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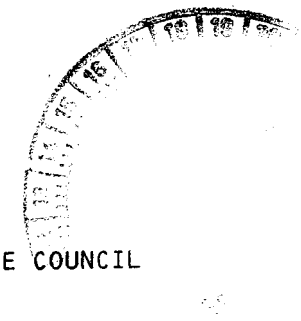

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL

NEW INFORMATION TECHNOLOGIES AND THE SCHOOL SYSTEMS

IN THE EUROPEAN COMMUNITY

Work Programme for the period 1985 - 1987

(Implementation of the action programme set out in the Resolution adopted by the Council and Ministers of Education meeting within the Council on 19.9.1983 and confirmed by its Conclusions on 4.6.1984)

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I. INTRODUCTION

1. On 19.9.1983, the Council and Ministers of Education meeting within the Council adopted a Resolution incorporating a series of measures relating to the introduction of new information technologies (NITs) in education (OJ N° C256, 24.9.1983). This Resolution was and continues to be the basis for a series of measures at Community level aimed at supplementing and supporting action taken by the different Member States.

2. On June 4th 1984, the Council and Ministers of Education meeting within the Council adopted a number of additional conclusions derived from the Commission's communication concerning technological change and social adjustment (COM(85)6 final).

3. The measures to be taken in the educational field represent only one element in the overall Community strategy designed to develop the human resources necessary to meet the challenges posed by the modernisation of industry. In particular, they are complementary to the measures which are being taken at Community level with regard to vocational training and new technologies (1) and with a view to strengthening cooperation between industry and universities insofar as advanced training is concerned - an area in which the Commission has been invited to put forward detailed proposals for actions (2). These three facets - education, vocational training and Industry/University cooperation - together with Community intervention in some specific sectors, such as the contribution of new technologies to the social and economic integration of the handicapped (3), constitute the necessary complement to Community action in the field of industrial policy, innovation and R & D (4). They should not only reinforce the competitiveness of industry but also ensure that these technologies play a supportive and not a dominant role in society,

(1) OJ N° C 166, 25.6.1983
(2) COM(83)6 final and V/1523/84-F/EN
(3) OJ N° C 347, 31.12.1981
(4) More specifically, the European strategic programme for research and development in information technologies (ESPRIT), OJ N° L 81, 27.3.1984 and the multiannual programme in the field of data processing, OJ N° L 126, 12.5.1984.

as underlined in the Council's conclusions on a medium-term Community social action programme (1).

4. The outline work programme has been fully discussed in the Education Committee at its meeting on 21 September 1984, and its contents have been warmly welcomed by the competent education authorities of all Member States as the basis for future effort.

II. MAJOR AREAS FOR COMMUNITY ACTION

5. In accordance with the terms of the Resolution, it is envisaged that Community action be concentrated on the following key areas :

(i) the incorporation of the NITs in teaching practices and school curricula (Area "A") ;

(ii) the training of teachers and those who train teachers (Area "B") ;

(iii) software, courseware and hardware systems (Area "C").

Given the speed with which the role of the NITs in the educational system is expanding, a fourth area of action has been added to the three outlined above, namely :

(iv) economic implications of the introduction of the NITs in education development strategies (Area "D").

A brief presentation of the main issues relevant to each of these areas is given below together with the corresponding actions at Community level that will be undertaken within the framework of this work programme. Advanced training in information, such as the courses supported by the Commission, should be reinforced. Proposals to that effect will be presented shortly.

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(1) OJ N° C 175, 4.7.1984.

A. Area 1 : incorporation of the NITs in teaching practices and school curricula

6. As has already been made clear in a previous Commission service working paper presented to the Education Committee in September 1983 (V/1258/83), this topic of common interest has several dimensions, specific actions are proposed for each of them.

Topic (i) What should be the content of a data-processing familiarization course for young people ?

Above and beyond general statements of principle, we must specify the guidelines for and the contents of this familiarization. What kind of teaching are we talking about ? Should it be made a compulsory or optional subjet ? At what levels, with what content and for which pupils ? Should we or should we not limit this familiarization to the mastery of certain technical skills - at programming level, for example - and, if so, how is this familiarization to be dovetailed into a course of study leading sooner or later to vocational training and employment ? Is it likewise necessary, or indeed preferable, to stress "social mastery" of these technologies, i.e. to incorporate in computer studies the socio-cultural dimensions relating to the impact of these technologies on our society ? These dimensions, as hardly needs to be said, are not mutually exclusive : technical knowhow and technological culture are not necessarily mutually antagonistic. Familiarization with computers should not lead to a precocious and artificial specialization (i.e. the training of "mini-programmers") or be limited to a superficial manipulation of concepts (algorithms) and equipment (microcomputers) without relation to their educational implications.

ACTION A.1. In early 1984, the Commission called on CIRCES (Italy) to carry out a study taking stock of the

approaches of several Member States to the teaching of computer studies in secondary schools. The first findings of this study should be available at the beginning of 1985, when they will be examined by the steering group of senior national officials with a view to later actions such as workshops or seminars.*

Topic (ii) How are the NITs - and above all computers - to be incorporated into an already overloaded timetable ?

Unless we decide to regard the NITs merely as a teaching aid regardless of content (i.e. computer-assisted teaching, for example) or as a specialized and autonomous development of a particular discipline (mathematics), they must be seen as opportunities for and means of enriching teaching practices throughout the curriculum. In other words, if the NITs are used in an ever-wider range of productive activities (not only in the scientific and technical field e.g. engineering, financial management, scientific research, etc. - but also in such diverse fields as the health and social services and the human sciences), is it not vital to identify the role and the place of the NITs in the various subjects ? The basic hypothesis underlying this approach is that technical knowhow and technological culture are not antagonistic in the sense that the former - being related to identifiable industrial requirements - has priority, while the latter - being more general - is of secondary importance. It is necessary to pursue an interdisciplinary approach - which, indeed, only confirms the trans-sectoral character of the NITs.

ACTION A.2. A study was carried out in 1982-83 for the Commission on the impact of the NITs on the teaching of scientific subjects at secondary level. The final report on this study carried out jointly by the INRP (France) and

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* See para. 13 below insofar as this group is concerned.

Dundee College of Education (United Kingdom) will be available shortly. By the same token, the seminar held in Newcastle (United Kingdom) in July 1984 made possible further exploration of the place of the NITs in various subjects. With a view to a better definition of the potential, constraints and possible limits of the use of the NITs - and also to point out examples of good practice - it is proposed to produce handbooks analysing and describing, with the help of specific examples, opportunities for using the NITs in the following fields : mathematics, science, human sciences (history, geography, economics), languages and technology at secondary level. It would no doubt be desirable to produce a similar document on primary education, since use of the NITs is beginning to spread rapidly at the level of education as well. These actions would be launched as from the beginning of 1985 and should continue for a maximum of two years (1987). The results of this exercise might provide the main topic for one of the seminars to be held in 1986. This seminar would provide an opportunity to take stock of the potential effects of introducing the NITs into education in terms of organization and teaching practices (§ 6 (iii) above) - a subtopic which could be prepared for by a study launched by the Commission in 1985 and whose findings should be available in the first half of 1986.

Topic (iii) <u>The potential consequences of introducing the NITs into education in terms of organization and teaching practices</u>

Microprocessors (but also other information and communication equipment linked to the new technologies : videotext, interactive videodisk, satellite, cable, etc.) are becoming increasingly common to the education market.

In the very near future the stage will have been reached where each school has not one or two micro-processors but a full complement of hardware and software (for example, computer rooms, simulation facilities and internal and external data bases giving access to programme libraries). This will mean a reorganization of teaching practices with regard to all the pupils and, more generally to the establishment as a whole - in terms both of time and of space -, and a decision on who is to have access to what, when and how and in what context in terms of equipment, structures and resources.

ACTION A.3. An initial collaboration in this field was undertaken with the OECD in 1983-84 on the topic of teacher training and the consequences on educational organization of introducing the NITs. This produced a number of working papers (CERI/NT/84.08, 09,10) which were presented at the CERI/OECD Conference in July 1984 and which show that this is a dimension, whose importance will continue to grow in line with technological developments. As a follow-up to these initial endeavours, it is proposed to embark upon case studies of education establishments which use of multimedia systems (these will be chosen in cooperation with the Member States). This should make it possible to identify the changes in the roles and the teaching practices of those involved in the teaching process. The conclusions of this exercise will be made available to the ad hoc working party and could serve as subject matter for exchanges and visits.

Topic (iv) The spread of the NITs in the education system and efforts to open up schools to their local environment

One of the most striking facts about the NITs is the way they are spreading throughout society - from production to the consumption of goods and services. Above and beyond their industrial and commercial applications - robotics, office automation, production line automation, computerized banking services - the NITs are being used in the home

for education, entertainment, information, household management and so on. An educational establishment is not isolated from its environment and it is not surprising if the motivation for incorporating the NITs in educational facilities frequently comes from outside, particularly where it is a question of integrated multimedia operations of an educational nature involving several partners in the local environment.

ACTION A.4. The action to be conducted on this sub-topic will be tied in with the action suggested above (A.3.) relating to changes in teaching roles and strategies.

A second area of observation could be provided by some of the pilot projects under the second transition programme - emphasis being placed on the contribution made by the local environment to the teaching process - particularly with regard to those young people who, because of their poor performance during their statutory schooling, have major problems with their social and occupational integration.

Topic (v) The NITs and the learning process

One of the arguments put forward by those who would like to introduce the NITs into primary education is that their use, particularly if use is made of high-level languages (LOGO, PROLOG, ect.), is likely to foster heuristic learning processes - a vital complement to more traditional teaching approaches. In other words, the NITs would make it easier to master such fundamental concepts as form, time, space, numbers, etc. This is not the place to embark on an in-depth discussion of this argument, but the very fact that the NITs are capable of enhancing individual learning capacities is a dimension which must be explored.

ACTION A.5. It is proposed that the Commission give its support to a number of research projects by university teams on this topic - either in the form of one or more studies or as part of a cooperative research programme drawing on the findings of the FAST I programme. These cooperative endeavours could also be the subject of a summer school bringing together the researchers in question.

Topic (vi) Search for and reinforcement of greater equality of opportunity regarding the participation of girls in school and educational activities affected by the NITs.

ACTION A.6. As is pointed out in the aforementioned note from the Commission to the members of the Education Committee (V/1258/83 - 115 en - § 9 - iv) the question of the participation of girls in school and educational activities affected by the NITs has not as yet been widely explored - at least at Community level. In view of the discussions which the Education committee will have in the second half of 1984 on equality of opportunity for girls, it is proposed to examine the possibility of supporting experiments and actions aimed at increasing opportunities for girls to gain access to teaching related to the NITs, in particular through the training of teachers. This action will be implemented in cooperation with the Advisory Committee on equality of opportunity.

Topic (vii) The contribution of NITs to the improvement of the education of handicapped children

This topic is referred to explicitly in the Council

Resolution and has already been the subject of a comparative study carried out for the Commission with the help of the Danish Ministry of Education (1982 - 83). The results of this study, which are now available, show the advantages which the NITs can provide for such children. The work to be done in this area comes under the Community action programme deriving from the Resolution on the social integration of handicapped persons adopted in December 1981 (OJ N° C 347, 31 December 1981) and the implementation of the conclusions adopted by the Council and the Ministers for Education meeting within the Council on 4 June 1984. The Commission supported the holding of a major conference on the education of handicapped persons and the NITs (United Kingdom, 1983). The Commission has also set up a computerized information system at Community level relating to handicapped persons (HANDYNET), and concerning in particular the technical characteristics of equipment, including those involving the NITs.

ACTION A.7. As part of this operation and in the spirit of the Communication from the Commission to the Council, a study will be launched in 1985 which should result in the production of a technical-educational manual on NIT equipment suitable for facilitating the education of handicapped children (deaf and blind especially). In this connection - and provided a Member State so wishes - one of the seminars scheduled for the 1984 - 1987 programme could be devoted, in 1986, to this subtopic of the Community which, given

the scale of demand and the restricted nature of national markets, could emerge a cooperative research and development programme with industry, culminating in the production of prototypes within the internal market. An initial meeting on this subject is scheduled to be held in Manchester (United Kingdom) in June 1985.

B. Area 2 : The training of teachers and those who train teachers

7. The importance of this area, which cannot be isolated from the preceding area, needs no stressing. Technical, social and cultural mastery of the new technologies and their introduction into education mean that teachers must be made aware of - if not trained in - these technologies, notably in relation to their subjets and the courses they teach. It is not simply a matter of acquainting teachers with the technical aspects of using microprocessors and other new media in teaching, but of boosting their teaching and methodological skills.

Topic (i) What are the needs and the methods of training teachers in the NITs ?

This question is not only of a quantitative nature, it also entails a qualitative approach. In other words, it is necessary not only to specify the possible guidelines and contents of a course of teacher training - which must necessarily accomodate the varying occupational profiles of the teachers and the aims assigned to the introduction of the NITs into the teaching process - but also the practical arrangements for training, which should cover not only initial training but also in-service training (the part to be played by the universities, the private sector, in particular the NITs industry, the length of training, etc.)

ACTION B.1. The needs and constraints of teacher training

It is appropriate to point out at this point that the central topic of the seminar scheduled to be held in Italy (May 7 - 10, 1985) will be the training of teachers in the NITs. The conclusions of this seminar must be used to improve identification of the constraints for initial and in-service training, and proposals for complementary actions at Community level will be put before the ad hoc working party in the wake of this seminar (1).

Topic (ii) Study visits and exchanges

As was stressed in the aforementioned note from the Commission to the Education Committee (V/1258/83 - 115 en, § 11), which is quoted here, changing it slightly to take account of the experience gained in the meantime :

The kernel of this activity will be the organization of a programme of exchanges and study visits aimed primarily at those who train teachers. On the basis of the experience already gained from other similar programmes organized by the Commission, several preliminary comments must be made :

(i) While the programme is intended primarily for those who train teachers, there is no reason why it should not also extend to other persons who, by reason of their positions and activities, are likewise directly involved in the introduction of the NITs in education and who can play a "multiplier" role in this respect. We are thinking here, bearing in mind the individual characteristics of each Member State's education system, of school inspectors, persons responsible for experiments in introducing the NITs and those responsible for their coordination.

(1) taking also into account the FAST Research Project (TET 3) concerning the future of the teachers.

(ii) If this programme should prove advantageous both for the Community and the Member States, the exchanges should be followed by the sharing and transfer of the experience acquired. In other words, the actions must be well prepared both in advance (i.e. prior information, files, etc.) and afterwards (exploitation of the results by the Member States concerned, drawing up and dissemination of reports, etc.). This preparation means that each Member State will have to step up the operational relationships between the various departments involved in implementing this Community programme, particularly the specialized information centres.

(iii) The exchanges and visits should be arranged on both an individual and collective basis and should cover either general or more specific topics.

(iv) The wish to coordinate this programme not only with the totality of the initiatives undertaken at Community level, but also and above all with the situations obtaining in the Member States makes it necessary to bring these exchanges into line with the priorities set out in the Council Resolution and with the implementation of that Resolution, as spelled out in this work programme.

(v) This programme of exchanges and visits, whatever its intrinsic advantages, makes sense only in relation to a more comprehensive aim : that of establishing common guidelines in respect of the content of training for all teachers and of specifying ways of incorporating this familiarization with the NITs into the more general framework of initial and in-service training of teachers.

(vi) To capitalize on the experience acquired, an intial stocktaking of these exchanges and visits will be made at a symposium to be held at the beginning of 1987 which, following the example of what was done at Pont-à-Mousson in 1983 with regard to the programme for local government officials, will bring together some of those who participated in this programme.

ACTIONS B.2. An action on behalf of "multipliers"

An initial series of exchanges and study visits will be organized for the 1984-1985 school year. In view of the resources available, they will involve only some forty "multipliers" and, on an experimental basis, these initial exchanges and visits will only go to the United Kingdom and France. This programme will be extended progressively to the other Member States thereafter. If this action is to be a success, it is essential to plan these exchanges a year ahead.

B.3. More specialized exchanges

Specific developments relating to the introduction of the NITs in education (in terms of content and/or methods) may inspire a wish on the part of a group of teachers/researchers to enrich their experience by comparing it with similar approaches put into effect in another Member State SSV model). By the same token, a group responsible for a teacher - training scheme in the NITs may wish to examine, along with other groups engaged in similar activities, the possibility of devising concerted approaches (JSP model). The ad hoc working party will look into the possibility of individualizing the programme of exchanges and study visits described above (B.1.) with a view to taking account of these more specific requirements.

C. Area 3 : Software, courseware and hardware systems

8. Four sub-areas are to be considered in this context under the Resolution adopted by the Council and the Ministers for Education meeting within the Council on 19 September 1983, it being understood that the activities in this general area must be brought into line with what is being done under other Community programmes, in particular ESPRIT, and with endeavours in the field of telecommunications and standardization.

Topic (i) Maximizing the educational functions of interactive languages which are supple and flexible enough for teachers to use the whole potential offered by the NITS in a variety of teaching situations, without mastery of these languages requiring excessively in-depth training for the producers of courseware[2]. At present, the programming language or software most used for introducing people to the use of computers and their applications in teaching is BASIC. However, this computer language, which was put together mainly to facilitate the interactive resolution of scientific calculations, makes an esoteric and stodgy impression on teachers and pupils with no interest in technical and mathematical matters. Other structured languages, such as LISP, PASCAL, COMAL and SMALLTALK, are seldom available on current microprocessors and, what is more,they were not designed for introducing people to the use of computers. On the other hand, a language specially developed for the uses to which computers may be put in educa-

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(1) SEC(84) 796. Commission staff paper : Standardization in information technologies.

(2) Courseware = educational software.

(3) Software : the programmes needed for the functioning of a data processing system.

tion, such as LSE, has a limited audience. Finally, computer languages such as LOGO, which is derived directly from LISP, still come very much under the "artificial intelligence" heading and their increasingly numerous applications as to fundamental learning processes among young children in primary schools does not mean that their use can be recommended for all teaching situations, particularly since they require a highly specific environment.

ACTION C.1. Teaching and interactive languages

A feasibility study was carried out in 1983-1984 by TITN which attempted - with the help of a comparative analysis of the languages devised for computer-assisted education - to discern a common core of teaching functions and a set of instructions relating to the tasks deriving from these functions. The results of this study and the study currently under way to examine the constraints and prospects of the use of LOGO as a means of teaching young children provide a starting point, and efforts in this area should be continued. To this end it is proposed to examine the conditions of application of the languages most commonly used in education. The result of this work and any proposals for action it lead to will be presented to the seminar scheduled to be held in Germany in October 1985. The Commission will also look into the question of whether to provide support for a series of summer schools concerned mainly with computer languages and calling on the experience gained from the summer school staged in Nice in July 1984 in cooperation with the French authorities.

Topic (ii) Improving the quality of courseware

This entails, if not the establishment of standards - which is difficult, perhaps impossible - at least

the identification of criteria enabling future users to judge the quality of courseware they wish to use (quality control). Ability to assess the quality of courseware - which means that it can be analysed and described - is a prerequisite for the exchange of such courseware.

ACTION C.2. The quality of courseware

As a follow-up to the seminar held in Newcastle (UK) in July 1984, it is proposed to call on a group of experts to examine current practice in respect of courseware quality control : criteria used, technical and educational factors, assessment procedures, etc. Their endeavours, which should be completed in the course of 1985, should provide the bases for the possible setting up of "didactheques" (courseware banks) in the Member States, thus facilitating exchanges.

Topic (iii) Facilitating the transferability of software/courseware

The present abundance of languages specially devised for use on microprocessors is due to the fact that each of these languages was devised for a specific machine and, above all, for the processing system used. This means that the transfer of courseware from one installation to another is expensive - all the more so where use is being made of electronic dissemination (telesoftware or electronic mail). Without going into technical details of the various modes of transmission in terms of carriers and network architectures, the ability for pupils and teachers to call up teaching and training courses which have been fed into data banks and are disseminated automatically on request via the networks as required is an asset which should be fully exploited.

ACTION C.3. Information transmission technologies in education

The position of the information transmission technologies in education, interesting as experiments with them have been, can by no means be taken for granted, even though the situation is beginning to develop at a fast pace. Microprocessors are less and less capable of doing without a network which provides access to data banks or programmes, enables them to send information to a pooling centre (teaching follow-up for pupils, progress of programmes, etc.) and, more generally, to initiate remote loading whereby a programme is sought out in a data bank, sent through the network to a local memory and then used - all without having to remain linked to an outside computer. Furthermore, it is essential, in this context, to take account of the forthcoming advent of interactive audiovisual technology, i.e. the whole range of services - including educational services - which a combination of videodiscs, computers and networks will make possible. A study is currently under way (SELESA - 1983-1984) on the subject of the transmission and telecommunication networks as they relate to education and training. It represents no more than an initial step, in that utilization problems relating to the application of information transmission technologies to education are far from being solved, whether these be the development of a modular range of terminals, the internal organization of the networks (hierarchy of data banks) or individualization of the dialogue between the user and the system (which entails the development of programme writing languages making it unnecessary to enter programme details). The magnitude of the stakes involved - not only from the educational but also from the technical and economic viewpoint - and uncertainty about optimum conditions of efficiency for information transmission technologies in education (for example, TELETEL,

SAVANT and SEVIL in France and CEEFAX/ORACLE, PRESTEL and CYCLOPS - Open University in the United Kingdom) make it necessary to launch an experimental Community backup action.

To this end a meeting of experts will be organized in 1985. Its purpose will be to lay the foundations for a work programme on educational information transmission technologies which, with regard to the fundamental questions brought up in the preceding paragraph, will include an analysis of the "protocols" relating to remote loading and support for network operations at either national or Community level (1986-1987). The conclusions which may be drawn from this activity will be presented to the seminar scheduled for September 1987.

Topic (iv) Increasing the suitability of hardware systems for use in education, particularly with a view to the combined use of several media (multi-media systems). In view of the current and foreseeable requirements of the education and training market (to say nothing of the use of microprocessors in the home) designers are tending to rush hardware systems on to the market, although in many cases no attempt has been made to define the technical and ergonomic characteristics and efficiency of such systems in relation to their use in education. This highly topical aspect of the question, which represents the point at which policies in respect of educational equipment and industrial development impinge on each other, is all the more fundamental inasmuch as new equipment or combinations of equipment will be appearing on the market - making an educational approach even more essential.

ACTION C.4. The NITs in education and hardware systems

The document put before the Education Committee in September 1983 (V/1258/83-115) proposed (§ 15) that collaboration be inaugurated between the education authorities and industry at Community level, for example by organizing a series of round-table discussions which would culminate in a symposium at Community level in 1986. The seminar scheduled to be held in October 1985 in Berlin may be regarded as an intermediate stage in implementing this collaboration, which will involve close liaison with the Commission departments responsible for industrial policy and research and development relating to the NITs at Community level, in particular the information and communications technologies task force.[1] One of the medium-term aims of this action could be the launching, in 1986-1987, of a Community level series of projects - with the Commission and industry sharing the costs - relating, for example, to :

- the devising of multi-media work stations combining the microprocessor with other teaching equipment (such as the interactive videodisc);
- the development of peripheral equipment and the corresponding external interfaces capable of enlarging man-machine communication, such as acoustic signal recognition (human voice), the use of touch screens, etc.[2]

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(1) A study was carried out recently for the Commision : "Opportunities for Information Technology-based Advanced Educational Technologies" (May 1984 - Open University).

(2) This action should be brought into line with some topics of the ESPRIT programme's type B projects (OJ L 81, 24 March 1984), particularly subprogrammes 3 (Advanced Information Processing) and 4 (Office Systems), just as Actions C.1. (The educational functions of interactive languages) and C.3. (Information transmission technologies in education) should be brought into line with the ESPRIT 2 subprogrammes (Software technology) and 4.3. (Communication systems).

By the same token, it appears important to examine the ergonomic aspects of the use of microprocessors and their interfaces in education, whether these be visual (dimensions of the screen, degree of resolution, etc.), acoustic (improvement of the sound environment) or, more generally, the arrangement of work stations.

To this end, it is proposed to embark on a comparative functional analysis in 1985 of educational equipment, combining human and technical factors in the light of teaching requirements, which will entail an initial inventory of equipment used in education.

This analysis should make it possible to draw up the specifications for a research and development programme in this field. An initial stocktaking of endeavours in this area could be presented to the seminar scheduled to be held in Berlin in October 1985.

D. Area 4 : Economic implications of the introduction of the NITs in education and development strategies

9. Above and beyond the technical and educational implications - indeed the problem of human resources (teacher training) - the spread of the NITs in the education system presents a number of economic problems, which themselves have implications in the field of strategy. Even though the cost of equipment is falling (microprocessor prices have declined considerably over the last few years, for similar if not superior performance) there is no getting away from the fact that a general introduction of the NITs represents a considerable investment, particularly if we include operating and maintenance costs.

10. The fact is that we have very little reliable quantitative information on the economic aspects. It is not a matter of providing one microprocessor per educational institution, but of a much larger-scale development. Now that the initial infatuation and enthusiasm have passed, it can be seen that the cost of a general introduction of the NITs throughout the education system is a major problem - at both financial and budgetary level.

11. Taking account of the specific characteristics of different Member States, it is important to identify both the cost parameters and the financing mechanisms set up at the various levels of responsibility. This is a fundamental question for the ad hoc steering group of senior national officials.

12. A study of the costs arising from the introduction of new technologies into schools should take account of two sets of factors :

Topic (i) <u>parameters with a direct cost incidence</u> such as costs entailed by :

- equipping the schools and other educational institutions with micro-computers and other NIT related systems (including depreciation)
- maintenance
- running cost

This analysis should highlight the financial flows (yearly expenditure) as well as the source of the funding (public/private sectors - industrial, commercial or others). This last point is important in so far as the private sector (constructors, consultancy firms, publishers) play an important role in the production and the dissemination of educational software and courseware.

(ii) <u>the cost-effectiveness of introducing new technologies into schools</u>. The idea here, is to measure - or at least to identify - the "value added" resulting from the use of new technologies - i.e. to measure how these technologies modify the <u>productivity</u> of the educational system, if at all.

This is a very difficult issue, even more so in that variables should be taken into account additional to those identified above such as : costs relating to the installation of equipment (including possible building works) and the costs of technical and educational personnel.

ACTION D.1. Economic implications of the NITs in education

An information file (D.1.) will be compiled on the basis of an analytical framework to be defined in a consultation with the Member States (1985). From the end of 1985 onward, further details regarding the direct and indirect cost of the introduction of NITs in education will emerge as the information file takes shape; this will apply in particular to the mechanisms determining the breakdown of these costs.

D.2. Development strategies

Information files will be drawn up containing data on the strategies followed by the Member States for the introduction of NIT in education. Taking account of the specific situation in the individual Member States, particularly with regard the the institutions, the object will be to provide information on the following :

- How are national priorities given effect at a regional level ?
- What is the real contribution of the universities ?
- What policies are followed with regard to the purchase of equipment (national/internal market), etc. ?

The information contained in these D.2. files will be regularly updated, in close cooperation with the Eurydice Central Unit and the network of NIT/Ed specialized centres (para. 16 - 20 below), on the basis of annual surveys of specific aspects, with due regard to the experience acquired in this field by the European Pool of Studies (EPOS) [1].

III. IMPLEMENTATION OF THE WORK PROGRAMME

A. Steering the Community progamme

13. The Education Committee, which has responsibility for coordinating and monitoring the implementation of this action programme, has agreed to set up a group of senior national officials to advise the Commission on the various activities to be undertaken in the four areas identified above.

14. The members of this advisory group - to be appointed shortly by their national authorities - will be officials with a co-ordinating and planning function in relation to the introduction of the NITs in the Member States. It is anticipated that meetings will be held regularly (twice a year) in Brussels. The advisory group's function will be to advise the Commission on the conduct and monitoring of the Community projects which form part of this programme, thereby helping to ensure adequate coordination, both between Community projects and between the latter and parallel initiatives in the individual Member States. As such, it will bring its expertise to bear in support of the coordinated project monitoring and guidance strategy which is essential if the maximum impact of the work undertaken is to be achieved.

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(1) The EPOS network was set up in November 1980 following the findings of the Standing Committee on Employment. It provides interested individuals and institutions with regular information concerning policies in support of technological innovation, significant developments in the field of industrial innovation and their effects on employment, qualifications, training and working conditions.

15. As indicated in Title IV of the Resolution of the Council and the Ministers for Education meeting within the Council, interim reports will be presented at regular intervals - the first in September/October 1985. The advisory group will assist the Commission with the preparation of this document.

B. Gathering and disseminating information

16. The introduction of the NITs in education is a relatively recent, still developing phenomenon. It is an area where a great deal is being done and remains to be done, and one characterized by a flood of initiatives at all levels of the educational system. It is for this reason, no doubt, that the process is accompanied by a similar flood of information, sometimes concerning developments at grass-roots level, sometimes on more widely based research.

It should further be added that there is a genuine demand for information - and one that is made all the more difficult to channel and structure by the multiplicity of initiatives emanating from the private sector (hardware manufacturers, publishers, etc.), from other government departments (industry, telecommunications, etc.) and from non-profit making educational or cultural organizations. Against this background, it is hardly surprising that the various participants in the schools system (public authorities, central government, teachers, heads of establishment, parents, etc.) should face a real problem in identifying the information relevant to the practical choices facing them (e.g. which equipment to choose; how to introduce the Nits into a given course; what to include in a computer studies course; how to train/retrain teachers, etc.). If we are not to sink without trace in a morass of largely outdated inforamtion, it is vital that steps be taken, at Member State level and at Community level, to organize

the production, and above all the circulation, of information in such a way that the emphasis is on information tailored to particular target groups and needs, thereby making a genuine contribution to the introduction of the NITs in education.

17. At Community level, the information network on education policy - Eurydice - established under the Resolution of 9.2.1976 of the Council and Ministers of Education meeting within the Council (1) represents the first step to create an information circulation system for national policy makers. It should be noted that the introduction of the NITs in education was not originally amongst the topics covered by Eurydice, although the pace of developments in this field led to its incorporation in the network's activities as from 1981, both in the context of the question-and-answer system on national policies, operated on behalf of the Commission, and in producing information packages for specific Community meetings at the request of the Commission (e.g. the dossiers prepared for the European seminars held in Marseille in 1983 and Newcastle in 1984).

Mention should also be made of Eurydice's contribution to the production of the paper presented to the Council and the Ministers for Education meeting within the Council in June 1983 (V/890/83), which provided, for the first time, an overview and analysis of developments regarding the introduction of the NITs in the ten Member States.

18. However, the implementation of the strategic programme for 1984-87 outlined above, the need to improve the effectiveness of the action taken at various levels and the multiform, highly specialized nature of the new technologies call for the establishment of a specialized infrastructure for the circulation of information in this field, as an essential counterbalance to the action undertaken by the Member States and at Community level.

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(1) OJ N° C 38 - 19.2.1976

19. It is essential that specialized centres be designated by each Member State with regard to the introduction of the NITs in education. It is expected that in general this will not be a matter of establishing new bodies, but rather of organizing and channelling information through units or departments already occupying a central strategic position with regard to the introduction of the NITs in education in the individual Member States and selected for this purpose by the national authorities. So far as the animation and co-ordination of this network is concerned, it is proposed that the Commission should ensure the necessary technical assistance for these functions by extending the remit of the central unit of the Eurydice network. The Education Committee has indicated its agreement to make these arrangements.

20. The function of this specialized information network will be to back up Community action as presented in this work programme - more especially by ensuring that the proper use is made of the results, and by enabling both the Commission and Member States to enrich and consolidate the various activities planned - e.g. as regards :

(i) the preparation of dossiers for participants in the programme of study visits and exchanges;

(ii) the preparation of information packages for seminars and of papers on the incorporation of the NITs in subject curricula;

(iii) the coordination of research activities.

The various units or centres constituting the network would be involved in the work of the advisory group referred to above (paragraph 13). To this end, it is envisaged that the heads of these units or centres would attend one of the two meetings of the advisory group of senior national officials to be held by the Commission each year.

IV. COOPERATION WITH INTERNATIONAL ORGANIZATIONS

21. Whatever the institutional, logistic, or operational details of Community action concerning the introduction of NIT in education may be, it can only benefit from close cooperation with international and intergovernmental organizations active in this field. The most important of these are the OECD (in particular the CERI), the Council of Europe, UNESCO, the IBI (International Bureau of Informatics) and, possibly, the Nordic Council.

22. In addition to participating in various actions undertaken by one or other of these organizations[1] and regular exchanges of information, one could ask whether a more active form of cooperation would not be possible in those areas where it would enhance the Community's efforts by avoiding unnecessary duplication. A first step in this direction was taken with CERI, which, with help from the Commission, has developed a number of activities in two specific fields[2] which also benefit from information supplied by non-Member States.

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(1) Four of these organizations have, for instance, sent observers to the first orientation seminar at Marseille. Likewise, the Commission took part in the conference recently organized by CERI in Paris (9 - 12 July 1984).

(2) Activities 3 : changes in curricula and institutional structures - CERI/NT/84.09 and 5 (D.1.) : new functions of teachers and implications in terms of qualifications - CERI/NT/84/08.

23. A study should be made of the ways and means of this cooperation, taking account of the available resources and the need to avoid spreading these too thinly[1]. The Commission's departments will consult with the above-mentioned organization on these matters; the present working programme could serve as a basis for these consultations. The results could then be submitted at the appropriate time to the Education Committee. Observers from these organizations might also be invited to take part in the meetings of the ad hoc steering committee on a regular basis.

24. The work programme presented above overlaps to a large extent with the work undertaken within the Working Group "Technology, Growth, Employment" set up as a result of the Economic Summit which took place in Versailles in 1982 - and more especially with the activities undertaken under "ANTEM" (New Technologies Applied to Education, Vocational Training and Culture). It will therefore be necessary to ensure better coordination between the Commission's Work Programme and these activities, in relation to which the Commission has played until now the role of an observer.

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(1) Active cooperation at project level is possible, under certain conditions, as is shown by the joint Commission/OECD programme within the framework of the Local Employment Initiatives project.