European Schoolnet Launching Conference

Making IT Work for Schools

8-9 September 1998: IBM Centre, Brussels

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This booklet contains a short version of the full report of the launching conference of the EUN.

This booklet contains the discussion paper by Stephen Heppell, and the summary of the conference workshops in French, German, Italian and Spanish.

The full report is available by contacting the EUN at the address below.

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Lucio Stanca
Chairman IBM Europe, Middle East and Africa

Creating an education system to equip children for the 21st century is a policy priority for governments across Europe. The system needs to embrace the economic and social challenges of the globalised economy, and adapt to an environment where information and knowledge transcend geographic boundaries and change is a constant.

Information and communication technologies (ICT) will play a central role in the new system. The power of ICT gives teachers and students access to a new wealth of resources. This is changing the learning model, and enabling delivery of education experiences tailored to the needs of individual learners. Sophisticated information systems are providing a depth of management information to direct reform of education systems and drive higher standards of achievement.

As a leading technology company IBM is contributing its breadth of expertise to deliver ICT systems that make schools more effective. In particular, through our Reinventing Education grants programme we are working in partnership with governments, teachers and school managers to develop solutions that meet the needs of teachers and students in the classroom, and support systemic change. Through this programme we are building a global education community which includes some major new partnerships in Europe.

The launch of the EUN network to connect schools across Europe marked an important milestone in realising the new vision for education in our schools. The facility for teachers to share their expertise and build resources will strengthen considerably our ability to raise the standard of attainment in schools and build the skills in Europe for success in the global economy.

The debate and dialogue at the conference highlighted the imperative to set an ambitious vision for change in our education systems, and the human, technical and policy challenges that need to be addressed. The close partnership between governments and educationalists exemplified by the EUN will be critical to realising this vision, and IBM will continue to contribute expertise and support to achieve this important goal.

Ulf Lundin
Chairman of the EUN Executive Committee

On September 8, 1998 the European Schoolnet officially took off during a conference in the IBM International Education Centre, Brussels.

The story of this project started on 17 December 1996, when Ms Ylva Johansson, the Swedish Minister for Schools and Adult Education, proposed that Member States should take a joint initiative to establish a European school information network to promote contacts and cooperation among schools in Europe. It was presented as a contribution by Member States to the implementation of the Action Plan Learning in the Information Society presented by the European Commission.

The unanimous starting signal for the European Schoolnet (EUN) to go forward was given by the Informal Education Council in Amsterdam on 2-3 March 1997. Presently, 18

Ministries of Education participate in the European Schoolnet (EU countries, Norway, Switzerland and Iceland); it also enjoys financial support by the European Commission through a number of specific projects.

The EUN Launching Conference involved four ministers of education, high level representatives from three European Commission General Directorates, IBM Europe, The World Wide Web Consortium and more than 250 delegates from 27 countries.

The overall objective of the European Schoolnet is to promote the use of ICT in education at European schools, especially by: encouraging and supporting cooperation between schools in Europe; offering didactic-pedagogic material and services; supporting the professional development of teachers; exchanging experiences and examples of good practice; concertation and standardisation activities. The advantages of ICT are easy to point out: students see ICT as a fun thing that is easy to use and available at all times; ICT offers the possibility to communicate, exchange experiences and set up a network with fellow students and teachers (as well as with other schools and abroad); ICT provides access to impressive sources of information; ICT can be used to simulate situations from real life into a virtual reality, a really important training instrument.

However, before all schools in Europe will be connected to the Internet and before all teachers will know how to use ICT as another pedagogical instrument, there still is a long journey before us. The main purpose of the conference was to focus the attention of the delegates on important questions with regard to the evolving curriculum, the evolution of technology tools and the professional development of teachers, and to reflect on the best solutions. This brochure summarises the various interesting contributions to these discussions and helps to show the way forward to the European Schoolnet and all other players in this field.

Finally, I would like to express once again my thanks to Mr Lucio Stanca, Chairman of IBM Europe, Middle East and Africa for the generous support from IBM for this conference and brochure.

IT WORK IN SCHOOLS

A DISCUSSION PAPER COMMISSIONED BY IBM FOR THE EUROPEAN SCHOOLNET LAUNCHING CONFERENCE, BRUSSELS, SEPTEMBER 8th and 9th 1998

By Professor Stephen Heppell. Ultralab. Anglia University Polytechnic

It is clear that information and communication technology (ICT) is increasingly playing a significant role in classrooms across Europe. What is less clear is the spectrum of impact that ICT might have through different scenarios for learning as we approach the third millennium. Sensibly, it is very much the European way that where there are choices a debate is needed; this paper seeks to provoke and inform that debate by exploring some of the choices, and clarifying some of the confusions and vocabulary.

In any domain where change is occurring rapidly there is much scope for understandable confusion. We face the same uncertainty about a digital communications future that previous generations faced about the telephone or television. The way we learn to harness new technologies determines the future they will offer us.

However, we should not assume that everything changes. By and large, children and learners do not change - there has been no ripple in the European gene pool as a result of new information and communication technology. Despite this there is needless confusion, frequently repeated, concerning the model of learning that ICT will support. Is it a new model? There is no reason to assume that is should be. Many years of quality research around the world have guided us to confidently understand what is essential for children's learning to be effective; children learn through doing. A sense of audience helps, as does high quality mediation to support, guide and debrief their learning. Research is also unequivocal in that however many resources we commit to teaching them, successful learning will also require students to feel a clear sense of progress, enjoy some collaboration and mix it with a generous helping of delight. This recipe for effective learning is not at all controversial although it often takes a great teacher to blend the ingredients together in a way that excites a learner's palette and leaves them hungry for more. However, such a ‘gourmet’ learning experience seems a very long way from the poor quality learning diet found too often both on CD-ROM and on the Internet which simply expects children to learn passively through the provision of standard or uniform content. Fast food rather than nouvelle cuisine produces consumers rather than chefs! Research gives us well founded confidence in this model of children learning through doing. As a result many choices are made clear for us: children are active not passive learners and this means they need to use their computers primarily as learning tools not as teaching machines. They learn with a computer not from a computer. Software tools should empower them as contributors rather than simply empowering them to explore other's work: authoring as well as browsing, annotating as well as selecting. It must be ICT not IDT (information dissemination technology) which transforms Europe's learning potential.

Unfortunately measuring the speed and effectiveness of that transformation is complex. What measures do we adopt? What parameters can demonstrate success? What standards have we progressed in our learning populations? Politicians, perhaps not unreasonably, would like to point to a substantial investment in technology, and to a parallel improvement in performance and say "We spent money; here is the result and it is an improvement on yesterday". Would that is was that simple. It is not. Unfortunately for politicians the rapid development of technology underpinning their investment impacts on our European curricula in three unhelpful ways making the data to prove such a simple statement elusive:

Firstly, some parts of the curriculum simply are not needed any more and must be dropped from an increasingly crowded school day. The venerable slide rule for example has been overtaken by other, cheaper, calculating devices - newer technology replaces older. Consequently, for these parts of the curriculum, direct year on year comparison is futile. Today's school students don't study what yesterday's school students studied. Tomorrow's students will have dropped some of today's curriculum too. The curriculum evolves, technology's rapid evolution accelerates that trend.

Secondly, some activities that children engaged in previously will, of course, remain important but new tools have changed the way that those activities are carried out. Children writing creatively with a computer employ new strategies (like editing and finessing their text with a word processor) and use many new tools (including perhaps a spelling checker, summariser or thesaurus) which match the tools they will find in the workplace. For these parts of the curriculum year on year comparison is difficult - we can see that the product of their work is better but has the process of writing been advanced and if so is that advance as ambitious as it might have been? Again, year on year comparison is unhelpful and misleading.

Thirdly there are some activities which were simply not possible at all before: children exploring complex data sets and modelling their behaviours, children creating animation and multilayered video, children composing music where they are in complete control of the full aural environment including the design of instrument voices. These are all possible because the tools that were once the unique domain of the expert are increasingly available on desktop, even palmtop computers (please note that this does not mean that expertise is unimportant, rather it is needed earlier and earlier to enable young learners to understand and unpack these new experiences). It is easy to see, for example, that a young student who has been exploring and modelling weather data through a spreadsheet has a better understanding of the evening weather forecast - seeing the model and guessing compromises rather than admires the presenter and their personality for example, but it is hard to represent this as progress by reference back to a previous curriculum. It is different, but is it better? If it is better, is it as good as it could be?

The effect of these three examples is to discredit criterion referencing as a way of comparing our progress year on year, or with other regions like North America or the Pacific rim. Of course we could simply freeze the curriculum at a moment in time; doubtless computers could be used very effectively to teach the use of the slide rule, we could ban the use of machine translation, text summary tools or calculators, but this will miss the essential impact of ICT on the lives of workers and citizens awaiting our school students. We cannot freeze the workplace or our social communities at a moment in time. The tools through which today's learners will create wealth and participate in democracy are constantly changing and if our economic region is to advance we must recognise this and help our school students develop appropriate capabilities. This means a constant tide of change in our European curricula and politicians unable to evidence a simple link between commitment and progress. The reverse may be more simply measured: don't invest, don't commit to change and the decline in our regional economy may be more convincingly quantified!

Another area where uncertainties and confusions abound is in the provision of communication infrastructures. Many regional, national and supranational governments are currently exercised about the provision, pricing and breadth of communication infrastructure bandwidth as schools across Europe embrace the open protocols of the Internet. Should we be pushing for ISDN2? for an ATM school network? Will public service digital broadcasting provide enough interactivity for learners' needs? will new satellite technologies offer a global infrastructure whilst we worry about a regional one? or should we be relying on the market to provide what is needed at an attractive and affordable price. A simple indicator (the raw number of schools connected) is easy to collect and seems to offer a clear alternative: schools are either connected or they are not. Again, this simplicity masks a more complex debate.

Firstly unless our students are to be passive cyber-couch potatoes (see above) that bandwidth needs to be two-way. Some commercial visions of a learning grid for Europe imagine broadband content (for example video on demand) pouring across the continent with consumers, learners included, being merely interactive as they make their choices through key presses - choosing channels or answering multiple choice questions perhaps. This is interactive only in the way that a microwave oven is interactive but it is not participative. It is as though we had libraries but our learners were unable to write themselves, or to have access to each others' work. There is clear research evidence that the Internet becomes a powerful conduit for learning only when individuals have their own identity, tools to make a contribution, which stands with a parity of esteem alongside others' work, and a clear sense of communication with other learners. This ability to contribute is not only important in building effective learning, it is also the only protection for small cultures; without this two-way bandwidth, powerful authoring tools and the resultant opportunity to originate material, these small cultures (and Europe is rich in their diversity) will be engulfed in the same way that they have been by the economies of scale of television or cinema. Culturally, dissemination technology is imposing, communication technology is empowering.

Secondly, relatively little thought appears to have been focused on the potential impact of that communications infrastructure on the scale in our learning institutions. Around Europe as our national curricula expanded we typically addressed the problem of how to support an expanded curriculum through economies of scale. Big schools were needed to deliver the necessary variety and specialism demanded by a modern education system ("how can we teach electronics in a viable class size with a school of less than 1,000 or bigger?"). School sizes thus grew although the price was often the divorce of schools from their immediate and local communities. We delivered that economy of scale through the mobility technology of the 1950s and 60s - motor vehicle transport - and children across Europe were bused and driven to increasingly distant schools. At the same time we relied on transport technology to make large factories and offices viable. Now however 'superhighways' are supplementing our concrete highways. Broadband technologies are allowing companies to derive the economies of scale, and sense of community, that they need in other ways. Today's geographically spread multinational company relies increasingly on information and communication technology to give its large scale some cohesion. In education ICT has enabled us to ask the question "How big do our schools need to be, to be effective?" Clearly much, much smaller is possible but if smaller is preferable we need to think about how our learners can evolve the skills necessary to collaborate effectively between such institutions and we need to tell our school designers and town planners urgently.

Even the most seductive of new technologies bring uncertainties for us to debate. Multimedia has been welcomed by policy makers, students, teachers, parents and publishers alike. The consensus view is that multimedia is unproblematically a Good Thing. It is; yet this same multimedia technology poses some unexpected challenges for the European curriculum and for the way we manage and value learning. Our current definitions of literacy are quite narrow: text read and text written, with some critical awareness of others work, covers much of it. Multimedia however offers us many corridors to support communication, many corridors for success: music, speech, aural ambience, text, video, animation, graphics and symbols, a second language or more, synchronous or asynchronous time and more. It allows us this portfolio of communication possibilities individually, collaboratively, in private, in public, in the same place or different ones. The problem this brings is of a need for a much broader definition of literacy, clearly now encompassing oracy and graphicacy for example. However, it is most unlikely that Europe (or anywhere) will ever produce individuals who are strong in every band of the spectrum that multimedia offers (think how many fall at the hurdle of text for example). All of us can think of successful people who, in their business lives, are greater speakers than writers, or who debate across e-mail with a confidence they do not exhibit in the immediacy of a face to face meeting (or vice versa). The problem for our curriculum is to decide which subsets of these multiple media we will encourage or how small a set we are prepared to tolerate and at which ages. Again it is because the rapid advances in technology have made so much possible that we are now faced with the unenviable task of deciding what is essential. Different regions of Europe place different values on the different components of multimedia (some stressing oracy far more than others for example). Perhaps rather than striving for an increasingly elusive common agreement we should simply recognise that multimedia has guaranteed diversity and concentrate instead on identifying subsets of media capability which are demonstrably dysfunctional and need remedial interventionist support. A text-based curriculum built around individual endeavour would arguably produce dysfunctional learners in a technological world, which is a highly controversial conclusion to emerge from the promise of multimedia technology.

Finally, in the context of what is above, the recruitment and development of new teachers, together with the continuing professional development of existing ones, inevitably provides another area for debate and uncertainty. If the future curriculum is assured of constant change, if something as fundamental as the size of our learning institutions is uncertain, if even our basic definition of literacy is evolving, then how should we arm teachers for the future? Indeed can we? These are tough questions but they require answers now. The students already in training for a career as a teacher, and the serving teachers enjoying their in-service professional development will, for the most part, be responsible for the whole current generation of students. This makes their professional development in these changing times an urgent need. Whatever else their professional development needs to include it is hard to envisage anything that does not familiarise them with the new tools and technologies that will support learning in their classrooms. Just like their students they might reasonably expect to learn with (not from) a computer, and to be able to critically evaluate the change that ICT brings to their classrooms.

In conclusion it is clear that these are weighty debates to engage in. Should the debate be long and exhaustive? There is probably not enough time for such luxury. Real children today are living their real lives in real time. Their capabilities and the capabilities of the technology around them are advancing rapidly and we have no way to pause the clock even if that was our reactionary wish. There are some who would use the uncertainty of technological change to try to pause the clock; they seek to wait whilst we identify and impose 'standards' - hardware, software, curricular - but history has shown that the imposition of standards is most vigorously campaigned for by commercial interests exactly at the time when they are collapsing and of course uncertainty panics policy makers into looking back not forwards; today's 'inarguable' standard is always tomorrow's lost cause and the only certainty is of continued and frenetic technological change. Defining and imposing standards (rather than, for example, vouchsafing open protocols) will always have the effect of trapping us irrevocably at a moment of technological time. Rather, we should embrace the certainty of constant and continuing change, and plan to maximise the potential it offers our learners whilst equipping them with the flexibility they will need to survive. Each teacher and learner is, in a very real sense, an action researcher exploring what is, and is not, viable with ICT in learning. This ability to reflect critically on their own learning will become an essential weapon in the learner's armoury.

There are of course many bonuses to set alongside these problems and debates: the opportunity for expanded access, the enhanced cohesion and identity of our region through interworking and shared learning experiences that are not limited by geographical location, the vastly enhanced audience for children's work, the neutral and unthreatening role of the computer in the exploration of difficult concepts, and of course the look of delight and wonder on our learners' faces as a computer transports their learning to processes, places and achievements that were simply unavailable before.

This brief paper seeks to suggest that there are many complex, and controversial, details to explore as we hurry ahead with the implementation of ICT across the curriculum. However, looking at the wealth of research suggesting that our young learners come to technology with a confidence and competence that always exceed our expectations we should probably not worry about the detail of this debate but focus instead on the simple question of whether we are being ambitious enough for their future: ambitious in our evolving curriculum, in our evolution of technology tools, in the professional development of our teachers, and above all ambitious in our confidence of their excellence and potential as creative learners.

Within our lifetimes the social and economic success of regions globally will be judged by the magnitude of that ambition today and at last this paper has a clear message that all politicians can take to their electorates: be ambitious for learning. ICT has made that ambition an imperative for us all.

The 250 delegates at the EUN Launching Conference on 8-9 September took part in eight workshops.

Full details of workshop speakers and topics can be found at:
www.eun.org/launch

Day 1

ICT in the classroom - pedagogical issues
School networks and ICT policies in Central and Eastern Europe
The future development of the Internet
Towards a metadata standard for education

Day 2

ICT and the professional development of teachers
Non-European school networks
The Internet and multimedia
Educational publishing on the Internet

As well as including a number of thought provoking presentations, the workshops were characterised by a high level of participation by conference delegates, and discussions that could easily have continued well beyond the allotted time.

Summaries of the workshop were compiled by four rapporteurs and the Conference organisers would like to thank them for carrying out the difficult task of providing edited versions of what turned out to be extremely wide ranging discussions:

Jim Ayre Partner, Multimedia Ventures
Roger Blamire Manager, BECTa
Jan Hylén Deputy Executive Secretary, Committee on the EUN, Sweden
Rogelio Segovia Director, EUN Office

Reports by the rapporteurs reveal that several key issues surfaced across the workshops. In this general summary of these Conference sessions, therefore, we have decided to provide a discussion of major workshop ‘themes’ and ‘problem areas’ rather than attempt to simply provide a transcription of over twelve hours of discussion within individual workshops. By so doing we hope to highlight important issues which the EUN will need to address during the course of the Multimedia Project and to start to define an agenda for online discussion, which will subsequently be launched on the EUN platform. It is hoped that both Conference delegates and a wider audience will participate in an ongoing debate concerning how the EUN project should evolve and the issues which it needs to tackle.

The Future of the Internet

Speed of the Network

A Conference session by Jean François Abramatic, Chairman of the W3C Consortium provided delegates with an insight into how the Internet would develop over the next few years, and issues relating to bandwidth and speed of access were recurring worries in workshops addressing international co-operation and educational publishing, as well as those specifically focusing on technological developments.

The workshops particularly suggested that, to date, discussions on latency and speed may have focused too exclusively on bandwidth and access issues at the client site and that it was equally important to address issues relating to infrastructure and the interoperability or interlinking of regional and national networks. In Education the problems of delivering media-rich content on CD-ROM are only now being fully resolved with high speed 24X drives and new formats such as DVD. The legacy of this slow development may be that we are still focusing too much on 'local bandwidth' and the capacity afforded by the 'pipes' in client computers. These will remain important issues, but the workshops also suggested that a challenge for the EUN will be to raise the level of the discussion so that issues relating to architectures, infrastructure 'bottlenecks' and the 'speed of the network' are capable of being addressed at an international level.

Bandwidth must be two-way

Professor Stephen Heppell's discussion paper contained a wealth of quotable advice and exhortations. He particularly suggested that software tools should empower pupils, not just to explore others' work, but should allow them to be active contributors 'capable of authoring as well as browsing, annotating as well as selecting.' It must be ICT not IDT (information dissemination technology) which transforms Europe's learning potential'. The workshops also underlined this point and highlighted the fact that schools want to be providers and even 'broadcasters' of information, not just consumers of published resources. EUN workpackages such as The Virtual Library (WP12) will start to examine some of these issues by exploring how pupils can both download multimedia resources and upload their own work to a 'live' database. Clearly though, there are major technological, IPR and cost implications in providing schools with a 'back channel' that will allow them to communicate, publish and distribute as easily as they can search and retrieve. This issue should become a major item for discussion for the EUN's Technical Strategy Forum (workpackage 4), a body made up of the key technical experts from national and regional school networks.

Multimedia and the Net?

Mr. Abramatic's conference presentation underlined the fact that the multimedia capability of the Internet is still rudimentary, and clearly there is likely to be a discontinuity for some time between the sort of media rich experiences we can expect from CD-based resources and what is possible using low bandwidth connections over the Web. There was a lively debate in the workshops concerning how long full multimedia would remain something of a luxury 'add-on' for online learning environments. On the one hand we are already witnessing huge advances in our ability to improve Web graphics, produce more dynamic sites, and stream audio and video over the Web. Workshop participants were clearly excited by the new design opportunities offered by XML and were encouraged that Apple's QuickTime has already been accepted as the basis for the new MPEG-4 standard which should dramatically improve the quality of Internet video. At the same time though, many delegates recognised that DVD, immersive VR, new 3D interfaces, and next generation game consoles will further raise the expectations of pupils. Essentially opinions remained divided as to whether bandwidth and available data rates on the Web would grow as exponentially as they have done for CD-ROM and whether multimedia online environments were a short-term possibility or a long-term dream.

Currently within the EUN Multimedia Project leading European broadcasters (BBC Education, Radio Telefis Eireann and Swedish Educational Broadcasting) will start to explore the pedagogical, copyright and technical implications of making public service broadcast materials available across the World Wide Web for the use of teachers and students. Workpackage 10, the Digital Media Library, will provide a pilot database of still and moving images and live audio which pupils can use to create their own low cost multimedia materials. Clearly, however, this will only constitute EUN's 'first step' towards the provision of repositories where multimedia assets and all data types can be stored, retrieved and manipulated as easily as we can currently manage text-based resources.

Providing new structures for information, structure and knowledge

A recurring issue for both Conference and workshop speakers was how to provide structures that would more easily allow teachers and pupils to access and process 'raw' information and turn this into usable knowledge and skills.

Metadata

The workshop on metadata, for example, considered how new classification and tagging methodologies could substantially enhance the 'findability' of information. David Beattie reported on Schoonet Canada's metadata project which is already well advanced. This initiative is attempting to satisfy Canadian teachers who, like all Web users, are frustrated by the large amounts of redundancy generated by online searches and 'want rapid access to the materials they need, preferably in under ten minutes'. Although a debate ensued concerning the desirability or otherwise of a 'minimalist' metadata standard, what was perhaps surprising was the extent to which there was a general consensus that the differences between metadata schemes or approaches (IMS, Dublin Core etc.) were not fundamentally a problem. It was suggested that computers could go a long way towards making different schemes interoperable. The key issue for delegates seemed to be that we still know relatively little about how teachers and pupils instinctively classify information or the keywords that best approximate the logical structures via which they construct a search. There was agreement that initiatives such as EUN's own metadata project (Workpackage 7, Tools for Multimedia Metadata and Search Services) must first carry out extensive user surveys and help build a consensus on what constitutes a viable classification system for Education.

Low Overheads

In this workshop, and others, there was a view that any new structure must involve a low 'overhead' in order to be effective and must be capable of being implemented locally rather than centrally. Recognising the already excessive workload of teachers and librarians, for example, it was agreed that 'metadata must not become just another thing they have to do'. The basic concepts should be capable of being grasped by virtually anyone producing resources, and metadata tools must be user-friendly and require little or no training of teachers.

Why Change?

It was also suggested that the 'business benefits' for new structures must be convincingly outlined and argued. Irrespective of the direct financial investment needed, there was a recognition that introducing new structures requires teachers to invest their time (often out of school hours) which is always the most precious and scarce commodity in Education. In Industry as well, ROI (return on investment) is an expected yardstick when new processes or structures are introduced; publishers no less than teachers and librarians must be persuaded that metadata, online repositories, or new distribution channels provide real added-value for their businesses and ultimately have a positive effect on revenues.

Providing structure to learning, therefore, increasingly becomes a debate about strategies for 'change management' and several delegates highlighted the need for initiatives such as EUN to collaborate with industry 'to make sensible standards and workable structures'. A key goal for the EUN will be to show how existing structures can best be improved, and provide persuasive arguments why teachers, pupils and industry should make the necessary investment and commitment to communicating and learning online.

Publishing and Content

Authoring is Learning. Issues relating to 'content' arose in several sessions and not only in the workshop specifically concerned with Educational Publishing on the Internet. Many delegates wholeheartedly endorsed the view in the conference discussion paper that the EUN must examine how pupils themselves are 'contributors' of material and not just 'consumers' of professionally published texts and multimedia resources from third parties. There was also a consensus that user-friendly software tools should allow pupils to create their own resources and not just explore those developed elsewhere, a view which workpackage 12 of the EUN Multimedia Project (The Virtual Educational Multimedia Authoring Laboratory) will investigate in some detail.

Copyright

A discussion of copyright and IPR issues highlighted the extent to which digital signatures, watermarking and full blown Electronic Copyright Management systems are now making it possible to properly regulate and license the use of resources in Education and guarantee the security of such things as the distribution of exam papers. It was suggested that publishing on networks will only be successful if asset owners can be given confidence that their rights are being protected. In the current environment, where many countries cannot even accurately report how many photocopiers are in schools, one can appreciate why this is such a live issue. Electronic rights management promises not only protection for digital copyright material but also an environment in which both rights' holders and users can place their trust and do business.

IPR and 'Multi-authoring'

At the same time though, the heightened awareness of IPR throws up some thorny problems for initiatives such as EUN. For example, as we move increasingly towards a situation where the 'multi-authoring' of resources by pupils is encouraged, does it make sense to think of complex systems, aimed at identifying 'document authenticity' and rights which are primarily aimed at protecting the 'canonical' or original version of a document by a single author? How do we legislate for an environment where pupils are working collaboratively on documents and resources and these are being added to in subsequent semesters and school years by a different group of authors? So-called 'fragile' watermarks make it possible to indicate that a document has been changed or is 'telling the right story', but what if there is no 'right story' and only a constantly developing one told by different generations of pupils?

The Commercial Return?

Turning to commercial considerations, micropayments and digital cash systems are beginning to emerge but it is clear that the costs of actually carrying out the transaction must be driven down further. In some instances the cost of carrying out copyright clearance is still more expensive than the assets themselves. There is also the question of how we protect the IPR of pupils and reward them for developing learning resources which can easily be traded and sold over networks, and may well have considerable commercial value. EUN's workpackage 2 (Copyright and IPR issues) clearly has a considerable agenda to work through.

The Missing Business Models

Publishers also reported that commercial considerations were uppermost in their minds. Exciting work is already being carried out in building online virtual communities, and design paradigms for networked learning environments are now appearing which are radically different to those developed for CD-ROM. However, business models for online publishing are slow to emerge and the Internet's tradition of providing free information is proving to be something of a dead-weight for companies which require a realistic and speedy commercial return on investing in online versions of existing resources. Governments are also well attuned to the fact that smaller countries in particular face considerable problems in developing learning materials which are tailored to the specific requirements of their national curriculum and/or own language. In his conference presentation, Michael Martin, the Irish Minister of Education and Science, admitted that the hardest problem his Ministry faced was 'the development of indigenous content and home-grown software', a sentiment that was echoed by many conference delegates, especially those from Central and Eastern Europe. Several delegates hoped that online publishing economics might well ameliorate this problem by allowing teachers themselves to participate more easily in the authoring and publishing process, but it was clear that we are still some way short of arriving at a workable business model capable of accommodating Europe's linguistic and cultural diversity.

Professional Development and The Role of the Teacher

Greater Transparency

It is now taken as given that the role of the teacher will undergo enormous changes under the impact of ICT in Education. Delegates almost unanimously started with the assumption that teachers will progressively become more of a mentor and guide, and that pupils will increasingly become more responsible for their own learning. It was also suggested that the growth of school networks would result in a situation where 'teachers are no longer isolated' and where it is easier for them 'to become a resource for each other' as they make their own contribution to Web-based resources, and for and 'add to the collective pool of knowledge'. Electronic communications also hold out the possibility that teachers will be able to respond much more quickly to parents' requests for information and assistance, breaking down barriers between the home and school. In short, for the majority of delegates, school networks and ICT generally will provide much more 'transparency' to the whole learning process and will allow all those involved 'to help each other to do their best'.

Resist the lure of technology

Given this general mood of optimism, however, it was sobering to be reminded by so many delegates that the realisation of this scenario still faces many obstacles. Several participants suggested that we must 'resist the lure of technology' and ensure that our desire to change the learning process and the role of the teacher is underpinned by sound pedagogical research and principles, coherent methodologies, and policies which recognise that the technologies that we use are simply 'tools' and not an end in themselves. Several participants suggested, for example, that first and foremost we need to build 'human networks' in order to exchange ideas and share experience, and that we were only beginning to understand how electronic networks could best be exploited for this purpose. We were reminded that the ability to extend a discussion to an online audience of several thousand teachers does not necessarily enhance communication and may merely produce 'noise'.

Will it scale?

Caution was even more of a watchword during a discussion of ICT in teacher education and professional development. While recognising that much value had been learnt in recent years from Commission-funded projects such as Trends and T3, serious concerns were expressed as to whether existing teacher education strategies would 'scale up' and allow for full scale deployment. It was pointed out, for example, that even our largest and most successful teacher education projects have involved only around 3,000 individuals. In project terms this is an impressive number, but measured against a European population of 4 million teachers, all of whom will require training in ICT, we clearly have some way to go before we can confidently assert that we have a formula which will transfer across to indifferent, fearful or even hostile teachers as well as those 'early adopters' who have thus far participated in projects. In short, 'as yet, we don't have a road map'. Not unlike corporations, therefore, who are currently debating whether Windows NT will 'scale to the enterprise', European researchers and the EUN will have to consider whether its strategies for professional development are merely interim solutions or whether they are adequate for the magnitude and full complexity of the teacher education challenge. The EUN workpackages, most directly devising strategies for integrating ICT in the classroom and improving teacher development (WPs13,14 and16), obviously have some major issues to deal with and particularly must extend the scope and reach of their research so that lessons learnt from the EUN's network of innovative schools (ENIS) will transfer across to those schools who are much lower on the ICT learning curve.

Learning to Share and Inspire

Sharing Global Expertise

With participants from member states, Central and Eastern Europe, the USA, Canada, Japan and Australia, the EUN workshops provided a unique opportunity to directly share experience and information on how school networks are evolving globally. Countries are obviously at very different levels concerning the pupil/computer ratio, Internet access and the sophistication, availability and cost of telecommunications infrastructures. One of the most striking features of the discussions, however, was the realisation how quickly progress could be made in some of the smaller markets given the political will, a coherent ICT strategy and well targeted funding programmes. The workshop discussions hinted that smaller countries may well have an advantage in being able to learn from the mistakes of more advanced national programmes and being capable of implementing their own ICT policies more quickly.

Long-term investment

There was a clear desire on the part of 'less advanced' countries to listen to and benefit from the experience of those who have already made significant progress in the wide-scale deployment of ICT in Education, although there was an appreciation that cultural and political differences made it difficult to recommend a 'one size fits all' implementation strategy. In spite of this, there was a consensus that ICT in Education can only be successful if it is viewed as a long-term investment and workshop participants agreed that the most successful strategies to date have adopted 'whole society approaches' involving pupils, parents, teachers, administrators, universities, industry, regional and national Governments.

Public-Private partnerships

New public-private partnerships linking the business sector with central/local administrations and individual schools are also emerging as a key driver of new learning models involving ICT. The cost of large-scale ICT deployment, of course, necessitates this, as there are severe limits on the depth of the public purse. Many delegates suggested, however, that, irrespective of economic considerations, public-private partnerships were desirable in themselves as social policy and will hopefully break down the artificial barriers of what currently constitutes Education and Business. The development of EUN's own Business Plan and strategy for long-term sustainability (workpackage 4) will certainly take on board this injunction to adopt a more 'holistic' view of Education which forges close working relationships and maintains a steady dialogue with industry.

Building confidence

Finally, the workshops highlighted that, just as finding the time not the technology' is the key concern for individual teachers, the major hurdle for initiatives like the EUN is finding ways to inspire teachers and build confidence'. The conference presentations, workshop discussions, and the applications in the exhibition outside the main auditorium were convincing proof that school networks are already beginning to change our perceptions of what constitutes effective learning, and potentially can enhance the educational experience of all pupils in every European school.

Following the conference, a key challenge for EUN will be to demonstrate existing successes to a much wider audience, continue to build on these and show how ICT can change the learning process and provide real added-value. Change for all of us, of course, can be time-consuming, sometimes disconcerting and occasionally even threatening. However, by providing a 'network of networks' and a 'window' on what ICT can offer European schools, EUN will hopefully become a major force in a confidence-building process that will touch every European teacher.

In his conference discussion paper Professor Stephen Heppell encouraged us to 'be ambitious for learning'. EUN looks set to rise to this challenge and will continue a series of discussions online related to issues raised at its launch conference.

Watch this space http://www.eun.org