INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

IN

SPECIAL NEEDS EDUCATION (SNE)

This report is an executive summary of the information from the information and communication technology (ICT) in special needs education (SNE) project conducted by the European Agency during the period 1999 – 2001. All the information presented here is taken from the ICT in SNE database http://www.european-agency.org/ict_sen_db/index.html

This report is also available in fully manipulable electronic formats and in 12 other languages in order to better support access to the information.

Electronic versions of this report are available on the European Agency's website: www.european-agency.org

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CONTENTS

Preamble

The use of information and communication technology (ICT) is currently very high on the political agendas of nearly all European countries as well as the European Union itself. The European Union *eEurope Action Plan* (2000) outlines the steps that need to be taken to move into the Information Society and the central role played by education in making the Information Society a reality is clearly highlighted. The OECD study *Learning to change: ICT in schools* (2001) clearly shows how ICT is set to transform schools and the educational experience of pupils across the globe.

However, until now, information on the use of ICT in the field of special needs education (SNE) has been limited to National level sources – very little information has been available at the European level.

In order to address this, the European Agency for Development in Special Needs Education has undertaken a major European wide investigation into the use of information and communication technology (ICT) in special needs education (SEN) in 17 Agency member states. This has lead to dedicated web-based resource banks of information which aim to present easily accessible information on policies, key issues, examples of interesting and innovate practice, key information sources plus future challenges in the field.

The information was provided by the Agency Working Partners in co-operation with key specialists and support professionals with an overview of ICT in SNE policy and practice in their country. The information-gathering phase of the project aimed to establish for each of the participating countries: the current state of the art in each of the countries; the current concerns and issues; key information sources available and what specialists see as being the future of ICT in SNE. The contact details of all contributors are listed in the country contacts section of the ICT in SNE database. At the same time, interesting examples of practice were collected and a web database of relevant information developed. The country-based experts regularly add examples of interesting ICT projects and initiatives to this database.

The country overviews and examples of practice databases can both be found at:
http://www.european-agency.org/ict_sen_db/index.html

The main findings of this project have been summarised within this short synthesis report that is available in electronic format and print in 13 European languages.

All electronic versions of this report can be found at:
http://www.european-agency.org/

All database information is accessible in text only as well as graphic versions and reports are fully downloadable as hyper linked word documents.

1 The ICT in SNE Project in Context

1.1 The European context for the ICT in SNE project

Before presenting findings of the Agency project, it is important to consider other European level work that sets the project information into a wider context. The following section presents points of view on special needs education, the application of ICT in education generally and finally the current situation of ICT in special educational settings.

About 10% of the population of Europe has some form of recognised disability (European Commission, 1999) and it is estimated that there are 84 million pupils – approximately 22% or 1 in 5 of the total school aged population – who require special educational provision either in a mainstream classroom, as part of a special class or within a separate institution (Eurydice, 2000). Depending on the way a child is identified and assessed in the countries of Europe, pupils with *special educational needs* (SENs) make up between 2% and 18% of the school age population (European Agency/Meijer, 1998).

Today, the provision of education for pupils with special needs varies across Europe according to different educational policies. Despite differences in political standpoints and practical provision, all European Union countries are in agreement that meeting the educational needs of every individual pupil and student can be viewed as an important element of guaranteeing the quality of life of all European citizens. In all countries, information and communication technology (ICT) is increasingly seen as a major tool in meeting this challenge.

The European Union *eEurope Action Plan* (2000) underlines the fact that education is the foundation of the Information Society, since it has an impact on the life of every citizen. The EC Communication *Towards a European Research Area* (2000) argues that there is a real need to improve co-ordination between research, industry and educational establishments, encouraging trans-European research and sharing of knowledge between the research, business and education worlds, if the full potential of the information society is to be made available to all.

The OECD study *Learning to Change: ICT in Schools* (2001) clearly shows how ICT is potentially set to transform pupils' school experiences in all countries. The study outlines how large financial (up to $16 billion annually across the OECD countries) and time investments are being made by countries to fully equip schools in terms of hardware, software and Internet connectivity. Information from Eurydice (*Key Data 2000*) highlights how almost all EU, EEA and pre-accession countries have National or official policy documents which promote the use of ICT in educational sectors. In addition, most countries are currently implementing National or Regional level projects and initiatives to introduce and support the introduction of ICT into educational organisations.

However, the present indications are that an "information society for all" – as, for example, described by Stephanidis *et al.* (1998) as the application of the concepts of universal access to all information technology hardware and software for all possible users groups - is far from a reality for all European school pupils. The OECD study emphasises that installing the hardware and using ICT to do traditional things in different ways will not in itself lead to pupils and teachers taking full advantage of the knowledge/information society. The study also argues that schools have to learn to change to new ways of learning if the potential of ICT is to be realised for each individual pupil.

Similarly, the information from Eurydice (2000) highlights the fact that the sorts of support structures necessary to maximise ICT use do not always accompany the provision of hardware and software in educational organisations. The Eurydice information stresses that even though ICT is included in the curricula of most countries, it is often taught as a separate subject. Most importantly, in-service training in ICT is often available, but not compulsory and specialist support staff in schools are mainly only available at secondary sectors levels. The European Experts' Network on Educational Technology publication *How Learning is Changing* (1998) stresses that basic teacher training to achieve ICT competence needs to lead to further training developing pedagogical skills and understanding of the possible uses of ICT in classrooms if its potential is to be maximised.

The Eurydice survey *ICT@Europe.edu: Information and Communication Technology in European Education Systems* (2001) argues that ICT in itself will not result in massive changes in the education systems of European countries unless its potential as a tool for learning is more fully explored. This survey points out that many countries are still at the stage of introducing technology into sectors of their education system and the real influence that technology could have on educational practice has yet to be seen.

Information from the European SchoolNet (1999) shows the disparity in hardware access across countries (ranging from 7 to 150 pupils per machine in primary and 5 to 37 in secondary schools) and Internet access (between 5% and 90% of primary schools and 48% and 100% of secondary schools connected to the Internet). Whilst the figures here are likely to have changed dramatically in the intervening period, it is obvious that there remains great disparity in the access individual pupils across Europe have to various types of information technology. The Eurydice (2001) survey discusses the possible effects of this disparity of access – the survey considers an impending "digital divide" unless countries take action to ensure certain groups are not disadvantaged in their access to and competence in using ICT in educational contexts.

Whilst there are very important National level sources, European wide information on ICT usage with pupils who have a range of special educational needs is very limited. None of the European studies referred to above specifically considers the use of ICT with pupils with special educational needs. Similarly, whilst there is a widespread international research forum - universal design in human computer interaction - focussing upon improving accessibility to ICT for people with all types of disabilities, it very rarely includes debates regarding the needs of pupils with special needs or the teachers and professionals who work with them (European Agency/Watkins, 2001). Information on ICT within SNE concerning policies and practice, or the impact of key issues emanating from the application of ICT within an educational context is not easily available at a European level from either educational or ICT research observers.

It is within this arena of increased ICT application in education across Europe, but the limited availability of information regarding ICT use within SNE that the Agency Project has developed.

1.2 Background to the ICT in SNE Project

Information technology is one of the main tools both for communication and dissemination used by the European Agency. This fact was partly instrumental in the use of ICT in SNE being identified as the focus of Europe wide research during 1999 – 2001, the aim been to establish a resource bank of information relating to ICT in SNE. The specific objectives of the project were to:

- provide an overview of existing country-based information in relation to ICT in SNE
- highlight the key issues regarding ICT in SNE in the countries
- identify examples of interesting ICT in SNE practice that could act as useful reference material for teachers and support professionals in other countries.

Information databases were developed in co-operation with ICT and SEN support experts who acted as the key contributors as well as a main target audience for the project outputs. It is important to highlight the importance of the contribution made by these country-based experts as without their input, the project would not be as detailed or targeted as it is. All of their contact details can be found in the contacts section of the ICT in SNE database:
http://www.european-agency.org/ict_sen_db/index.html

The first phase of the project was to develop web based overview information relating to the ICT in SNE situation in: Austria, Belgium Flemish and French communities, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden and the UK.

The overview information collected for each of the participating countries highlighted the strengths and weaknesses of the policy and infrastructure of equipment (hardware and software as well as Internet access), specialist support, access to information and ICT training available to teachers in special education settings. The analysis of this overview information has lead to the production of this synthesis report.

1.3 Rationale for the Summary Report

The aim of this short report is to provide a synopsis of the main findings from the country-based overviews. As well as providing background information, there is an attempt to identify possible trends in ICT in SNE in the countries, as well as draw out key issues and highlight possible implications. This report does not present a strict analysis of data, but rather a synthesis of the available information focussing upon the perceived key issues in policy and practice and possible future trends in ICT in SNE usage.

This report has been prepared in close collaboration with the Agency network of ICT specialists involved in the project. The agreed intention is that this report should present issues that should be considered as being applicable across European countries, not just on an individual country level. Therefore, this report highlights points for reflection and examination applicable to all countries without identifying individual respondents. It is hoped that, in this way, the report will inform the European debate on the use of ICT in SNE generally. It is also hoped that this report reflects the aim of the project in promoting international exchange that not merely focuses upon comparisons between countries' approaches to key topics, but has the goal of promoting learning from each other's experiences in order to improve the quality of education and inclusion.

This report is only able to provide a limited insight into the wealth of information gathered as part of the project. It is recommended that readers consult the comprehensive overviews on the ICT in SNE web database (http://www.european-agency.org/ict_sen_db/index.html) for much more detailed descriptions of the situation in each of the participating countries.

In the following sections, key findings and trends relating to policy and practice, emerging issues and the possible future of ICT in SNE are considered.

2 Policies and Practice across Europe

The Eurydice survey (2001) clearly describes the national ICT in education policies and resulting patterns of provision and practice in place in each of the participating countries. The area of questioning within this project focussed specifically upon ICT in SNE policies and practice. A summary of the main issues raised within these areas is given below.

2.1 ICT in SNE policies

Contributors were asked to outline the ICT in SNE policy arrangements within their countries, policy referring to a specific national level statement on principles, intentions, means, objectives and timetables relating to ICT in SNE.

The different possible areas of concern for national level ICT policies appear to cover five elements: infrastructure, support for practice, training, co-operation/research and evaluation. Different stress and emphasis maybe placed upon different aspects. It appears most countries have general – not SNE specific - ICT policies that include statements and objectives relating to these five areas. Short and long term aims of national policies on ICT in the education system dictate the infrastructure of hardware and software made available to teachers and pupils. Policies also have a direct impact upon a teacher's access to training, support and information relating to ICT.

Most countries indicated that there was no specific ICT in SNE policy and that the general ICT in education policy for their country included special educational provision. In addition, some countries indicated that the general ICT policy included statements of equity of educational opportunity with respect to and through the use of ICT. For some countries, national educational policy states that pupils with SENs have same rights as all other pupils – this includes access to appropriate ICT.

A number of countries identified that there was a national level ICT strategy or programme – or defined as specific project or funding arrangement - specifically focussed upon ICT in SNE. Only one country identified a specific policy where ICT is incorporated as a particular element of national disability and SEN legislation. In some

countries as an element of educational policy, ICT is embodied within the school curriculum that applies to all pupils, including those with SENs.

All countries indicated that different bodies are responsible for policy implementation – national and regional level, school level (specialist ICT and/or SEN teacher co-ordinators) and support service and centre level (inspectorate, specialist teachers etc) - with overall responsibility being at ministerial, sometimes regional government level and then action or implementation responsibility being taken by a range of partners – even including private companies (i.e. network providers).

Within countries with highly decentralised government (particularly those with autonomous regions who have their own legal frameworks and decision making powers), there is a pattern of policies and implementation programmes being set at this level of government with national policy being can be used as a guideline for implementation.

In countries with highly centralised Government – particularly within the smaller countries – implementation of ICT in SNE maybe conducted as initiatives at the level of the school, or even individual teacher.

Some form of evaluation of general ICT policies is being conducted in the majority of countries. However, specific information on SNE and on the impact of ICT on teaching and learning is only being made available in a small number of countries.

2.2 Provision and Practice

The ICT in SNE project did not specifically ask contributors to describe *how* ICT was used within SNE settings. However, from the general descriptions provided, it is obvious that ICT is used to fulfil a range of functions: a tool for pupils and teachers as a part of the general learning environment, a communication aid for pupils and teachers and as assistive or adaptive technology to meet particular needs.

Similarly, it was beyond the scope of the project to consider the individual technical infrastructure (numbers types of computers, peripherals and software availability) in each of the countries. The possibility of considering this was discussed, but the conclusion amongst contributors was that whilst the information would be very useful, it will be hard to find and very difficult to compare like with like across countries.

The focus in this section is upon describing the types of provision available within special educational settings as a result of national or regional level policy and the perceived strengths and weaknesses of this provision.

2.2.1 Specialist ICT in SNE support networks

The availability of appropriate support structures for implementing ICT in SNE settings is stressed as being as important for many teachers as having the appropriate hardware and software to use. This is a point highlighted by all countries in one-way or another.

The different types of support structures available within countries focussed upon combinations of one or more of the following:

- National dedicated agencies for ICT in education
- Support services that work directly with teachers and pupils within in SNE
- Specialist resource centres where teachers obtain advice, materials and information
- Specialist regional working groups
- Specialist websites and on-line networks
- In school support

Most countries offered a number of inter-related ICT services for teachers working in SNE. In school support was highlighted as being of particular importance, but also an area of potential difficulty as whilst most countries suggested that individual schools may have named staff with special expertise acting as ICT co-ordinators, these staff were not necessarily those with the necessary SNE expertise.

2.2.2 ICT in SNE training

ICT appears to be an integral part of initial basic teacher training in most countries – this fact is highlighted by the Eurydice (2001)

survey as well as findings from this project. However, training in the use of ICT to meet SENs was identified as being available in initial teacher training in a limited number of the countries involved in the project.

In relation to in-service training, most countries offer general ICT courses for teachers. In-service teacher training focussed upon applying ICT to meet SENs was identified as being available less than half the countries participating in the project. However, ICT is an integral part of specialist training courses for SEN teachers in most countries.

2.2.3 Perceived strengths and weaknesses of systems of ICT in SNE
Countries were asked to identify what they saw as being the main strengths and weaknesses in the systems of ICT in SNE within their countries. In relation to weaknesses, the following factors clearly emerged as concerns within and across countries:

- Diffused responsibility for policy implementation
- Attitudinal barriers in relation to understanding the benefits and possibilities of ICT – at policy and implementation levels
- Lack of information on needs and requirements of schools and pupils upon which to base policy initiatives
- Limited finances supporting different aspects of provision or funding that is not needs targeted
- Lack of specialist teacher training; limited flexibility in training options
- Limited availability of specialist hard and software resources
- No formalised national support structure for ICT in SNE
- Disparity in availability of specialist expertise at regional level (including centralisation of services within one area e.g. the capital)
- Limited availability of specialist information (particularly on-line) resources
- Geographical isolation of teachers.

However, there were obvious strengths that existed within some or all country systems:

- Local level implementation that is able to identify needs and target resources accordingly

- Existence of clear support structures for teachers
- Incorporation of ICT into pupils' individual education plans
- Possibility for additional ICT funding based on need, upon application to authorities
- High proportion of staff in the ICT sector generally
- Accessibility to global information
- Existence of specialist projects and initiatives
- Principles of pupils' rights to appropriate ICT underpinning policy
- Existing or forthcoming legislation on disability and special education that will promote the use of ICT in SNE.

It can be observed that in some instances, these perceived strengths are often the factors that specifically address the potential weaknesses identified earlier. Whilst there are elements within national ICT in SNE systems that require attention, this fact presents ICT in SNE professionals with some useful information on how to overcome obstacles within the system in the long term.

2.2.4 Factors hindering and supporting a teacher's use of ICT in SNE
As well as considering the ICT in SNE systems, contributors were asked to identify the factors that support or hinder an individual teacher's use of ICT in SNE settings. Whilst specific countries suggested specific information, all of the points presented here can be seen to be generally applicable across all countries.

The main hindering factors were identified to be:

- Teachers' lack of confidence in applying ICT within SEN programmes and curricula
- Lack of information exchange, sharing of expertise at the school level and between schools
- Limited school level availability of specialist hard ware and software resources and/or upgrades
- School level access to specialist support and information
- ICT in SNE not a clear element within school development plans
- Lack of provision on assessment of pupils' ICT requirements
- Inflexible school organisational structures
- Age and gender barriers in using ICT
- Teachers' perceptions of the limited uses of ICT

- Lack of incentives for teachers to accept ICT responsibility in schools
- Resistance to change generally and specifically change brought about by ICT
- Limited availability of or access to in-service training in ICT
- Limited availability, up-take/participation in in-service training
- Confusion over un-coordinated sources of support, information and advice
- Lack of ICT expertise and/or interest of specialist SEN support staff (i.e. psychologists)
- Limited possibilities for teachers to apply outcomes of research.

These are all very specific and concrete points. Similarly, the identified supporting factors are of the same concrete nature:

- A clear ICT in SNE policy in the school
- Commitment and support of school managers
- Availability of appropriate specialist hardware and software resources and support at the school and classroom level
- Access to specialist training that develops teachers' feelings of confidence
- Availability of specialist information and examples of other teachers' practice
- Teachers' teamwork and sharing of experiences and expertise
- Teachers' increasing motivation to and competence in using ICT flexibly
- Positive outcomes in terms of pupils' learning and/or motivation as a result of ICT application
- Increased usage of ICT at home, by parents and in society generally
- Possibilities and awareness of these possibilities for new teaching strategies presented by the use of ICT
- Awareness raising of benefits of ICT at all levels of educational provision (policy makers included)
- Regional co-ordination of all forms of ICT in SNE support.

In considering the possible supporting and hindering factors within systems of ICT in SNE support for individual teachers the inter-relation and influence of strengths and weaknesses of policies upon teacher-focussed issues cannot be ignored.

2.3 Summary

The contributions suggest that the role of policy makers relating to ICT must be to:

- Promote basic and specific training for teachers in the use of ICT
- Ensure adequate hardware and software infrastructure is available for all pupils
- Promote research, innovation and the exchange information and experiences
- Make the educational community and wider society aware of the benefits of ICT in SNE.

These four elements appear to be reflected in the various comments of most countries' contributions. These aims can be achieved through general or SNE specific policies, projects or programmes. The identified points of weaknesses in policies and hindering factors for teachers' use of ICT need to be positively addressed so that they become strengths and supporting factors. The contributions highlight the fact that policy initiatives need to reflect need and then support initiatives targeted to meet actual need at national, regional, school, teacher and pupil level.

Support for individual teachers in using specialist ICT can be provided at national, regional, local, school or colleague levels. Whilst this can lead to a range of flexible information, advice and practical support services it also presents problems in terms of split responsibilities, difficulties in accessing funding and potential lack of co-ordination in provision of information services. Co-ordination and rationalisation of support, again based on clear information about needs and requirements of teachers and their pupils, appears to be very important.

3 Emerging Issues

Without exception, all countries highlighted a range of issues that currently influence the application of ICT in the SNE context. Each country differed in the types and emphasis placed upon the issues identified as being faced in their country, but from the information presented, it is possible to identify a number of common areas where issues are evident. These areas are:

1. National or regional level policies
2. Infrastructure – hardware, software and Internet access
3. Pedagogy
4. Teacher level
5. Pupil level
6. Accessing relevant information
7. Research and co-operation

Each of these will now be considered separately, but it is important to stress the interconnection and inter-dependence between each of the areas.

3.1 National or regional policy level

The central issue facing countries in relation to SEN and the use of ICT is the lack of coherent support structures - available to pupils, teachers, parents and support staff - underpinned by a clear ICT in SNE policy. Such support structures require personnel with appropriate expertise as well as the appropriate resources at school and individual pupil level as well as at regional or support centre level. These elements can only be realised if there is a policy directing their implementation.

Policies need to redress the possible disparities in resources and support across an area as well as at individual school and pupil level and it is therefore important for them to be based upon a clear understanding of the ICT situation in the given area. For example, it would be useful for a policy to establish: an overview of hardware and software available for different SEN target groups; clear information about teachers' needs for products; what specific training in using ICT is required; information on models of ICT management in schools; general knowledge about integrating ICT in education.

In relation to the provision of training for teachers and support staff, any policy would need to operate on two levels, the first being training the next generation of teachers whilst also implementing a programme of training the current generation of teachers and support personnel.

Overall, the ICT in SNE policy would need to work developmentally towards establishing a satisfactory infrastructure of ICT in the area.

3.2 Infrastructure – hardware, software and Internet access

The issue of access to appropriate IT resources at the school level – hardware, software, Internet access and funding for running costs – was raised by a number of countries.

Providing individual pupils with the necessary material equipment – equipping all classrooms with hard and software and Internet access, providing specialist equipment for pupils with specific needs, covering on-line costs – was also stressed.

In the long term, it maybe necessary to develop more flexible models for financing ICT equipment and its maintenance. Such models would need to take into account different stakeholders in the information society – such as educational organisations, parents, industry and researchers – if serious disadvantages across regions, across and between countries are to be avoided.

However, as well as access to financing to allow the provision of suitable equipment, the issue of availability of appropriate types of hardware and software needs to be considered. Whilst access to suitably adapted or designed hardware remains an issue, access to software that meets pupils' particular needs is an area of concern, as is access to Internet material designed for pupils with different types of special needs. To support the learning of pupils with individual needs, the priority is for software that can be adapted to individual learning requirements. In addition, varied software should be available which fits in with the curriculum and individual study goals.

The aim of ICT in the SNE setting could be considered to be meeting the individual needs of pupils with SENs via an appropriate personal technical infrastructure. The provision of this appropriate technical

infrastructure requires a consideration of the key principles of learning and teaching as well as the identification of individual learning styles and approaches.

3.3 Pedagogy

A key concern to being addressed by ICT in SNE users and specialists in many countries is: how can ICT give more, or added, value to the educational experiences of pupils with special needs? The real educational value of ICT, not its potential use as just another tool in the learning environment, is the current issue. When, how and why it is desirable to use ICT and how its use may be adapted to the requirements of individual subjects and the individual study goals of pupils with special needs is a key question being faced within countries.

Developing good quality, relevant electronic educational resources for pupils with SENs is one task. However, attempts to extend the best application of ICT and to generate a new quality of learning will not be successful unless new theories of learning using new technologies are devised. What needs to be developed are methods on how to use ICT as a pedagogical aid in the teaching of all pupils.

Other educational questions are raised: how can information on using ICT effectively in the learning environment be disseminated? How can information on good pedagogical practice be shared? How can school curricula and study plans more clearly define the purpose of using information technology for pupils SENs? How can ICT methods of use be adapted to meet the requirements of an individual country's educational programme?

At a fundamental level, there is the issue of how ICT can be used to support a particular pedagogical philosophy i.e. a school for all and within this context, how ICT is made an integral part of special educational provision, where every school develops its own concepts on the best use of ICT to meet the needs of its pupils.

ICT presents a range of possibilities within a school, for pupils, teachers and the school as a whole organisation, but there is a need for everyone to be made aware of these possibilities and how to exploit them. Added value is not in evidence just because pupils use

new technology in the daily educational activities. The positive results of using ICT can be seen if its application leads to:

- teachers being significantly helped in their education practice
- pupils learning more and in better ways for them
- improved communication because of and about ICT across a whole school.

3.4 Teacher level

A satisfactory infrastructure and the availability of good quality ICT educational materials is not a guarantee of effective ICT usage in schools. The issue that was raised by every country participating in the project was that of ensuring adequate forms of teacher training for ICT in SNE.

There are various problems associated with teachers' lack of knowledge and expertise in ICT. Often, there is a lack of confidence on teachers' parts in relation to using ICT in their classrooms. They may lack basic skills or have limited opportunities to practice these skills.

Training teachers in the effective use of ICT needs to be considered during initial training as well as being a form of on-going in-service training. In all training scenarios, training should aim towards helping teachers integrate ICT into their daily practice generally and the individual education plans of pupils. ICT training generally needs to be made more flexible and take account of the individual needs of the teacher. In addition, any training in the use of ICT needs to examine methodologies, didactics and the organization of learning with clear connections made between theory and practice.

ICT in SNE should also be the focus of specialist training – either for SEN support teachers or ICT support teachers. However, the issue of the lack of training in special education generally means it is unreasonable to expect teachers to use ICT effectively in special education if they have not been trained in special education initially.

If ICT in the field of SNE is to reach its potential, teachers require access to more expert knowledge and there is a need for more systematic co-operation between different professionals who support teachers working with pupils with SENs in different ways. The

application of ICT in the process of school development and management will need to be carefully planned and implemented. ICT in SNE support services must be improved, as must teaching arrangements, with teachers and other professionals given time and opportunity for collaboration, allowing for guidance and professional advice as close as possible to the workplace.

All of the above points need to be considered in the light of the attitudinal factors present in implementing new teaching methods: if the real potential of ICT for pupils' learning is to be reached, teachers will first have to be convinced of the value of using ICT. Consideration also needs to be given to the possible issue of addressing and overcoming the factors regarding teachers' ability to adopt and accept changes.

The introduction and more widespread application of ICT in educational situations means all teachers – including, perhaps especially, those working with pupils with special educational needs – will be part of developments in the learning environment that will fundamentally change the role of teachers. As concepts such as "learning to learn", "life-long learning" and "on-line, distance education" become increasingly accepted, traditional educational methodology will change dramatically for all pupils and those who work with them.

3.5 Pupil level

The changing landscape of education will have an effect upon the educational experience of all pupils. The challenge in relation to ICT in SNE is to ensure that all of the possible advantages these changes can offer are made available to every pupil with special educational needs. ICT in whatever form should be available to any pupil in order to support their individual learning needs.

However, the provision of support is not always appropriate or comparable across regions. Support structures are being developed, but difficulty is faced in providing the necessary person intensive individualised support needed for pupils with special needs, their teachers and parents.

Access to different forms of ICT within education is a reality for many pupils with SENs, but not all. Equality of opportunity in access to ICT through an appropriate infrastructure, specialist support and ICT competent, experienced teachers is a goal still to be worked towards across Europe.

3.6 Accessing relevant information

Access to relevant information can be considered in relation to teachers and pupils. There is a need for pupils to have access to information on the World Wide Web that is appropriate for them. However, the information presentation barriers associated with the Internet faced by pupils with special needs – both in terms of level, content and languages – cannot be over stressed.

The majority of countries also highlighted problems associated with access to information for teachers of pupils with SENs. At a national or regional level, an important task for education managers could be to familiarise teachers with important developments and changes in the ICT field. Technology develops rapidly and it is vital to have organised data in each country on how ICT can be used to support pupils with SENs.

Giving teachers and specialist support staff access to specialised ICT in SNE information is an issue being considered by many countries. Possibilities for establishing actual or virtual resource centres are being considered. Specific responsibility for organising such a central resource bank of specialist information may need to be assigned to one key organisation. Any such specialist resource bank could usefully have information on new developments and projects in other countries. However, issues relating to translation of other countries' information need to be overcome first.

Having access to examples of how ICT is used in other SNE situations is considered useful for teachers and support staff, but the presentation of these examples and the means by which they can give useful detail that can be considered in other contexts requires careful thought.

3.7 Research and Co-operation

The need for systematic research and co-operation between different Agencies in the ICT in SNE field is an area that many countries see as requiring development. Research and co-operation can be considered as being on the one hand separate areas of concern, but on the other, inter-related factors. Both aspects require consideration on the national as well as the international levels.

More applied research is required at the national and international levels that focuses upon the rationale for using information technology generally. More information is also needed on successful and innovative examples of research into using ICT in SNE practice.

At an international level, there could be a need for concerted co-operative research to establish a central forum that could be responsible for developing and testing ICT hardware and software for pupils with SENs.

The need for more inter-agency co-operation at the national level was highlighted by a number of countries. One specific issue relates to the lack of co-operation in or between schools on teachers training and other ICT implementation initiatives. More systematic co-operation between different agencies or groups of professionals also needs to be reflected in developments in co-operation between professionals and the parents of pupils with special needs, possibly leading to the development of national networks of practitioners in SNE using ICT that would support teachers, support staff and parents etc.

Increased co-operation at an international level is generally viewed as something that would be extremely positive by all countries. Co-operative arrangements would need to take account of and also promote research initiatives. If the use of ICT in SNE is accepted as a valid Europe-wide goal, then there are a number of important areas such co-operation could focus attention upon. Building ICT networks in Europe between teachers of pupils with different types of SENs is one potential area. Extending the provision of distance learning in ICT for teachers is another.

The need for data banks of projects, resources, examples of innovative practice and sources of information related to ICT in SNE to include National and International information is seen as a major area for European wide co-operation and one which seems to require close consideration in the future.

3.8 Summary

A key tendency emerging from a consideration of all countries' inputs is the degree of agreement that exists between countries regarding what are the priority issues for consideration. Whilst provision of a basic infrastructure in terms of quality hardware and software is stressed, the most important issues relate to developing a clear, evidence based rationale for using ICT in the educational context and equipping teachers with the necessary skills and feelings of competence to implement this rationale.

The development of theory for using ICT in SNE is seen as being potentially enhanced if there are opportunities for co-operation between different groups of actors (pupils and their families, teachers, support professionals and researchers) at national and international levels. Furthermore, the possibility to enhance virtual co-operation with face-to-face meetings and exchanges was raised. The power of ICT as a tool for communication as well as a tool for learning is reinforced by the personal contact and exchange of SEN and ICT specialists.

4 ICT in SNE – the Future

Throughout the project, the contributors referred to very concrete and specific examples of potential developments in ICT in SNE that needed to be looked at by policy makers, researchers/developers and information providers in more depth. These suggestions give an insight not only into areas of present and future need, but also into what the ICT in SNE field may look like in the future if these practitioners' requests are met.

Specific suggestions related to four areas of ICT in SNE:

1. Requirements in terms of IT infrastructure development
2. ICT in SNE information provision
3. The potential focus of future research and collaboration
4. Methods for facilitating the above

The information in the country overviews presents a wealth of suggestions – so many that it is beyond the scope of this report to discuss them all in full. Relevant information relating to the four areas identified above is therefore presented here in bullet point form indicating an area for future consideration. Although items have been listed under discrete headings, it should be pointed out that many of the suggestions overlap categories; the inter-relationship of these categories themselves also needs to be kept in mind.

4.1 Requirements in terms of IT infrastructure development

Suggestions made relating to IT infrastructure can be sub-divided into three areas: hard and software developments, Internet access and compatibility issues.

4.1.1 Hardware and Software Development

In relation to the development of hardware and software, the following suggestions were made:

- ICT innovations as one solution to problems of communication and access to mainstream activities
- Pedagogical robots such as Valiant Robot or Jeulin's Turtle
- Pedagogical devices like Lego Dacta or Electronics Lego
- Development of gesture recognition devices

- Development of individual hard and software solutions for children with severe disabilities
- Development of software for diagnostic purposes
- Development of the wearable computers.

Within all of these suggestions, there needs to be a clear focus upon the educational context – cultural, ethnic, philosophical and psycho-pedagogical – as well as the technological development.

4.1.2 Internet Access

The following suggestions were highlighted with respect to widening access to Internet:

- Email with speech input/output
- Browsers for pupils with severe learning difficulties, with flexible control mechanisms (for example controlled using only a few icons)
- Improvement of networking facilities to allow more efficient co-operation between institutions
- Building an on-line network (discussion groups, list servers) in Europe between teachers working with pupils with different SENs
- Creation of a very simple system for installation of websites
- The development of an international virtual Resource Centre with all the information being related to ICT and SEN.

As can be seen from the suggestions, two aspects supporting access need to be considered: developments designed to support pupils' access to use and content of Internet based information, but also developments that help a teacher use the Internet more effectively with pupils with SENs.

4.1.3 Compatibility/application issues

Four possible areas of concern were identified here:

- Adaptation of standard software to the needs of the children with different SENs
- Models to simplify the frames of windows based programmes
- Co-operation in order to get a standardized storage format for text, pictures and sounds in different teaching materials and software according to the different needs of pupils with SENs

- Integrated research concerning hardware and software in order to ensure compatibility.

It was suggested that each of these could only be effectively developed within a framework of cross sector (public and private) as well as international co-operation.

4.2 ICT in SNE provision: training, support and information

Access to appropriate information is in itself a key source of support for teachers and professionals who support them. The project participants identified information on ICT in SNE policies, ICT usage and ICT users as areas they would like to have access to on a national and/or international basis.

4.2.1 Policies

The following suggestions regarding policy information were put forward:

- Examples of policy documents regarding ICT in SNE from different countries
- Data on important results and progress resulting from policies
- Comparative reports of support structures for ICT in SNE, with statistics and trends identified.

Information on ICT policy, its implementation in practice and its evaluation in other countries was seen to be of high importance. An exchange and reflection upon policy information was seen as an important aid to the learning process at a European level.

4.2.2 ICT in SNE Usage

Concrete information on how ICT is applied within the field of SNE in other countries was perceived as being a main priority for sharing information. The main areas suggested were:

- Concrete examples of projects dealing with ICT in special education settings
- Practical information on latest hardware and software developments
- Overviews of information on available hardware and software relating to particular types of special need

- Examples of innovation in teaching strategies that could be transferred from one country to another
- Examples of special projects, innovations and successful practises in ICT
- International exchange of resources; comparisons of resource provision across Europe
- Sources of information on in-service support to teachers
- Information on training and training resources that are available
- Information about ICT management in schools
- Information about integrating ICT into educational processes
- Results and ideas from research and development projects in other countries
- A database employing a fixed evaluation schema, which estimates perceptions of the quality of educational software
- Making teachers aware of the possible uses of ICT with pupils with SENs, although their current use is actually limited.

The emphasis for using such information would be on the potential learning from colleagues' experiences. It was stressed that for such learning to occur, then there would need to be more than just descriptions of examples of practice, but also a degree of analysis as to why – or why not – examples were considered successful. It was suggested that an evaluation of the features and factors of the context of the examples usage would aid learning and transfer of examples from one country situation to another.

4.2.3 Other Users

Specific information on users focussed upon:

- Addresses of experts and institutions in the different countries
- International contacts on ICT development and implementation
- Connection with websites of special schools and other pedagogical institutes and universities around Europe
- Information about key international conferences/seminars etc
- Information about teachers' need for products and services.

Information providing contact details of (who) and opportunities for virtual and face-to-face meetings (how) between individuals and organisations was highlighted as being needed by most countries.

Added to this was the practical need for more information on the needs and requirements (what) of both individuals and organisations using ICT in SNE. Providing this who, how and what information is a crucial area for future consideration at a European level.

4.3 The potential focus of future research and collaboration

Suggestions for potential research covered all aspects of ICT in SNE usage – policy, implementation and evaluation as well as research and development of technology:

- Research into psychological and pedagogical aspects of ICT & SEN children
- Research and development into new technologies specifically designed for children with special educational needs
- Research and development projects on the actual effects of ICT in the learning process
- Research work concerning how ICT may help support the inclusion process of pupils with SEN
- Transnational projects exploring video-conferencing in particular, with email and web-based support, to ascertain the value of international communication in special education
- Systematic investigations into models of teacher training, distance training and support
- Focussed information about teachers' real needs for products
- Research into systems directly related to the educational environment and its requirements
- Curricula development using ICT (considered in both a theoretical and practical way)
- In the development of educational software, there should a clear focus upon the educational context - cultural, ethnic, philosophical and psycho-pedagogical
- Systematic evaluation of the effects of ICT in SNE policies
- A survey of initiatives and projects using the full range of opportunities for educating pupils with special needs that ICT brings. Such a survey would be of projects with truly innovative aspects.

All the suggestions in this area point towards the need for systematic, long-term collaboration, research and/or evaluation that would require the input of different groups of ICT in SNE actors and users.

4.4 Methods for facilitating the above

A number of proposals raised by contributors highlighted broad strategies that could be used to implement some of the concrete suggestions regarding research and co-operation developments:

- Widening international opportunities for specialist teacher training
- Developing sources of examples of good practice which exist across Europe
- Work on the translation and the adaptation of European methodology to and within individual country standards
- Identification of infrastructure guidelines and benchmarks for SNE
- Setting up platforms for exchanging experiences and devising joint initiatives
- Establishing a European learning centre which would be responsible for developing and testing programmes for pupils with special needs
- Working to create common European models of practises.

The perceived need for – and willingness to be involved in – extended international co-operative initiatives was a clear message from all countries.

4.5 Summary

In various ways, many countries suggested that increasing opportunities for international co-operation and sharing of information would be one means of beginning the work in the areas of need identified. It should be pointed out that much of the information referred to here (both in sections 4.2 and 4.3) already exists at an individual country level, but there is work to be done to co-ordinate this information and make it available, not only internationally, but also to other groups of ICT in SNE users, policy makers and researchers.

The participants in the project all had very clear ideas about what developments would need to be made in these four areas if the needs of pupils with SENs were to be better met through the application of ICT in the future. The points raised provide a very clear

overview of what the possible future of ICT in SNE could be, that is a future:

- based upon the application of effective educational theory and principles,
- where international and national information on all aspects of ICT usage is easily accessible,
- in which training possibilities are varied and diverse,
- where research, co-operation and collaboration is supported at local, national and international levels.

5 General Conclusions

The central players in ICT and SNE are pupils with special educational needs and their teachers. The main conclusions of the project centre upon the issues of direct and immediate relevance to pupils and their teachers that must be addressed. These issues include: funding, training, inclusion, support, availability of accessible ICT, integration of ICT within the curriculum and learning using ICT.

The wealth of information provided within the ICT in SNE project and this subsequent summary report essentially provides descriptions and discussions of these issues in relation to firstly, policy and its practical implementation, secondly, information requirements and methods of accessing information and finally, co-operative arrangements at various levels and between various players.

What are considered to be the key messages relating to these areas will be the focus here.

5.1 Policy, provision and practice

One of the crucial debates within the ICT research and development arena at present is the application of inclusive by design principles – that is the diverse range of users' needs are considered at the outset of designing hardware or software; their needs are not considered later and met as some form of adaptation to the already existing product.

In order to build a truly inclusive information society, educational approaches and appropriate technology must be developed that meet the requirements of all users, including those who have special educational needs. Access to appropriate ICT can reduce inequalities in education and **ICT can be a powerful tool in supporting educational inclusion**. However, inappropriate or limited access to ICT can be seen to reinforce inequalities in education faced by some pupils including those with special educational needs. The digital divide that could potentially develop within countries' educational systems (Eurydice, 2001) can be seen be particularly significant within the special education sector.

The **principle of inclusive by design needs to be applied** during the planning, financing and formation, implementation and evaluation of ICT policies, provisions and practices. The SEN-IST-NET consortium (2001) argues that an *inclusive approach to the development of a new learning culture in general and to technology-enabled learning in particular* is required. As a starting point for this, it maybe necessary to identify the elements of education, ICT, and ICT in SNE policies and practices that make some policies more inclusive in their impact than others.

It can be argued that there is a need for a shift in focus of ICT in SNE policies and programmes. Previously the emphasis has been upon establishing the means (infrastructure in terms of equipment and expertise) to enable ICT to be effectively applied in SNE settings. The evidence from this study suggests that practitioners in the field are now asking for **the emphasis to be placed upon the ends, the aims and goals, of using ICT in SNE and not just the means** of that use. Such a focus would help inform debates about the development of appropriate infrastructure, but would most importantly focus attention upon why and how ICT can be most appropriately used in different educational contexts. Significantly, this shift in emphasis would help **centre attention upon using ICT to learn in different contexts rather than upon just learning to use ICT in different ways**. Genuine inclusion of ICT in the curriculum for pupils with SENs will only occur when the full potential of ICT as a tool for learning is understood.

5.2 Generation of and access to information

Access to information is important; access to the right sort of information is essential. Whilst it is impossible to identify every ICT in SNE users' information requirements, information from this project suggests that there is a rubric of different forms of information that need to be made available more widely:

- **Information is required from and about all levels of ICT in SNE work**: international, national, regional, school, colleague/other teacher and pupil
- **Different types and formats of information are necessary** - different in terms of content, presentation levels, presentation

medium, languages and also technical formats – in order to maximise accessibility.

The principle guiding the availability of access to information in ICT in SNE should be that all levels and types of **information should be accessible to all** – that is open in terms of content and technological format to as many different audiences as possible.

Whilst there is information available at national and international levels, information of the correct type, format and focus does not always exist - it has yet to be created. It is crucial that the principles of information accessibility for all apply to information yet to be generated as well as that which already exists.

5.3 Co-operation and support

If the principles of policy and provision being designed to include all and information being made accessible to all are to be worked towards, then **co-operation between and more flexible forms of support for different groups of ICT in SNE players** is required.

Increased co-operation between all levels of participants in the ICT in SNE field is called for: international, national, regional, school, support professional, teacher, pupil, their families and their communities. The purposes of co-operation need to be varied: personal communication, support, sharing information, debate, provision, training, research and even policy development Moreover, a greater range and diversity of co-operative arrangements are required: formal/informal, face to face/virtual, short-term/long-term, funded/unfunded.

ICT not only needs to be the focus or topic of increased co-operation, it needs to be more accessible to a wider audience as the means by which co-operation can develop.

5.4 Concluding comments

Despite the practical – and sometimes political – issues relating to the front line application of ICT in classrooms, the contributors to this project were very clear about the importance of teachers and support professionals in SNE being involved in the process of developing

policy, provision structures and even the technology that influences their work with pupils with special educational needs.

Information on the needs of all potential ICT users should inform the debates on the relationship between technological innovation and development and educational theory. The findings of this project support this viewpoint: an understanding of ICT in SNE users' educational and technological needs should be the basis for the policies and infrastructure of ICT provision which underpin the practice of teachers and the professionals who support them.

Information from this survey suggests that their concerns and requests are not always being accounted for at an international (specifically EU), national, regional and even school level. If the dialogue between these various groups can be facilitated to a greater extent, then a real step forward will have been made towards achieving a genuine information society that includes all citizens. It is hoped that this short report goes some way to supporting that dialogue.

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Project questionnaire:
http://www.european-agency.org/ict_sen_db/question.html

Contributors' contact details:
http://www.european-agency.org/