquiry has found that at present approximately 95% of schools have information technology equipment which is still relatively heterogeneous, as this equipment was bought at different times and usually at the school's initiative.

At present however a clear tendency can be seen to acquire more standardised equipment of the compatible PC type working under the MS DOS operating system.

In Belgium (Dutch-speaking), the distribution of software is made as follows:

65% for secondary schools, 25% for primary school and 10% for special education. The plan is to unite all schools in an electronic network which can be of use equally in distribution and maintenance of educational software.

Since the academic year 1985-86, small groups of teachers have been released from teaching in order to prepare themselves for this project and for the preparation of educational software for their particular speciality, in collaboration with university experts. Prototypes were developped in university centres of expertise, with the help of (amongst others) Tencore and Turbo Pascal as programming languages. Suitably motivating surroundings for programming for students were foccussed on the universities of Anvers and Brussels.

Following some research into appropriate methods for presenting software by the Faculty of Science of Louvain University, a generator of programs called MIRA was developped.

The best strategy for development of good quality software for teaching purposes seems to consist in the collaboration of groups of teachers and university centres.

Secondary schools are at present being equipped with computers at an increasing pace. In March 1987, there were on average 9 microcomputers per school. In one year, the total of 16 bit-MSDOS increased from 11% to 36%. In the two preceding years, all State schools were equipped with 8 MSDOS computers, a printer, a monitor with a big screen in basic colour with basic software (Pascal, structured Basic, word processing, databank, spreadsheet, graphics). The number of pupils is limited to 45 per computer, for secondary education. A third of primary schools are equipped with micro-computers. The average number of systems is rising to 0.9.

94% of systems are for individual computers (MSX: 27%; Philips P2000 MC11: 23%; Commodore C64: 21%.) Only 6% of these belong to the category of 16 bit MSDOS machines. The number of pupils to each computer is rising to approximately 200 in primary education.

In some Member States, Belgium (French-speaking) for example, no hard and fast choices have been made when it comes to the equipment needed in the initial stages of introducing NIT into primary schools. But the basic minimum has been laid down.

In France, FF 200 Million was set aside for the purchase of software and in 1986 a further FF 40 million was set aside to equip lower and upper secondary schools. A software catalogue containing 700 items from France and abroad was circulated to all the schools and each establishment received at the same time as its hardware one or more collections of software.

With a view to the development and purchase of software, the Ministry of National Education has organized a national competition of software scenarios for educational use, the results of which were given by the Ministry in October 1987: 34 scenarios were awarded.

Competitors had to submit:

- the aim of the scenario in terms of result when it has been developed
- the level of qualification of the pupils for whom it is designed
- its educational intentions in terms of training activity, evaluation, analysis, problem-solving, understanding, reasoning, etc
- the benefit of use of the information technology and possible linking with other educational tools
- suitability for school programmes, teaching and disciplinary requirements
- main characteristics and functions of the products to be produced from the scenario
- a detailed description of the tree-structure with presentation of a significant number of screen/pages
- the recommendations to publishers
- a documentation project intended for product users which would be produced from the scenario.

Results of a second competition should be given in April 1988.

In the second place, the Ministry of Education has perfected an original user rights acquisition (mixed licenses) procedure for a certain amount of software for all secondary schools and colleges. The products to be covered by this procedure are software of which the innovatory nature and educational interest are proven but the cost of which could be a deterrent. This device is intended to permit the establishments to acquire, in good condition, the software corresponding to their own requirements, while encouraging the publishers to distribute high quality educational software on an as yet uncertain market.

Schools which require to do so will be able to obtain this software by paying the publishers a sum very much below the trade prices. This sum will essentially cover the cost of back-up, distribution, any assistance and maintenance of the software.

However, it should be pointed out that, beyond the software covered by these contracts, there are other products which present characteristics and qualities which may correspond to the requirements of the pupils and of the teachers.

In the Grand Duchy of Luxembourg, the situation is as follows:

- Pre-school/primary education

The hardware is in the hands of the communes taking part in the experiment. In order to ensure a certain uniformity, the Ministry recommends the purchase of certain equipment on which primary school teachers are also trained. The software is partly bought by the communes (LOGO version, word-processing incorporated in the computer), partly supplied to the schools by the Ministry which benefits from a cooperation contract with SCET of Scotland.

- Secondary technical and secondary education

All the technical secondary and secondary education establishments are equipped with one or two networks consisting of at least 16 machines. These computers, from 64 to 128 K, are designed for the lower classes. For the higher classes, higher performance personal computers are provided. Although most of the establishments involved in technical secondary education are equipped, the secondary education establishments at present have a single computer of this type which is mainly used in management, but which is also used as a teacher preparation tool with a view to possible introduction of information technology courses at the level of the higher classes.

The software is supplied to the various establishments by the Ministry by means of a centralized distribution service. Part of this software originates from the SMDP.

In Spain, the Ministry of Education and the Ministry of Industry have established conventions for the development, within the framework of the Atenea project, mechanisms of communication between educationalists, computer scientists, producers of software and editors, or via subsidies to firms with a view to getting to know their needs better and improving their understanding or requirements, creating a programme bank and determining the nature of new software.

The experimental centres and teaching centres receive the following allocation:

Hardware:
- from 5 to 10 computers
- 1 or 2 printers

having the following characteristics:

- MS-DOS compatible
- 256Kb main memory
- colour screen
- graphics capacity
- two disk drives
- matrix graphics printers

Programs:

- language LOGO
- language PASCAL (Secondary centres)
- language BASIC
- information system OPEN ACESS (Secondary centres)
- information system ASSISTANT (Primary centres)
- graphics program PAINT BRUSH
- self editor program FIRST PUBLISHER
- databank for documents KNOSYS
- overall specific programs for education: EAO, simulations, micromondes, etc..

In Ireland, the Department of Education has launched a purchasing scheme for the purchase of hardware and software for secondary level schools with a view to having an element of standardization in these areas. Schools are however, free to purchase hardware and software from their own resources.

In other Member States, work has been based on years of experience and the results have been extremely interesting.

In the United Kingdom for example there is almost three times as much software - more than 3,000 units - now as there was in 1983. There is a very wide range of software available.

In the interests of better software production, the Netherlands and the Commission organized a symposium on the development of educational software in May 1986. This was an opportunity for the Member States to compare their experience and, above all, to pool the results of their research in this field.

As there is a great need for software, the emphasis has been on projects development. This has already made it possible to prepare prototype software and on 1st August 1987 a four year production project baptized POCO (Development of software for the application of information technology in education) was launched.

The public authorities have taken this initiative after realizing that the publishers of educational works were being too passive in this area. The POCO project will make it possible to produce some 1,000 hours of courseware which can be grafted directly on to the contents of training in basic, secondary, lower or average vocational education. The COI manages the project, which will follow four major paths:

1. the stipulation by the Ministry of Education and Science of priorities with regard to the various area/year of study combinations

2. definition of the product, drawing up a list of specifications to be met by the courseware

3. adjudication procedure: anybody interested in the production of the courseware is permitted to tender

4. distribution phase: to be carried out in theory by the publishers.

In Denmark, nearly 15% of primary schools have computer hardware. The software is mainly devised by the teachers without state subsidies. Projects exist to instruct the National Centre for Educational Resources (Landscentralen for Undervisningsmidler) to arrange for the diffusion of courseware to all schools.

Certain activities are also worthy of mention:

- SCEN (evaluation of software and courseware in the Netherlands) publishes fortnightly evaluations

- increased attention will be paid to the staffing of schools when NIT is applied in the classroom

- development of prototype software will continue for some years in order to probe the optimum possibilities of use of NIT

- the schools taking part in the NIVO project (new information technology in secondary education) have a purchase voucher to permit them to purchase the software from the publishers. One of the aims of this operation is to induce educational publishers to produce software.

It should be pointed out that the Netherlands are also placing special emphasis on the evaluation of the national programmes, as carried out to date.

The school inspectorate have drawn up a letter on the situation in the area of NIT. Reports have been published on the matter of basic and special education as well as of secondary education. Reports dealing with teacher training and vocational education are being prepared. At the initiative of the Ministry, a retraining evaluation has also been carried out. In 1985, this evaluation was carried out by a commission of experts from the inspectorate and from the financial sector. NIVO retraining, after being examined at the internal level, is at present being audited by a mixed commission from the inspectorate and the financial sector.

In Portugal, widespread educational use is made of commercial applications software - such as word processors, spreadsheets, data base management packages and computer aided design tools - with innovative educational uses being exploited in an increasing range of subject areas.

Most nodes of the MINERVA project are systematically engaged in educational software development. Although some of the nodes still resort to the development of software by individual teachers, the approach clearly being favoured is the one which relies upon a team approach which involves educationalists and computer scientists. Content-free and simulation packages are the ones currently being preferred. Intelligent tutoring systems are also under development.

Team development of educational software includes evaluation as an inseparable part. The teams meet and complete evaluation grids at various stages during the process. The results are analysed, and may lead to substantial revisions. Subsequent stages involve pupils (individually, in groups, and in the classroom). A similar process takes place when selected commercial educational software packages are evaluated.

A broad range of subject areas are now being covered - including the humanities, sciences and languages teaching - although a stronger bias still exists towards science teaching packages.

Although it was decided that during the pilot phase of the project no standard would be imposed for equipment, the use of MS-DOS compatible computers has been encouraged, in order to allow for increased portability and better communication. As a result, most of the computers now in the schools fall in this range. Some Apple MacIntoshes are also being used in some specific applications where they are found to produce better results. A few low priced 8-bit machines which were selected by one of the nodes at an earlier stage of the project are still in use.

In the German Federal Republic, certain Lander have introduced new development procedures. Thus in Lower Saxony, specialist commissions have perfected teaching methods for certain subjects which include not only handbooks for teacher and pupil, printed sheets and worksheets, but also accordingly programmed diskettes. In the Land of Rhineland North Westphalia, specialist groups working in the Central Institute of the Land have designed teaching methods for three important areas of information technology teaching with the corresponding diskettes. In Schleswig-Holstein, the Central Institute of the Land has had its basic training programme published by a publishing company and made the relevant diskettes available to the schools.

As always, the major scholastic publishing companies dislike developing courseware due to the narrow nature of the market in question. The largest educational publishing company has nevertheless enlarged its range of model and simulation programmes in the area of natural sciences for 1986. The literature, which is abundant, and the manuals are now supplemented by programmed diskettes. During the summer of 1986, one Land placed contracts with software engineering and publishing companies for the design of courseware aimed at the thematic requirements of schools. Part-release teachers are cooperating with this project.

Generally speaking, recourse to simplified test courseware continues. One Land has however started experimenting with an advanced test system using terminals connected to a major central unit (TCAM - Rhineland Palatinate).

The institut fur die Padagogik der Naturwissenschaften of Kiel University has implemented projects researching the possibilities and limits of new programming environments or teaching natural sciences as well as NIT and communications.

Future prospects are characterized by the development of standard software using user languages which are easy to learn and can be adapted according to the requirements of the courses, now that almost all the lander have opted for originators meeting the MS-DOS industrial standard (1986). The Institut fur Film und Bild in Wissenschaft und Unterricht, situated at Grunwald near Munich, which is financed by all the Lander, will thus make an offer for an efficient commercial standard software for the areas of teaching cover.

In the United Kingdom, there are on average 2.5 computers for primary schools and 23 per secondary school.

The MESU has produced much material to assist teachers in teaching the curriculum. Some computer programs have been created to help teachers in their task. Further the MESU have published 40 books and videos.

In Scotland, there are on average 2 computers per primary school and 20 per secondary school.

The SCET remains the main body for the preparation of a national software system and a common diskette operation system. Parallel to the research into the NIT, there are other applications such as: electronic table, simulations, interfacing, word processing, information and graphics.

Conclusions

Since the Council Resolution was adopted on 19 September 1983, the Member States have made a considerable effort with the introduction of NIT in education, teacher training, the production of software and the acquisition of equipment.

The situation of course varies from one country to the next, but each Member State is now resolutely tackling the job of introducing NIT into schools. Some countries have adopted a more reserved approach which will be equally effective in the long-term. Others, which have had more experience, have brought in regional and national plans providing a framework for the various educational establishments and institutions and are thus in a position to supply information, equipment and training programmes.

Although the Member States put the accent on general secondary education to begin with, all branches of education are now involved with NIT.

Since 1985, most of the Member States have concentrated on the production of educational software.

Since 1986, the Member States have paid more sustained attention to the eveluation of software (the central theme of the Coimbra colloquium work).

It should also be mentioned that the Member States are willing to increase the number of cooperative projects and to become involved in the area of software exchange.

## II. STATUS OF COMMUNITY ACTION

### a) European symposia

National situations were very different in 1983. All the Member States had incorporated NIT into their vocational secondary courses and most of them (with the exception of Greece and Italy) were trying to bring in introductory courses in higher education. Two of them, France and the UK, had embarked on vast national programmes to spread the use of computers and microprocessing equipment to all their schools at both primary and secondary level.

Spectacular progress was achieved with NIT introduction in the Member States over the 1983-8 period, and alongside this, the basic issues have also changed between 1983 and 1985.

The symposia held in Marseilles in December 1983, Newcastle in July 1984, Bologna in May 1985 and Berlin in November 1985, Enschede in May 1986 and Coimbra in December 1987, were the opportunity for their audiences, mainly decision-makers (representatives of Ministries and top civil servants from the Ministries of Education) and representatives from the world of education chosen because of their numerous contacts (inspectors and teacher trainers), to take stock of the progress made with introducing NIT into schools in the different Member States, to discuss the basic problems attached to incorporating NIT in education and to define common strategies for teacher training, data exchange and evaluation of software.

#### 1. Marseilles symposium, December 1983

(The importance of NIT is understood)

Three months after the adoption of the Resolution (19 September 1983), the Commission, with the collaboration of the French authorities, organized the first European symposium. It was held in Marseilles on 7-9 December 1983 and the subject was information science and education (see the annex on Community activity, 1983-85).

The meeting was primarily an opportunity to survey the as then new field of NIT in education. Until then, the Member States had been left to their own devices and had to withstand the initial onslaughts of NIT on their own. Today we can see that the Marseilles symposium was, thanks to the Commission, the Member States' rude awakening to the importance of NIT and of the extent to which Europe was lagging behind, both technically an culturally, at that stage.

Before Marseilles there had been a general tendency to await

new technological developments before making a better informed decision. But at Marseilles, all the delegates agreed on the urgent necessity of getting older secondary pupils familiar with NIT so they could obtain - in extremis - the basic know-how.

Since then, and especially since the Newcastle meeting, NIT has begun to be introduced into the other areas of secondary teaching and plans are being made for the primary school too.

Delegates at Marseilles were aware of the importance of NIT and of the resistance of teaching staff to it and they highlighted the crisis in an education system which was cut off from the real world around it.

The subsequent development of NIT has accentuated this. Marseilles was an awakening to the scope of NIT and an opportunity to make the delegates aware of progress in NIT. But it also showed them that most of the Member States where lagging behind. Its merit is that it cleared the ground, marked out the path and outlined the problems of the moment.

Since then, the subjects of reflection have changed, turning towards new centres of interest such as alterations to school syllabuses and timetables.

2. Newcastle symposium in July 1984
(NIT incorporated into education).

NIT is becoming a vital teaching aid. The Newcastle meeting, which had the benefit of the experience of the UK (the organizer) in NIT, was held barely six months after the Marseilles symposium. The dates were 3-6 July 1984 and the subject was NIT in education.

Various equipment and software were brought to the symposium, so delegates had the opportunity of getting first-hand experience of NIT through modelling, word processing, data bases and various computer languages.

Newcastle was the first European symposium to stress the educational aspects of NIT, stating, in particular, that computers should not improve education but enable the pupils to organize their own learning [1].

As already emphasized, Newcastle agreed that NIT should be introduced into primary schools, as they were more flexible from the point of view of the timetables and syllabuses.

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1 This was dealt with in greater detail at the summer school in Liège on 11 - 13 July 1985 when NIT in the learning process in the primary school and at the change over from primary to secondary was discussed.

It also recognized that it was less important to teach pupils computer science as a subject than to get them to use computers in all subjects when they went to school. Delegates went counter to what had been said in Marseilles when they agreed that there was bad software, as whether it was good or bad mainly depended on how the teacher used it.[1]

Lastly, Newcastle clearly highlighted the fact that it was less important to change the structure, presentation and content of programmes than to make radical changes to teaching methods.

Delegates noted the various types of resistance teachers had to NIT. Some were worried about losing their jobs and others were ill at ease in the new role of learning manager in which they had to teach how to identify and process data rather than simply pass it on.

3. Bologna symposium, May 1985

NIT training for teachers must be intensified.

The Bologna symposium on NIT and teacher training (7-10 May 1985) dealt with the problems of the teachers.

Although the introduction of NIT in schools owes a lot to the enthusiasm an initiative of a certain number of teachers, Bologna also showed that we must be careful their enthusiasm does not wane and pay attention to the majority of teachers who are not involved in NIT.

The phenomenon is all the more acute in that teaching is always in a minority position in the overall process of information technology in society.

Bologna recommended overcoming these various handicaps by making all teachers familiar with NIT. This would start with an introductory phase followed by a continuation phase, with constant updating of knowledge. Although there is general agreement on the need for all teaching staff to have some basic training, there is still uncertainty when it comes to the method and content of the training. The general impression still seems to be that most of the countries involved are a long way from having proper plans or clear objectives in this field.

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[1] See the seminar on the development of educational software in the Netherlands on 26-28 May 1986, and at Ghent University (8-15 July 1986) devoted, in particular, to the use of NIT in schools.

Delegates at Bologna said they wanted to provide structures whereby experienced teachers could collaborate candidly on the production of suitable software.

They seemed to agree that there should be permanent, local training units so teachers can apply to centres in their environment.

Although there are many important aspects of NIT to take into account, Bologna showed how great a concern teacher training should be, as teachers are one of the vital links in the teacher-taught chain. It comes as no surprise that one of the most important recommendations of the symposium was on running a detailed European study of the conditions of teachers and an analysis of the costs of training them.

4. Berlin symposium in November 1985: making NIT available to vocational education

The Berlin symposium which was held from 4 to 8 November 1985 demonstrated problems relating to the introduction of basic training in NIT for young people aged between 10 and 16 and between 16 and 19 years of age.

Divided between four working parties, the participants studied the following topics:

- basic training in information technology in lower secondary school (10 to 16 year olds)
- training in information technology in upper secondary school (16 to 19 year olds)
- vocational training in information technology in the business and administrative management sector
- vocational training in information technologies in the industrial technology sector.

This symposium provided an opportunity for participants to familiarize themselves with pilot projects conducted in the Federal Republic of Germany and to visit enterprises, schools offering general education and vocational training centres.

Participants were also given the opportunity to examine a wide range of teaching material: teaching programmes, teaching units for an introduction to information technology, simulation exercises, videotext and computer-assisted learning software. The participants were able to appreciate the broad diversity of projects and products in the Federal Republic.

## 5. Enschede symposium in May 1986: the need for cooperation

Devoted to the development of educational software, the Enschede symposium organized in the Netherlands from 26 to 28 May 1986 was set in the context of CAL (computer assisted learning) for Europe. It dealt with four topics:

-computer assisted learning and future development

- the concept of educational software

- the production of educational software

- the development of courseware and international cooperation

The Enschede symposium was the first to be opened to the new Member States, Portugal and Spain.

It emerged very clearly that the Enschede symposium was a turning point in the perception of NIT in education since the participants proved to be sufficiently advanced to go into greater, more technical, detail in their debates on NIT in education. This was due to the rapid strides made in a few years in the Member States' technological and cultural progress.

At the Enschede symposium, participants also broached the question of the market in educational software which is a particularly sensitive issue for the smaller Member States which produce neither hardware nor software. On this occasion, other partners, companies producing educational software and software publishers, who had until now remained on the fringe of the symposia had the opportunity to carry on a dialogue with the traditional partners in education. While not resolving the problem of market, participants were at least able to discuss the subject and define the limits of their scope and influence.

The Enschede symposium also demonstrated the will of the participants to move from an operational phase so as to obtain concrete results and actual products.

Lastly, the papers and debates emphasized the need for cooperation between the Member States of the Community, while respecting the different cultural areas.

This cooperation, the principal feature of the Enschede symposium, would be given three directions as follows:

- realization of cooperative projects each involving a limited number of Member States, in the field of devising and producing courseware;

- dissemination of these achievements to all the Member States, taking account of the EURYCLEE network;
- organization of restricted meetings between Member

States: working parties, mini-seminars etc. so as to target more effectively the groups of participants.

This cooperation was felt not only by each of the Member States but also by the Community to be a significant contribution.

6. The Coimbra symposium in December 1987: the need for an evaluation of information technology status.

The Coimbra symposium was held at the end of the period established by Council resolution of 19th September 1983 on the implementation of community initiatives in matters of introduction of NIT into education.

This symposium provided an overview of the work carried out since the adoption of the resolution. The products prepared in 1987 were presented, particularly the handbooks for teachers (cf. point e, 9 below), the software items developed at the Glasgow Summer School (cf. b) 4 below), the brochure describing the Eurydice network (cf. h), and the conclusions of the seminars on summer schools held in 1987.

The work of the symposium centred on the distribution of these various products at national level and on assessment of the benefits they may bring at Community level.

Agreement was reached on the very great importance of the products developed at Community level and on the need to distribute them as widely as possible in schools.

b) Summer Schools

The Commission has organized a number of summer schools with the help of some of the Member States. The aim is to encourage meetings between high-level educational research staff so they can find out about the work and experience of their European colleagues, combine what are all-too-often dispersed efforts and compare their points of view.

The Commission's action here is an essential contribution that is of considerable importance because it enables researchers to go in for profound, cooperative reflection on precise, selected problems of education, going beyond passing fashions and tastes right to the root of the issue. It is an opportunity for researchers, who are often isolated and disseminated, to obtain information and discuss the latest results of their research.

1. The first summer school was run in Nice on 3-13 July 1984. It was organized with the collaboration of the French authorities. The subject was computer languages and their use in the classroom. The papers were of course very technical, but the important thing to remember is that the emphasis was on two basic computer languages:

- LISP, the oldest one, which dates back to the 60's.

It is based on a mathematical structure and it gave rise to a whole family of LISt Processing languages that use lists as a basis for representing concepts and objects. The most important of these, which the researchers discussed, are small talk and logo which are used in many ways in primary schools.

- The more recent PROLOG (logical programming) , a product of the 70's, which was designed as a specific answer to data processing problems close to natural language. This gave rise to other languages such as Mirco-prolog and Dialog.

This meeting, the first of its kind, enabled researchers to investigate the implications and consequences of computer languages in education. The Nice summer school was, above all, an opportunity to clear the ground and lay the foundations for computer languages and highlight one or two of the problems of method and concept connected with their use in schools.

2. The second summer school the Commission ran, in conjunction with the Belgian authorities, was held in Liège on 4-13 July 1985. The subject covered was the introduction of information technology in primary schools and the meeting itself was jointly organized by the Universities of Liège and Ghent.

While the Nice topics were more technical and more general, those discussed in Liège were more specialized.

They were focused on the primary school and resolutely concerned with educational psychology.

The researchers in this case were more interested in the teaching and learning processes than in the outcome and they methodically presented their results, the hypotheses behind their research and their initial scientific investigations in the matter of introducing NIT in schools.

Rather than deal with immediate effects, they stressed the problems and questions which, in spite of appearances have not always had satisfactory answers.

Lastly, the Liège meeting produced a number of recommendations and, in particular to:

a. increase small-scale research projects on which teachers and researchers can join forces. The results of this should then be spread over a wider field;

b. set up an interest group on the creation of material that is just as exciting and open-ended as logo, but with different content (history, geography or languages, say).

c. research into the possible contribution of programming to primary education is a fundamental, but it is rare and often inconclusive at the moment. So the meeting recommended developing this kind of research so as to obtain clear, specific information for teachers seeking aims and the relevant methods of achieving them.

3. The third summer school was organized by the Commission in cooperation with the Belgian authorities. It took place at Ghent University on 8-15 July 1986 to discuss how to use educational software.

It was organized in collaboration with Ghent and Liege Universities. Ghent University undertook to study four topics of research:

- Analysis and description of software

  . preparation of descriptive analysis
  . search for descriptive categories
  . ways of using educational software

- Methodology: identification of specific teaching and learning strategies which could be assisted by this software

  . structural aspect: highlighting organizational problems at school
  . introductory and in-service training of teachers in the use of software
  . evaluation of the introduction of software in the education process.

In addition to the researchers, the Commission had invited the heads of the EURYCLEE centres to facilitate the supply and dissemination of information.

The four topics were discussed in plenary meeting and by the working groups and gave rise to four reports. On of the topics of research that was emphasized was the analysis and description of software.

In this context the researchers sought to arrive at an analysis of software which could be used by teachers in the various Member States. Thus, they drew up a table for the description of software as an aid to establishing a European system of analysis and classification of educational software, and the presentation of a glossary in nine languages containing the main educational software terms.

The table of description of software covers 4 areas of analysis[1]:

1. General description
   - 1.1 Identification
   - 1.2 Population, objectives, content
   - 1.3 Origin
   - 1.4 Documentation
2. Technical features
   - 2.1 Necessary material
   - 2.2 Environment
   - 2.3 Adaptability/Transportability
   - 2.4 Menus
3. Educational features
   - 3.1 Educational goals
   - 3.2 Educational significance
   - 3.3 Educational strategy
   - 3.4 Pupil activity
   - 3.5 Aid and adaptability of the pupil
   - 3.6 Aid and adaptability of the teacher
   - 3.7 Quality control
   - 3.8 Educational environment
4. Supplementary information
   - 4.1 Experimental sheets
   - 4.2 Users' sheets
   - 4.3 Evaluation sheets
   - 4.4 Bibliographical references

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1 Only the main chapter headings are listed.

The third summer school which is an extension of the Enschede symposium on the development of educational software has thrown new light on the use of educational software and gave rise to products that serve as useful tools for teachers in the European Community.

4. The fourth summer school organized by the Commission in cooperation with the SCET (Scottish Council for Educational Technology) was held in Glasgow from 7th to 14th July 1987. Its object was "The design and development of educational software".

This summer school was innovative in its procedures in so far as the work in Glasgow was preceded by working meetings with the teams of all the Member States in order to produce software elements each. These 13 items of software, designed and produced according to common criteria, covered various subjects (electricity chemistry geography, etc.) and was submitted at the Glasgow summer school. This European set of educational software was made portable and translatable into various languages by the summer school organizers. They can therefore be used, after development, in each of the Member States.

This exhibition drew together some fifty delegates from the 12 Member States, including heads of Eurydice network Centre heads, teachers and information technologists.

5. The fifth summer school, organized by the commission in cooperation with the Universities of Liège and Ghent and the Belgian Government, took place from 22nd to 28th September 1987. Its theme was: "The introduction of NIT into primary education: case studies and work routes".

It is known that the teachers, and among them, primary teachers, have great difficulties in introducing NIT into their classrooms.

Throughout Europe activities are being developed in primary school classrooms where children and teachers use the new technologies.

Researchers and practicians involved in these experiments often ask the same questions and answer in an original manner. . The teacher must be capable of preparing the various stages of the activity in fine detail. How must the teachers therefore be trained to use the new technology efficiently in their profession?

Before considering recourse to computers during school activities, another basic point must be queried: to what extent is the new technology useful to children in their school life and how can they be implemented to be of use?

In order to carry out an experiment, it is not sufficient to deal with the training of the teachers and the evaluation of

the knowledge of the pupils at a given time.

It is also necessary to monitor the continuation of the project in the classroom, once the researchers have gone, and its extension within the school or schools in a territory. What are the factors favouring this spread?

These questions connected with teacher training, the educational contribution of the new technology and the spreading of the acquisitions of experiments were the central themes of the summer school attended by some fifty participants who came from the 12 Community countries.

All the teachers, heads, inspectors, researchers and representatives of the Euryclée information networks invited took part in experiments on the introduction of the new technology into basic education. Each in turn explained specifically the activities carried out in the schools. Furthermore, the discussions took place on the problems met and on the relevance of the solutions found. Finally they jointly produced a practical document for the use of those preparing an experiment.

This kind of work made it possible to gain the benefit of the opinions of external experts on the current experiments and to supply practical information to those preparing to introduce the new technology into their school curriculum. This seminar thus met the basic worries of the world of education.

6. The sixth summer school, organized by the Commission in cooperation with the "Deutsches Institut für Fernstudien an des Universität Tübingen" was held at Tübingen from 25th to 31st October 1987 and covered: "Artificial intelligence, intelligent tutor systems".

The organizers started with the declaration that the massive implementation of micro-computers has underlined the lack of courseware in view of the education requirements expressed.

Thus the use of methods, approaches and techniques arising from cognitive psychology and artificial intelligence in training research activities seem to be able to give way to repercussions in the area of education both by the production of courseware and by the underlining of new strategies.

This summer school also dealt with a data base regarding artificial intelligence projects.

c) Young people and NIT weeks

1. Young people and the NIT week in Turin, July 1985.

This European event was organized by EUIAP, the Piedmont region, the province and commune of Turin with the help of the CSI (a computer consortium), Fiat, the Agnelli Foundation, the Turin Polytechnic and the collaboration of the Commission of the European Communities. The aim was to offer young people a broad picture of how NIT is used in industry and promote International Youth Year. The 150 young people who attended were aged between 15 and 18 and came from schools in the 10 Member States, the European Schools and the Piedmont area. They were selected by the Ministries of Education in each of the Member States and in some cases, national competitions were run to choose them.

Computer workshops were run by the CSI, Fiat and the Turin Polytechnic. So the youngsters had the opportunity to attend sessions on graphics (air quality control), cartography (screening weather maps of Europe and the Piedmont area), using interactive graphic instruments to produce a model car and using a personal computer to produce small training courses. They also visited firms and were thus able to see the latest progress in integrating NIT in the Italian business sector (optical fibre factories, inter-plant video libraries, electronic means of controlling looms etc.).

There were cultural and leisure activities in addition to this heavy work programme.

2. European Tours (July 1986)

In 1986, the Commission of the European Communities promoted the organization of European tours in France for school children from the Member States in cooperation with the office for information, communication and scientific and technical education (DIXIT) of the Ministry for Research and Higher Education (MRES).

The aim of the European tours was to:

- make young people aware of scientific research, introduce them to careers in research, discover the specific features, facilitate access to experiments and topics associated with new technology;

- develop and enhance the feeling of belonging to a European Community.

Inter Echanges organized two European tours on 4-12 July in France for about 100 16 to 17 year olds who were accompanied by scientists and interpreters.

Participants first met in Paris where they visited a large

science museum and in the science and industry park, the "Geode" science complex and its giant spherical cinema, the Palace of Discovery and the magnificent planetarium, the "Commissariat à l'énergie atomique" at Saclay and the National Saturn Laboratory set up around the new Saturn cyclotron.

Participants were then divided into two groups, one visiting the Rhône-Alps and the Côte d'Azur region, and the other the Normandy, Brittany and the Val du Loire.

(a) Rhône-Alps, Côte d'Azur

The young people had an opportunity to visit "Solems" at Palaiseau, the only European firm producing solar cells on an industrial scale, the Elf Acquitaine, Rhone Poulenc, Institute Max Von Laue - Paul Longevin, the National Studies and Telecommunications Centre, the Electronic and Information Technology Laboratory in Grenoble and the Sofia Antipoles science complex in Nice where there are 120 firms and a research centre forming the largest industrial park in Western Europe. Participants were also invited to visit historic sites on the Côte d'Azur particularly Vallauris, St. Paul de Vence and the Maeght Foundation.

(b) Normandy, Brittany and the Val de Loire

Young people on the second European Tour visited the Dassault company at St. Cloud, the Electro-nuclear centre at Flamanville where the first nuclear chain reaction was recorded in 1985, Mont St. Michel, the national wind energy testing centre in Lannion where experiments concern radio telephone stations nd meteorological observatories, the Pleumeur Bodu site which since 1962 has housed the telecommunications satellite station and the EDF power station at Chinon. This tour of discovery was completed by a visit to the Loire Châteaux.

Both European tours were a great success with the young people who were thus introduced to the most recent technology. The young people were entertained in the evening and took part in lively discussions.

3. Young people's tour of Great Britain (July 7 1987)

The third European young people's tour was organized in the United Kingdom by the Department of Education and Science with the backing of the European Community from 4th to 11th July 1987. The "Central Bureau for Educational Visits and exchanges" organized the event, the object of which was to interest a group of young people in communications and industrial control as well as in art and design.

The participants, who came from Community Member States, were most between 16 and 18 years old.

The young people's tour was a great success. After a visit to London, the young people went to an introduction to the study visit schedule. They visited the BBC Television Centre where they were able to look at the new technology with regard to production, graphics and interactive video. They visited "Acorn Computers Ltd." at the Cambridgeshire College of Arts and TEchnology, some schools in Nottingham and the London Borough of Brent and the Ironbridge Gorge Museum, as well as four newspapers, The Birmingham Post and Mail Ltd., the Coventry Evening Telegraph, the Shropshire Star Ltd., and the Express and Star. These visits enabled them to see the new information technologies being put into practice.

The young people have been invited to prepare a "Journal" reporting on their visits.

d) Seminars

Meetings intended specifically for teachers trainers and inspectors were held for the first time in 1987.

1. Madrid Seminar on teacher training (26-28 November 1987)

On the basis of the presentation of case studies, the discussions ranged over three topics, namely curricula and the educational sofware used in the training of teachers; training teachers in the use of NIT in the classroom; policies for training teachers in the NIT. A working party was set up for each of these topics. The first considered the changes necessary in the content of teacher training courses to enable them to use the NIT as a teaching aid.

The second working party tackled the problem of the relationship between the training of teachers in the NIT(particularly the evaluation of software) and the practical use of these new aids in class.

The third working party dealt with policies for training teachers in the NIT, concentrating on practical training in the use of the materials in the various classes, the assistance to be given teachers and the back-up to be provided regarding the use of materials in practice and as a teaching aid.

2. Seminar in Soest (Düsseldorf) on the use of word processors in class (December 1987).

e) Study visits

Within the scope of the general education programme, a study visit and exchange programme has been organized with the "Pädagogischen Austausch-Dienst" (PAD) of the Permanent Conference of Ministers of Culture of the Länder of the German Federal Republic. One of the aims of these visits is to create a multiplier effect in so far as the participants are able to relate to other people the fruits of their experiences and their information. This thus creates numerous contacts and a network of relationships For the first time, during the academic year 1984-85, the theme of the NIT was part of this programme; 46 scholarships were granted for study visits to the United Kingdom and FRance. This was a voluntarily limited initial experiment. Since then, the number of scholarships granted has increased and the visits are developing throughout the Member States.

The participants felt that, at European level, NIT could provide the technical support for better cultural communication beyond the national frontiers and linguistic boundaries, thereby encouraging better cooperation between the European citizens of the various Member States.

It clearly emerged that NIT is an excellent subject for study visits in that it:

- is of capital importance in education;
- covers a number of specialized field, such as:
  . equal opportunity;
  . cultural handicaps;
  . the transition between school and work;
  . general education and training;
- calls for joint efforts.

f. Studies relating to the new information technologies in education carried out on behalf of the Commission (Directorate General for Employment, Social Affairs and Education).

1 Education and microprocessing - two European strategies

This covers the UK and France. It was written by Catherine Chrétien and François Michel for the "Agence Nationale pour le développement de l'éducation permanente". It is in two volumes and was printed in Paris in 1982.

The study describes NIT policies in the education systems in the UK and France and summarizes the important aspects of the measures implemented. Volume two contains documentary based on a selection of documents collected during local trips. The important thing is that each of the strategies developed in these two countries is reflected more in the coherence and traditions of their education systems than in the incorporation of NIT.

Another important finding is that the budgetary problems are a worry because current operating budgets do not appear anywhere. At best the outlay on equipment can be traced, but the running costs can never be found with any precision.

2 Information technology in education and vocational training in the European Community

This was produced by the Council for Educational Technology for the United Kingdom. It is in two volumes and came out in 1982.

The study starts with an analytical description of the provisions introduced to foster exchanges of information of NIT in education and training at national level (see volume II) and Community level (Eurydice, Cedefop, Diane-Euronet) and at international level (Council of Europe, EIB, OECD).

The authors clearly state that none of the countries studied yet have a precise, exhaustive system of data collection.

They then go on to deal with the exchange of computer packages within each Member State and between the Member States.

An action programme and 20 or so recommendations have been sent to the Commission with a view to accelerating exchange on NIT.

3 New Information Technology and its impact on the science curricula in secondary schools in the United Kingdom

This was produced by Dundee College of Education in 1983.

The study starts with a description of the educational systems in the UK and then analyses a number of subjects on the basis of a questionnaire which 30% of the sample answered and which represents 10% of all schools in the UK.

The subjects focus on:

(a) changes in the curriculum and course content;

(b) the role of the computer in the classroom (simulation, experimentation, networks);

(c) basic and continuing training for teachers;

(d) remote software (telex texts, videotexts).

Various conclusions and recommendations complete the study.

4 The effect of data processing on scientific subjects in secondary schools in France

This was produced by the Institut national de recherche pédagogique in 1983.

This was undertaken at the same time as the Dundee College study. It deals with the effect information technology has on natural science, physical science and mathematics.

It emerges from the study that, in spite of considerable efforts, computers are not yet in ordinary use because most teachers are only beginning to discover NIT. This has nothing to do with the technical possibilities of the field or its educational potential.

The study ends with various prospects and a number of suggestions about avenues to explore in the field of adult education, equipment and software.

5. Higher education, industry and new information technology

This was written by Ladislav Servych for the Institut européen d'éducation et de politique sociale. It is in two volumes and came out in 1984.

The study quotes examples from France, the Netherlands, Germany and the UK. The analysis is along three lines:

(a) the extent and nature of high level NIT training requirements and collaboration between higher education and industry;

(b) the weaknesses and drawbacks of European systems of higher education - the considerable shortage of equipment and software, the blatant inadequacy of qualified staff and the isolation and inadequacy of research;

(c) permanent education and, most importantly, exchanges between higher education and industry - the two principal strategies for the vital development of NIT training.

Lastly, the study makes proposals for practical action at Community level.

Volume two deals with three particular aspects of the question - unlike the commonest methods, these studies do not look at the situation or trends prevailing in any given system (national case studies). The aim in this case is to make a more advanced and therefore more technical investigation of the effect of NIT on training in the two "most exposed" areas - engineering (annex I) and management (annex II). The third study, which is even more specialized, deals with the course in computer engineering offered by the TEchnological University of Compiegne in France (annex III).

6 Teaching and training the handicapped through the new information technology

This is by Jorgen Hansen. It was produced by the Official Publications Office of the European Communities in 1984.

The idea here is to give an overall view of teaching and training for the handicapped through NIT. It refers to certain schemes run in Belgium, Denmark and the UK. The author has the originality of providing a working definition of "handicapped", which is a long way from cerebral, motor and sensorial inadequacies.

He highlights the common handicap - a barrier to communication between the subject and his environment and vice versa. NIT is of major interest here as a means of communication, in particular via the voice, touch, reading, sound etc.

It is also envisaged as a means of vocational training.

National and international proposals on NIT in special education point the way to further developments in this field.

7. Evaluation of educational software in European Community Member Countries (project A116) Eurydice network and Ronald Pirson - C.E.T. (Brussels)

The various Member States have adopted very different policies with regard to the new information technology (NIT), generally speaking, and more especially to its application to education, and have implemented these not very concomitantly and at very different speeds.

An initial inquiry has been carried out in cooperation with all the Eurydice centres, covering the educational software evaluation procedures.

The inquiry gathered a certain amount of information which constitutes an initial transnational image on the subject. This initial synthesis was covered by Newsletter No. 2 from the Eurydice network, which will be circulated in 1988 (cf. point h.below).

8. Inventory of computers in European Community Member State schools (Project A126)
Eurydice network and Ronald Pirson - C.E.T. (Brussels)

The object of this inquiry has been defined as an attempt to identify the present situation and the main trends regarding computers used in Community Member State schools. It is in fact important to try to get this matter right, as the need for uniformity and standardization is becoming more and more urgent every day. This inquiry was also carried out in cooperation with the Eurydice Centres.

Major trends, in particular the trend of heterogeneity of information technology equipment but also a certain standardization of purchasing policies and operating systems, have been found by the inquiry, the results of which have been summarized in Newsletter No. 1 from the Eurydice network which will be circulated in 1988 (cf.point h below

As well as this information of general interest, which constitutes good information base, the inquiry shows the need to be able to have in the medium term a set of investigating tools permitting the production of better and more in-depth results.

9. The handbooks

In order to back the efforts of teachers in the introduction of NIT into schools, the Commission have asked for the publication of three accompanying handbooks inspired by school practice in the Community:

1. The first, produced by J.B. Ewing and Mr. W. Robotson (Dundee College of Education - Scotland), covers the integration of NIT in secondary schools, in human sciences; it deals with the means of use of databases, simulations and interactive video.

2. The second published by H. Blansdorf (Kiel University) is applicable to the specific sciences and explains, backed by examples, the use of the NIT in the areas of chemistry, biology and physics.

3. The third, the result of a cooperative study (French-speaking Belgium, France, United Kingdom) is being published. It deals more especially with examples of use of NIT in primary schools, presentation of the development of integration of NIT into the school classes observed.

g) Subsidies

Subsidies have been granted for projects having a European dimension and responding to the centres of interest of the work programme.

In 1987, several symposia benefited from the Commission's support; in particular a symposium which was held in Paris and was organized by the University of Lancaster had the object of creating a data bank containing the basic information necessary for setting up a European network of researchers specializing in NIT and education.

h) Products

Various products were prepared in 1987.

Teachers' handbooks on the incorporation of NIT in the human sciences were prepared by British and German teams. These handbooks will be translated into the languages of those Member States whishing to distribute them. The same applies to the handbook on the use of computers in primary schools (completed in June 1988).

A brochure has been prepared by the European Eurydice Unit; this brochure gives a description of the centres of the Euryclee network and has been translated into all languages. It will be distributed in 1988.

The conclusions reached at European meetings are summarized in various Commission publications, such as Social Europe (wide circulation revieuw), Eurydice News (produced by the European Eurydice Unit on behalf of the Commission) and the Newsletters (see below).

Any interested party may obtain more detailed reports from the Commission.

- Information notes called Newsletters are produced by the National Council for Educational Technology on behalf of the Commission. These Newsletters are sent to the Euryclee network which distributes them. They consist of information files on the role of the NIT in schools and give information on European meetings. For exemple, the conclusions of these studies (see f.7 and 8 above) on the evaluation of educational software in the Member States and on the inventory of computers in Member States' schools are summarized in the first two Newsletters.

ANNEX I

## COMMUNITY ACTION

| Year | Period | Type of activity | Place | Topic |
|---|---|---|---|---|
| 1983 | 7-9.12 | Symposium | Marseilles | Teaching computer studies |
| 1984 | 3-06.6<br>3-13.7 | Symposium<br>Summer school | Newcastle<br>Nice | NIT -Teaching applied computer languages and their use in education |
| 1985 | 7-10.5 | Symposium | Bologna | NIT and further teacher training |
| | 4-08.11 | Symposium | Berlin | NIT in technical and vocational education |
| | 4-13.7 | Summer school | Liège | introduction of NIT in primary school |
| | 11.2 | Study visits | France, UK | |
| | 10-11.10 | Youth week | Turin | NIT and new industries |
| 1986 | 26-28.5 | Symposium | Enschede | development of educa. software |
| | 8-15.7 | Summer school | Ghent | analysis, methods and evaluation of the educational process when introducing course-ware in school. |
| | 4-13.7 | Youth week | France, Brittany, Normandy, Loire, Rhone, Alps Provence, Cote d'Azur | |

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| 1987 | 23-24/6 | Seminar | Paris | Creation of a network of researchers |
| | 4-12/7 | 'Youth' week | U.K. | |
| | 7-14/7 | Summer school | Glasgow | Software design and production |
| | 22-28/9 | Summer school | Liège | NIT and primary schools: difficulties in introducing NIT |
| | 25-31/10 | Summer school | Tübingen | Artificial intelligence: intelligent tutor systems |
| | 25-29/11 | Seminar | Madrid | Implication of software in teacher training |
| | 2-4/12 | Seminar | Düsseldorf | Word-processing in the classroom |
| | 8-12/12 | Symposium | Coimbra | Evaluation and circulation of NIT in education |

ANNEX. II

## ACTIVITIES UNDERTAKEN FROM 1985 TO 1987 TO IMPLEMENT THE RESOLUTION

At community level, and with a view to supplementing and supporting the action of the Member states, the initiatives listed below will be implemented between now and 31st December 1987.

1. Organization of a series of meetings, seminars and symposia, aimed at discussing the experiences of the Member States with regard to the introduction of the new information technologies into school programmes, in particular on the following points:

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| i. suitable targets and methods of making pupils familiar with the new information technology and its effects; | Symposia (decisive) in Marseilles (December 1983), Newcastle (July 1984),Portugal (December 1987). |
| ii. the possibility of applying the new information technology in the various teaching subjects and the possible consequences on the organization of education; | Symposia (decisive) in Bologna (May 1985), Enschede (May 86); summer schools (researchers/ teachers)in Nice (July 1984), Liège (July 1985), GHENT (July 1986), Liège (case studies - secondary school, July 1987), GLasgow (production of European software - July 1987), Tübingen (the contribution of artificial intelligence to education (October 1987); seminary (teachers) in Madrid (November 1987 - NIT and teacher training), Düsseldorf (use of word processing in the classroom - December 1987). |
| iii the potential contribution of the new technology to the education of children with special needs; | a) Study being carried out into the contribution of word-processing and word synthesizers in learning to read and write (within the framework of the |

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| | | prevention of illiteracy) |
| | b) | Activities carried out by the handicaps office - Seminar at Hoensbroek - Netherlands (1986) (on the handicapped and NIT, including children); studies on this subject. |
| iv) | strategies leading to a greater participation of girls in school and teaching activities affected by the new information technologies; | Research - action on equal opportunities and NIT (preparatory phase completed; operational phase under way during academic year 87-88). |
| v) | Relationships between school teaching, vocational training and other more advanced training in view of the task consisting of favouring familiarization with the new information technologies and mastering them. | Berlin Seminar on technical teaching and FP (1985). |
| 2. The organization of a visit and exchange programme intended primarily for teacher trainers in order to enlarge their practical and professional experience; | | General study visits programme |
| 3. The execution of comparative analyses with a view to increasing the transferability of software and courseware and to appreciate better the educational value of the various systems; | | Cooperative projects under way aimed at producing the European software (2 software awaited: mother tongue; foreign language); Glasgow U.E. referred to above. |
| 4. Setting up an process of exchanging information and data from experience taking account of the use made so far of the Eurydice network. | | Eurydice; created 1986; exchanges within the network operating by electronic mail; brochure produced by Eurydice will be available in December. |
| The Education Committee will follow up the execution of the programme on the basis of work progress reports which will be submitted to it regularly by the Commission. By 30th June 1988 it will draw up an overall report on the results of the initiatives taken at Community level in the Member States | | An initial interim report was adopted by the Council in November 1986; the final report is being prepared. |

ANNEX III

WORK PROGRAMME 1986-1987, adopted by the Council in November 1986.

1. This programme of activities is to complete the Work Programme for 1985-1987 (COM(84) 722 final) which implements the Council Resolution of 19.9.1983.

2. One outcome of the activities should be recommendations for a work programme for 1988 to 1991. The approach outlined here for the next eighteen months leads directly to their selection.

Activities for 1986-1987

3. Consolidation of existing achievements and the flow of information

- The responsible national officials will continue to meet regularly in Brussels to maintain the flow of information exchanges at national and Community level, coordinate Community action and advise the Commission departments on the progress of and follow up to this action.

- The heads of the centres in the EURYCLEE network will meet regularly to define the harmonized products which the network will supply. A brochure presenting the centres in the network will be published in the course of 1986 with the technical assistance of the EURYDICE European Unit. A list identifying the most important innovators in the field of NITs and education will be compiled and regularly updated. The network will also provide a regularly updated list of national conferences, seminars and exhibitions taking place. The possibility of introducing an electronic mail system to speed up exchanges and strengthen cooperation between centres will be examined. Finally, national reports on the introduction of NITs in education will be regularly updated by the centres.

- Increasing exchanges and cooperation with international organizations.

- Exchanges of information between teacher trainers.

4. Theme for 1986-1987

The topic stimulating most interest in Member States at present is software development, and this will be the theme for the work during the next eighteen months. As

it was the topic of the Netherlands seminar and the Summer University in Gent, it has been launched from a generally accepted background. Software development should be approached, not as the production of a number of independent items, but with full integration into the curriculum being taken into account. Other themes to follow include software dissemination, communication and the impact on primary schools. It is not envisaged that any theme will be exhausted within its particular time-span, but that initiatives will have been started that can be continued both through this Programme and other support.

5. The activities and projects will be associated with this theme, approached from the four points of view identified in the 'Work Programme'.

- A. the introduction of NITs in teaching practices and curricula,

- B. training of teachers and teacher training,

- C. software, courseware and equipment systems,

- D. the economic aspects.

In addition, implementation involves activities and measures by governments of Member States to ensure that the introduction of NITs is realized on a broader scale in education.

6. Criteria

The criteria behind the identification and practice of the activities should include the following:

- the activity should involve a minimum of three Member States

- adopted the activity should lead towards further and widespread collaborative work between the Member States

- the work within the activity should benefit from added value derived from the European dimension

- the outcomes should be formative and helpful throughout Europe

- the activities should relate to and involve practitioners as far as possible.

7. Each activity should be followed up and developed as far as practicable. Any lessons learned should be disseminated with as much publicity as appropriate in each Member State. The EURYCLEE network will assist in

this, and in interlinking the projects with each other.

8. Areas of Work

To promote the theme of software development, work will take place in the following areas:

a) Preparing the ground

- taking into account the need to exchange software and to foster joint development between countries, a report, involving evidence from all Member States, will be prepared describing the level of cooperation that is practical between the states and identification of the problems to be overcome.

- a model will be developed to foster the exchange of experience concerning the development and application of computer based teaching materials. This will take into account the relevant cultural similarities and common perspectives between Member States. Particular attention will be paid to the promotion of greater equality of educational opportunity for girls.

b) Collaborative development

To further stimulate cooperative activity, three types of software development projects will be promoted:

- two projects will take place, each involving three or four Member States, which will involve collaborative development of software. Each group of Member States will work together to develop materials, taking account of their integration into the curriculum and classroom practice.

- the Community will call together seminars to prepare specifications and outline programmes through the following strategy. Each Member State will provide a team of four, a teacher trainer, curriculum developer, charismatic teacher and administrator, and these will meet together in two seminars of six countries each to debate and prepare packages in outline. The target will be carefully specified beforehand by the Commission, and it is hoped that each Member State will encourage final production of the items identified. During the seminars, probably of

five days duration, the exchanges of working practice procedures will encourage wider understanding and help to stimulate greater breadth of approach.

- a seminar for individuals from each Member State will be held to develop ideas into draft programmes, including the use of tools, in a collaborative atmosphere. These can be further developed in the home state. The aim here is to spread general skills among those who are relatively new to programme development.

Topics for development will be agreed with each project, but attention should be paid to software for children with special needs, and also to that aimed at ensuring equality of educational opportunity for girls.

In all these activities, one of the outcomes will be the identification of problems that inhibit exchange of programmes between Member States and collaborative development, and the Commission will prepare a document outlining these issues on completion of these projects and seminars.

c) The needs of teacher trainers

A three-day seminar will be held to examine the teacher training requirements associated with computer software. This will be carefully targeted on teachers and teacher trainers, relating to specific and typical materials from each Member State, and producing a report identifying a range of particular approaches and tactics adopted, and their characteristics. The final outcome will be a document providing specific recommendations for software developers.

d) Sharing classroom experience

- two seminars for teachers will be held to explore different ways in which software is used. The objective will be to share experiences, identify needs for the software and identify means of encouraging further exchanges between teachers in Member States. The two topics will be the use of word-processing with 13 and 14 year olds in non-vocational lessons, and the use of databases in science teaching with children of similar ages. In each seminar, each Member State will be asked to send three teachers, preferably those who can act as multipliers within their own countries. Member States

may like to provide videos of the teachers at work to illuminate the presentations. The Commission will provide a report on the seminars.

- the current experience of primary teachers in using software will be the subject of an investigation in Member States. Particular attention will be paid to the identification of common problems.

- two reports will be prepared, each identifying interesting experiences and practice in the use of software in the classroom. One will concentrate on Science, the other on Human Sciences.

e) Visits

- the exchange study visits during this period will be for software developers, and be aimed at visits to sites where development is taking place to explore procedures, tactics and strategies.

- three tours by young people will take place, helping them to share experiences and identify the use of information technology in each others education.

f) Technical problems

- one major issue inhibiting exchange and collaboration is the translation problem, encompassing both computer and national languages. This will be approached in the following way:

- a forum of experts, one from each Member State, will meet to identify the computer language and operating system issues. A feature of the outcome of this forum will be the costs involved in adopting a range of strategies. Attention will be paid to problems of portability and distribution of software.

- a selection of six programmes, not generic or content free, will be identified by the Commission in consultation with the Member State, and a number of countries will be invited to translate them for use in their own schools. A very careful analysis of the procedures, strategies and costs will be undertaken, the final report from the exercise providing guidelines and

recommendations for future activities.

g) Evaluation of software

The Commission will collect evidence from each Member State on the different approaches and criteria adopted for software evaluation. These will be collated and a possible Community approach will be prepared for appraisal by each Member State.

h) Follow-up

During and after each of the activities and projects outlined above, the Commission will support such follow-up work and meetings as are necessary to draw out the practical benefits for further tasks and for the information of Member States.

i) Presentation of reports

At the end of 1987, a seminar for decision makers, experts and practitioners will be held to receive the reports of all the projects outlined above. These will be accompanied by a very specific list of recommendations which Member States will be invited to agree and implement in their own countries.

9. Forecasting the Future

The Commission will arrange for an occasional exchange of views between national experts on future technical and educational developments and their impact on education in schools. Papers from these exchanges will be provided to Member States to illuminate their decision making.

10. Other EEC activities

The Commission will prepare papers outlining the implications of other EEC initiatives that relate to or have a bearing on this Work Programme. Personal reports will continue to be made at the biennial meetings of those with national responsibility.

ANNEX IV

COMMISSION
DES
COMMUNAUTES EUROPEENNES

DIRECTION GENERALE
DE L'EMPLOI, DES AFFAIRES SOCIALES
ET DE L'EDUCATION

Bruxelles, le 28 Juin 1988

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ANNEX V

COMMISSION
DES
COMMUNAUTES EUROPEENNES

DIRECTION GENERALE
DE L'EMPLOI, DES AFFAIRES SOCIALES

Bruxelles, le 28 juin 1988
ML/cb

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