



Education

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Abstract:

This publication has grown out of an invitation Conference at Bangor in July, 1989. The brief was to examine the possible role of IT in Education in the year 2010. Although the materials produced focus on the place of IT in education over the next twenty years, their relevance extends beyond that of the IT community. They will be of interest and relevance to all teachers who have an eye on the future. A number of different scenarios are offered as the basis for promoting discussion with either pre or in-service teachers. So far the activities are proving highly successful in encouraging lively and imaginative debate.

Acknowledgements:

Particular thanks are due :

to Ralph Tabberer at NCET for agreeing to fund the Conference
to Research Machines and NCET for contributing towards the cost of publishing this book and
to all the delegates who gave freely of their time during the summer of 1989

With the sponsorship received, one free copy of this book has been sent to every Local Education Authority in England, Scotland and Wales and to every Education and Library Board in Northern Ireland. One free copy has also been sent to every teacher training establishment in the UK.

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Prologue

'To survive in the 21st century the universities must replace all but the best lecturers by recorded material, with teachers concentrating on tutorials. But that is only a beginning. Computers will both integrate the whole system and help the student to chart his way through it'

'Within a generation, unless universities change dramatically, competition from the information industry will give them a purely marginal role in both education and society.'

Both these quotes are from the same article, 'Why academics are under threat' by Douglas Hague (Financial Times, 15/2/89). Do similar sentiments apply to education in general, particularly schooling 5-16? In order to consider this question, and specifically the role of IT within education, a small group of educationalists met in Bangor in July, 1989. We decided to focus our attention on education in the year 2010; half the working life away for any young teacher currently entering the profession.

This booklet presents the essence of that Conference, which was entitled 'Education 2010'. We wanted to provide a set of materials which would encourage teachers to step back and take a considered look at where education may be going and what, more importantly, we might do to enable us to influence it in the right direction. Is education in danger of being hi-jacked; of becoming a consumer led product; of being driven by market forces (perhaps you think it should be!!)? Are we in danger of losing sight of the educational process that has been nurtured and developed over the years in favour of a system of instruction and assessment?

There are two distinct sections to the booklet. The first section includes a number of different ideas, presented in varied formats. The common thread which links these papers is that they are each designed to offer a focus for discussion during either pre- or in-service education, when students or teachers are being asked to focus on future possibilities for education. At present we tend to live from hand to mouth, most thinking is pragmatic and aimed at solving the immediate problems.

Three of the discussion papers in the first part of this booklet open the debate by suggesting differing scenarios for the school of 2010. Each of these papers is followed by a selection of ideas about the way in which the scenario might be used. Another paper raises some of the issues concerned with communications. Hardware will be cheaper and more powerful in 2010, but communications and information could still be relatively expensive. The fifth paper provides two simulations; one based upon technological developments, the other on technology, change and human values.

These papers were produced, by groups of people, over a three day conference, they are not intended to be definitive documents but, rather, to act as starting points. The suggested activities are imaginative and reflect each group's approach. You may have different opinions, and your own ideas for extensions or modifications or other follow-up activities. The materials are designed for use in pre- and in-service education, please adapt them, but acknowledge the original source.

The second part of the booklet consists of a number of different scenarios for Education 2010. These were written, by individual participants, prior to the Conference. The brief was that the scenario 'should be speculative but plausible, and must be attainable (assuming the availability of reasonable financial resources)'. Thus, these papers present a range of personal perceptions which formed a background to debate at the Conference. They are included here because they provide a context for the first section of the booklet.

We hope that this booklet will help stimulate debate about education in 2010 and that it might promote further meetings and Conferences. I will be happy to receive any feedback and suggestions for modifications or future activities.

Roger Keeling
October 1989

Co-Learners and Knowledge Counsellors

What is this resource?

This set of papers was produced at Y Coleg Normal, Bangor, at the Education and Information Technology 2010 Conference in July 1989.

Clearly 2010 is a long way away and yet the choices we have to make and issues we have to discuss today will directly affect the way educational computing looks in 2010.

This resource aims to provide three scenarios for the way that "learning institutions" might look in 2010. They are intentionally fun to read but rooted in serious extrapolation and in our knowledge of current developments. They are, we hope, stimulating enough to help readers to debate the Issues, and to want to tackle some of the Activities, in Item 5.

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Item 1. Factsheet on Multimedia

The Three Scenarios

Item 2 Lo-tech, Lo-Budget, Lowlands School

Item 3 Drop in to The Learning Centre

Item 4 A big "Hi" from High Tech High

Item 5 Activities and Issues Sheet

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Co-Learners and Knowledge Counsellors
Contents page and Introduction

Multi-media - Fact sheet

Rather than speculate about what will or will not be possible by 2010 you might find the following check list useful. This is neither science fiction, nor is it wild extrapolation. The technologies below will all be here well before 2010.

The following things are attainable and will be part of normal personal hardware well before 2010. This development will be led by the 'home' and consumer markets and will be very common in the workplace.

- laptop computers with photograph quality colour screens
- 'unlimited' memory and storage
- faster / easier links between computers
- universal access to libraries of information, films and sound, at a price

The computer screen will be able to display multiple video pictures from TV, Satellite and compact / optical disc. The user will be able to select images or clips of film, manipulate them and link them together to create their own montage of images. High quality audio from live-sound, disc, broadcast and synthesized speech will be a normal part of the use of the computer. All these sounds can be selected, modified and stored.

In 1985 a Quantel paintbox system (as used on 'Top of the Pops' to play with images, or to create the 'Channel 4' exploding logo) cost around £100,000. This sort of power will be available to the personal user in the next few years for their personal computers. A child with a laptop tomorrow, will have access to the same sorts of creative tools that television producers use today.

To go with computers there will be a range of extras: large very-high quality thin flat screens, colour printers, music keyboards and other instrument kits. The 'feeling' technologies from 'arcade simulators' will become commonplace.

The quality and quantity of images available will significantly narrow the gap between real-life experience and simulation.

Computers will not become very much cheaper and standardisation is unlikely. Restricted speech input may become possible although achieving a casual conversation with your computer is unlikely. Computers are, however, likely to have improved, very natural, speech output.

The biggest cost to schools by 2010 is likely to prove to be the high cost of information rather than hardware.

Lowlands School

Working for a Stable Community

date as postmarked

Dear Parents,

I am writing to you at this important time in your child's life to help support the difficult decisions ahead.

Here at Lowlands School over 2,500 students enjoy the traditional values and stable culture that parents and grandparents still recognise as important.

At the centre of Lowlands is the school farm. This provides a laboratory of life as well as a substantial part of the school's income. A day at Lowlands might include early morning milking before moving on to practical mathematics in the accounts office. After breakfast a period of Modern Language Studies might be followed by Science in Horticulture. Afternoons might be spent at market, guiding visitors around the farm, working on product design in the traditional craft workshops, on engineering projects or at the Appropriate Technology Centre.

The foundation skills of numeracy, literacy and oracy focus on the real needs of a growing community. Our lessons are founded in real, useful and practical experiences. We believe that what you see is what you study. And for the community at large the commitment at Lowlands School proves time and time again that what you sow is what you reap.

We do not base our curriculum on the shifting sands of

technology, with the vast resources that need to be squandered on ephemeral information. Other schools, usually in the pockets of industry or commercial interest, always with over generous funding, have lost what we care about most.

Our hand picked teachers have years of real, practical experience. Many have returned to Lowlands enriched after a wide variety of careers. Although class sizes are large, we attempt to nurture each child through the evening tutorial. Tutor groups are large, typically around 80 and this provides a fertile forum for interchange and peer support. In addition, pupils can raise issues through the School Council on which they are represented by senior students.

Our educational philosophy provides the rare opportunity for students to take responsibility for themselves and for others. We intend that this provides an important platform of social skills from which to launch a life of useful citizenship.

Our philosophy has been confirmed over the years; students coming to Lowlands, sometimes reluctantly, from technologically focussed schools, have quickly found our balanced approach to education to be more in tune with the realities of their lives.

Feel free to come and walk around Lowlands. Admission charges are always waived for prospective parents. There is no limit to the number of children that we can welcome here at Lowlands.

A. P. Toddy

(Headteacher | Tenant Manager)

The Learning Centre

At the Learning Centre you, your family and friends can make your contribution to the Information Age.

We believe in participation and actively seek to encourage collaborative ventures.

If you are worried about drowning in oceans of information The Learning Centre provides the tools to let you make sense of and use, current technologies.

Instead of watching the news every night our students are out there making it.

All of us are special. And we all bring something special to The Learning Centre. By working together we can share our expertise and share our enjoyment as we explore, create and present innovative and stimulating material. We let our learners' activities and outcomes speak for themselves and have no need to hype.



Current working groups include:



"Patterns of Parenthood" - support material for global parenthood,



"New Sound Experiences?" - an audio tapestry across three generations of musicians.



"Voices in a Room" - a live learning link up between minority language speakers in Wales, Friesland and Goa.



"Comic Culture" - a text free, local, neighbourhood animated broadsheet running live at bus stops.



"Don't Forget Grandma" - a small business support package to revitalise lost skills.

What experiences await you at the Learning Centre?

Let's look at the lives of two Learners. Enriquez, 9 and Morwenna, 13 joined us last year on a four year scholarship from a TechnoSchool in the Falklands.

They are currently exploring marine food chains - Enriquez has a specific focus on Whales whilst Morwenna is concerned with mapping the emergence of mutant life forms in the Irish Sea. They have built a powerful presentation patched together from European Broadcasting Corporation Video archives, original footage they shot themselves and some live scenes that MonitorSat located for them. Of course there is a lot of talk from Enriquez and Morwenna edited into the presentation but they have located some good expert inputs which can be incorporated too. Enriquez's Whale project routes out of this joint presentation and ties up nicely with some work that he did back at TechnoSchool. Morwenna's Irish Sea Study is linked into some of the work that the Ethnic Folk Tunes group are preparing and they have both learned a lot from each other and the others involved.

Enriquez and Morwenna have not got the same Knowledge Counsellor but their mother is able to spend some time each week with them. She is at The Learning Centre two days a week anyway as a Co-Explorer. She brings her own special skills in modern languages as an Argentinian national and expert in South American cultures.

We consider the learning environment at The Learning Centre important because we allow our learners to follow the routes that they choose for themselves, we let them revisit and rework their ideas and we let them work together when it seems appropriate.

Come into the Centre at any time. Talk to our learners. You will find them to be confident, excited by, and involved in, their work, happy to share this excitement with you in the way that they share their expertise with one another. Over the years we have found consistently that individuals of any age are welcomed and their ideas valued and respected by the learning community within, and well beyond, our campus.

While you are visiting drop in to our open access records centre. Here you will find our learners self assessment profiles which give a clear indication of the personal and intellectual developments that characterise our learners. Also feel free to browse the extensive presentations bank of past work and work in progress. In many cases learners will be only too pleased to accompany you as you explore their presentations. Often past learners will link in live to enjoy your reactions and support your quests. Please don't hesitate to question, or to offer your own expertise.

Our Knowledge Counsellors have amassed a vast experience as co-explorers and guides within the Learning Centre; often they themselves have completed pathways through the centre and are anxious to repay some of the vision and support they enjoyed. Most of them are in employment for a part of the working week outside the Centre and we actively encourage this.

Of course, none of this would be possible without funding. We pride ourselves in offering peripheral support for all our learners' personal computing equipment and our technical facilitation staff are second to none.

We offer our learners the best there is. And the best is not cheap.

High Tech High

"from the cradle to
the gravy train"

An invitation to parents. . . .

Do you want your children to
be successful ?

The individualised program for your child from High Tech High guarantees results. Our highly trained team of education professionals tailor the learning to your child's needs nurturing their strengths and building on their personalities. High Tech High will provide your child with the tools to succeed in our competitive world.

*83% of High Tech High graduates achieve
highly paid professional jobs.*

How do we achieve this?

By harnessing the latest High Tech technologies and the latest learning approaches.

Our learning counsellors will assess your child and discuss with you which program of study they will follow. Current programs of study include:

The Science Program, The Enterprise Program,
The Arts Program, or The Lifeskills Program.

Co-Learners and Knowledge Counsellors
Item 4: A big "Hi!" from High Tech High

The Foundation Program will suit those children who are starting out on their learner careers. Through **carefully designed** and structured modules, they are equipped with the tools for later Programs.

From day one you will be able to **watch your child grow in knowledge** through our daily computer generated profile of achievement.

Harnessing Hi-Tech at High Tech High.

Using the **latest** in multi-media learning packages, your child is presented with a distillation of the knowledge from the world's leading authorities on all major subjects. Your child will learn history from **Professor Chandler** of the University of Wisconsin, Math from **Dr Cray** at the Leibzig Institute and Business direct from **Donald Trump's** team at the Bonn Business School.

Then, through sets of carefully graded assessments, your child can earn valuable profile points towards their place in the Learning League. **While children are able to explore, the points system encourages them to keep on target.**

But is it fun?

Yes of course. We feel learning should be fun and should have its **rewards**. Children collecting profile points can redeem them against **prizes** such as games, toys and books as well as **educational opportunities** such as visits and travel.

Co-Learners and Knowledge Counsellors
Item 4: A big "Hi!" from High Tech High

OK, but I need to know more.

Here is a typical day's schedule from a child engaged on the 2nd level of The Science Program:

0800-0815	Morning Prayers
0815-0900	Consolidation Refresh the material you met yesterday and set the targets for today
0900-1200	Lab Session 1 Work on the science lab consoles These sessions encourage individual learning of science topics using simulation enhanced by audio-visual stimuli (including industrial and commercial case study perspectives). At any stage the child may attempt one or more achievement tests to earn profile points. Refreshments may be taken at any time during this period.
1200-1230	Health thru Leisure A wide range of physical and mental leisure experiences are supported.
1230-1300	Luncheon
1300-1400	Social Interaction Period Learning consoles are automatically shut down during these periods.
1400-1600	Lab Session 2 This session might allow a student who has studied science in the morning to master business and commercial skills enabling them to exploit the marketplace.
1600-1630	Review of Achievement Each child reflects on the achievements of the day, receives their Learning Profile (for signature by guardian) and a set of Evening Work Targets.

For the younger child a shorter day (0800-1500) is offered, although many families prefer the long-day option.

How do I know my child will benefit and get good value from the High Tech Approach?

High Tech is part of the United Education Corporation and is committed to the highest quality of schooling at the **lowest possible price**. Through individualised computer based learning and **corporate sponsorship** we keep the cost to you down. Indeed more than 60% of our students receive a **United Scholarship**

Co-Learners and Knowledge Counsellors
Item 4: A big "Hi!" from High Tech High

Activity Sheet Things to Do and Explore.

- Read the enclosed fact sheet (item 1).
- Study the three scenarios (items 2,3 and 4).

Choose any or all of the activities below:

- 1 Structure your own discussion around the Issues Sheet
- 2 Create your own scenario
- 3 Select one of the scenarios. Design the layout of a part of the institution, focussing on the use of technology and the resources available.
- 4 Write a diary for "a day in the life of" a twenty first century learner.
- 5 Draw a large "cartoon" of a "Learning Counsellor / Co-Explorer" showing their essential attributes!
- 6 Write a letter of complaint from a dissatisfied parent at any of the "scenario" institutions.
- 7 Submit a Project Outline for a group at The Learning Centre **or** devise a Program of Study for an individual at HiTech High.
- 8 Write an account of a child's visit to all three centres comparing them from the child's viewpoint.
- 9 What skills and insights did you require to get to where you are now? What additional skills will you need to equip you for 2010?
- 10 Plan a further activity for colleagues based around what you see as the most important issue.

The Issues Sheet

Things to discuss and develop

- HiTech High, The Learning Centre and Lowlands all offer different forms of Personalised Learning. How do we evaluate and choose between them? Do we need to?
- What is the role of the teacher of the future?
- How might we assess the process outcomes claimed for any of the institutions?
- How do we recognise and avoid bias in information sources?
- How do we provide access to information? What are the issues of ownership and control?
- How do we afford both the appropriate technology and access to information? What are the issues of costs and resources?
- What should the relationship be between home "edutainment" and "school learning"? How should we respond to a student coming in to school with a Sony Thinkman (or whatever)? Is there a future for family learning?
- To what extent do the scenarios cater for differing learning and thinking styles?
- Can competitive and collaborative work be compatible?
- How do we address issues such as equal opportunities including special educational needs?
- These scenarios are EuroCentric and elitist. How will these advances affect learning in, for example, South America or Africa?
- What do we anticipate that the main sources of funding for education in Europe will be? What are the implications of these sources?
- What values do we want to find in education, in 2010?

Co-Learners and Knowledge Counsellors

A Simulation

(This exercise has been developed by Dr Niki Davis. It uses the material in the previous pages as the basis of a role play exercise)

Initial Briefing

Welcome to the world of Co-learners. It is the year 2010 and the location is a primary school meeting intended to help parents decide which secondary school they will choose for their children.

The meeting is chaired by the primary school head. Three secondary schools have sent representatives to 'sell' the merits of their schools. The rest of the group consists of parents and governors of the school. The head will introduce the representative from each school, allow them 5 minutes to 'sell' their school and allow time for questions from the audience.

Each person (or pair) has an individual briefing, except for a few parents who may decide on their own role. You are free to invent any further background details that seem helpful, but these must be entirely consistent with the details with which you have been provided. Please take your roles as seriously as possible: this is not a game. Once we start my role is solely that of a visiting HMI.

Instructions for the Facilitator

Before the session:

- (i) make copies of the school prospectuses and the specific briefings
- (ii) prepare some headings on a flip-chart from the issues sheet of the 'Co-learners and Knowledge Counsellors' section to use in the debriefing.

At the start of the session:

- (i) Hand out the factsheet on multimedia to all the group and explain briefly what it covers. Tell them they are going to act a role play to bring educational issues alive. Read out the initial briefing.
- (ii) Allocate roles for the participants to take. The number of participants will dictate how many you allocate. Choose three pairs (or individuals) to represent the three secondary schools, a chair person to act as a primary school head. Direct the rest of the group to act as governors or parents of children in the primary school.
- (iii) Hand a copy of a different school prospectus to the representative(s) of each secondary school. Hand a copy of all three prospectuses to the primary school head and to all the parents. Give out the specific briefings to the primary school head and the parents. You may let the latter choose among themselves which one they would like to take; it is not necessary to use them all.
- (iv) Announce the time constraints and any other matters of administrative convenience. This should include 5 minutes reading time at the start.

It is also very important to set aside a substantial period of time after the simulation for a serious debriefing in which the main aims are:

- a) to air as fully and sensitively as possible all of the issues which people perceive as having arisen within the simulation;
- b) to consider how these are related to the specific issues you may be concerned with regarding computers and education.

During the simulation you should listen, making notes which will assist you in the debriefing.

Individual Briefings

The three representatives from the three schools will take their briefing from their school's prospectus.

Primary School Head

You act as chair to the meeting and will allow each secondary school up to 5 minutes to talk. Then throw the meeting open to questions. Repeat this for the other two schools and, if time allows, more questions may be permitted at the end. You will also act as referee if the meeting becomes too heated! You may decide to ask for a show of hands to vote for each school at the end.

Parent 1

You have a shy but bright daughter. Samantha is very keen on ballet. Money is not a big problem.

Parent 2

You have a large family and this is only the first child to be transferring to secondary school. Kamleish is very keen on football and although fairly bright he does not apply himself to studying without a lot of pushing. You are worried about finances if all your children need an expensive school.

Parent 3

Your child has special educational needs because of a hearing difficulty and some difficulty with coordination. You are very worried about support both educationally and socially for Peter.

Parent 4

You are a traditionalist and you would like your children to be educated in a similar way to yourself. After all you are doing quite well in a good sales post.

Parent 5

You earn plenty of money as a solicitor and you would like your son Malcolm to follow you in the family firm.

Parent 6

You are an unemployed labourer who had an awful time at school 15 years ago. However you don't want your daughter Mary to get too many new ideas. You think she'll be happiest married and settled with kids of her own.

Parent 7

You are a single parent and finding it a strain with 3 kids. The eldest, Carrie, is at High Tech High, but it is difficult to find enough money for all the extras. You would like to send John there but need a scholarship to make that realistic. You would also like to relax in the evening, not supervise work!

Parent 8.

You are a single parent with one child who has a wealthy God Parent willing to finance his education. You want to give him the best and are aware that he is lonely and needs more friends.

Parent 9.

You are an outworker for a software firm and so have a work room in your home. You have two children who are very different and quarrel quite a lot. Jo is already a member of 'The Learning Centre' but you are finding it hard to be a co-learner when deadlines are tight. At other times it is great! However you have to consider whether this is also right for Tuam.

Parent 10.

You work from a country home as a engineering consultant. Your twin girls are average educationally and socially. Your salary can vary a lot.

Primary School Teacher-Governor

You are a teacher from the primary school and would like to ensure the parents recognise how different these schools are and what lies behind their sales talk.

Primary School Governor

You run a medium sized firm in the town and would like to encourage the schools to turn out pupils who will be prepared to train for the furniture trade. This may cover things from computer assisted manufacture to a knowledge of the export trade.

We Have A Dream!

This section is designed to provide an opportunity for attention to be focussed on the ideals and principles of education. We present a vision of what education might be like in 2010, we identify how technology can contribute to the realisation of this vision, we list the changes that need to be made if the vision is to be attainable, and then we list some of the issues that arise. We hope that the papers will provide an opportunity for an exploration of value judgments and beliefs.

This set of papers can be used in a variety of ways, here are a few suggestions. The papers could be read and some of the 'Issues' be discussed; individuals or groups could write a similar paper focussing on their own vision and its implications; only 'The Vision' could be distributed and participants could write their own sections about the role of technology, necessary educational changes, and issues that arise. Presentations could be made by a group who had adopted the role of a facilitator, a learner, or a parent, living within the vision. Two groups could be set up, each group would focus on one issue but from a different perspective. For example, the first group could work together to devise a strategy for persuading members of the second group that one of the changes is absolutely vital (e.g. persuading a group of managers that the timetable in the primary school should be abolished). Each activity should be designed to stimulate thought about the nature and value of education, and to provide an opportunity for examining existing assumptions.

These suggestions are the result of the deliberations of one of the discussion groups who were concerned about how technology could help fulfil the vision of a future where there would be less distinction between learners and teachers.

The Vision

Aim of education in 2010

To provide a setting within which learners acquire the skills and attitudes necessary to achieve and maintain ownership of their own education, where education has become the life-long process that we have always claimed it should be.

This setting has to reflect both that the learning process is open ended and that from the individuals perspective the ever growing knowledge base appears to be infinite and thus can only become meaningful through personal exploration and experience of inter-related parts.

Attitude

A primary achievement will be the freedom from the fear of failure alongside a preparedness to explore and enjoy informed risk taking in all human experiences. All forms of learning will become valued and free from bias.

Learners

The development of individuals as decision makers will be supported by a learning process which considers:

- Goals
- Form of evaluation
- Method of realisation
- Organisation of and allocation of time
- Cooperators, collaborators and competitors

Teachers and Enablers

Teachers will be professional enablers and skillful learners. Their role will be to remove barriers to learning. Learning will be part of the enabling process. Anyone can be an enabler.

Learning Environment

Content is not predetermined but gains a particular structure and any necessary constraint through supported (enabled) choices made by the learner. The institutional barriers will have disappeared. All environments will be recognised as having potential for learning. Everyone, worldwide, will be expected to accept responsibility for learning and enabling.

Organisation and Management

There will be freedom from arbitrary time constraints. All learners will have open access to all Centres of Education (Resource bases).

Resources

The environment will be a rich resource with multi-media IT available to support all aspects of emotional, physical, social and intellectual development.

How Technology can help achieve the vision

Technology has the potential to offer wider power to learners and teachers/enablers. Technology alone may not produce any change but its availability should be the catalyst for these powers to be realised. The crucial factor is the context in which it is used.

The personal laptop companion

By the year 2010 laptop technology will be available on a one to one basis and will be as cheap as the pocket calculator is in 1989, so should be provided as a standard tool of the 'learning trade'. These laptops will be capable of being linked to large stores of information either through local networks or wide area networks through a communication system such as telephone lines can provide. The stored 'information' will include text, pictures, diagrams, moving video sequences and sound. The laptops themselves need to be capable of doing whatever we demand of them.

The larger micro with display screens for individual or collaborative work

Larger micros will also be available as workstations, providing a technology-rich environment for individuals or small groups. By comparison with the continuing laptop presence on the individual desk (or in the individual carrier bag), these larger micros will present one, two or more large display screens for the simultaneous display of text, pictures and moving video sequences, as well as sound and voice synthesisers. Although, in technological terms offering little more than the laptops these larger micros will provide a much richer sensory experience for individuals or groups, encouraging personal and collaborative creativity. The larger screen (or screens) will also be invaluable in focussing the attention of a pair or small group on a shared concern.

An 'Educational Computer'

The concept of an 'educational computer' warrants consideration - or in other words a personalised device for handling the information that is used for education purposes rather than borrowed from commerce (this is likely to be more rather than less versatile than the industrial equivalents).

Easy Access , International Communications.

The realisation of appropriate applications of distance learning will rely on easy access to international and wide area networks of wide band communications.

A sort of 'education dating agency'

An education dating agency could be available providing :-

- Databases of learners seeking collaborators who are seeking co-learners
- Databases of enablers who have skills and knowledge they wish to share
- Databases of enthusiasts who wish to share.

Collaborative learning technologies:

One shortcoming in current technology is the limitation of current systems to handle collaborative work. We would envisage a system where personal computers will be able to feed into a host system which would allow a public display of shared space on the screen (see diagram). It is envisaged that groups will be working (in the main) in the same room. The system will be designed to be flexible, supporting a wide range of styles and a variety of purposes. The great advantage will be that ideas can be developed on screen as well as orally, and provide a written record.

The cooperative working tool will cope with the foibles of individuals engaged in a meeting allowing individuals and groups to:

- interrupt conversations
- call for a reprise of ideas
- make private asides and personal reflections
- make decisions jointly

What do we need in order to achieve the vision?

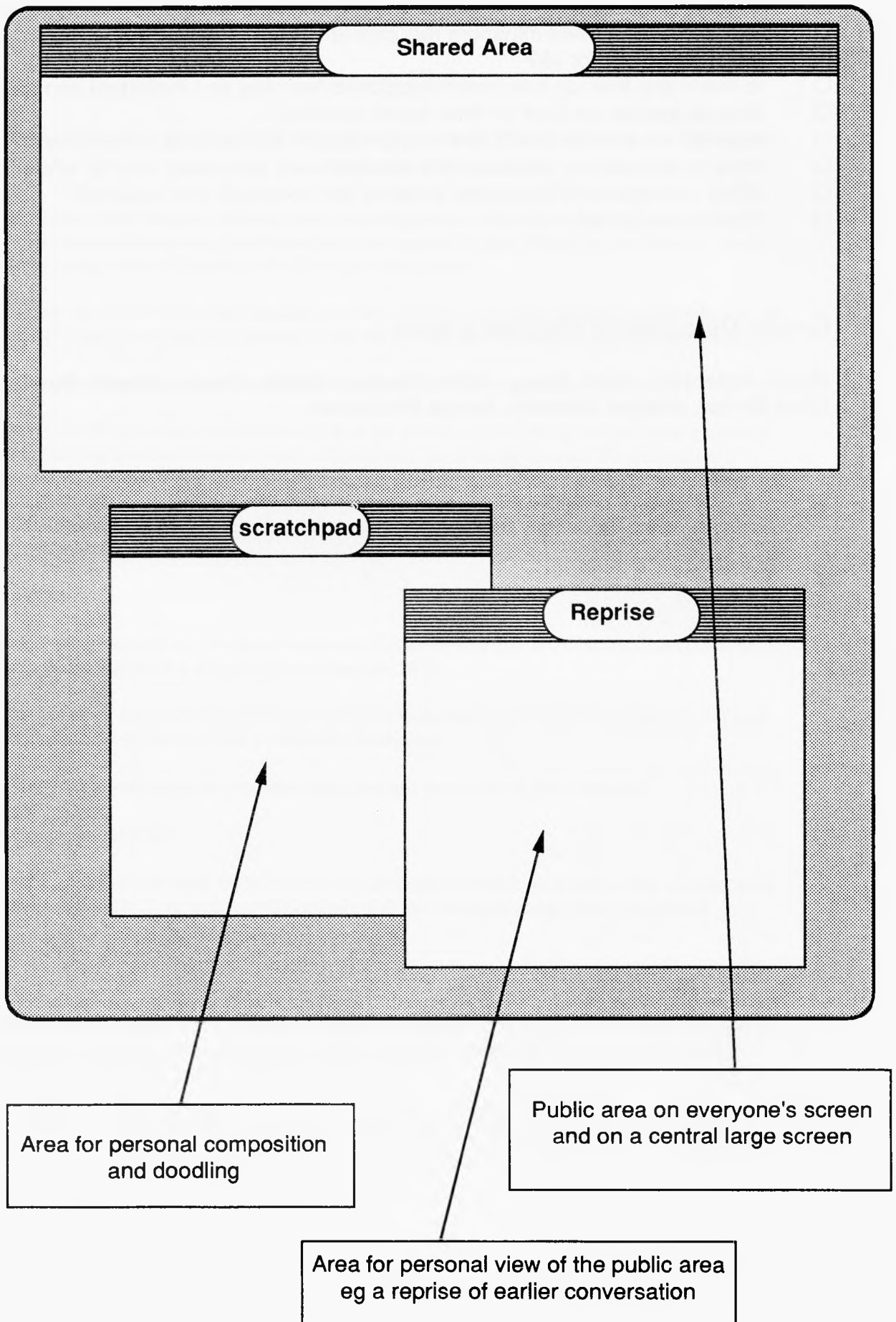
- Open access to education at all ages. Integration between formal and non-formal systems.
- Education centres in which teachers enable learning to take place. These could include heritage centres, museums, theme parks etc.
- Learning contracts with negotiated objectives (refer to the list in **The Vision** to see what is involved).

Teachers as tutors

Teachers will have a group for whom they remove any barriers which will interfere with learning. The members of the group may be within, or across, phases and ages or have a common enthusiasm. The members of the group may be working individually, cooperatively or collaboratively. The responsibility for learning resides with the learner. Negotiated learning programmes will ensure breadth, balance and relevance.

Possible Cooperative Working Tool

It is anticipated that the windows will be facilitated by a good range of tools like Hypercard™, and simulation tools etc. All screens resizable and capable of being moved.



Issues for debate

- Where, when, and to what extent, if ever, should education be compulsory?
- Is there a prescribed minimum requirement in terms of content (skills, processes etc.) for all?
- Is there any limit on how much supported learning any individual can have?
- Should people be paid for time spent learning?
- How do we provide credit and recognition for educational achievement?
- How is educational achievement recorded and assessed, and by whom?
- What management structures (internal and external) are required?
- Who is in control?

Group Discussion Members were :-

Grant Alderson, John Fazey, Mike Fischer, Martin Owen, Maelor Rowlands, Dave Siviter, Bridget Somekh, Senga Whiteman.

'One per Child'

(the ideas in this section are starting points; please feel free to extend or adapt as you think necessary)

Contributors: Mike Matson (4Mation) for developing the two classroom-based scenarios, Mike Fischer (Research Machines) for the analysis in the appendix, John Whittell for the Extremes Sheet, Roger Keeling, Andrea Tapsfield, Niki Davis and Mike Aston.

It is clear that it will be entirely possible for every child to have a full-function laptop micro by the year 2010 (see the appendix at the end of this section for the rationale behind this statement).

How they will be used and how learning will be organised is not so clearly predictable.

The two activities in this section are to help in the process of identifying and examining some of the underlying issues and values which will influence the learning process. The first activity encourages you to develop your own scenario for 2010. It is based around the Extremes Sheet, but you may decide to use only a subset of the options available. The second activity involves examining someone else's scenario and discussing its educational merits or otherwise. There are no right answers ... are there?

Activity 1

Divide into groups of two or three. For each of the statements on the Extremes Sheet, agree as a group where you think a school will be in the year 2010.

Your decisions may be based **either** upon prediction **or** what you would like to happen, but each decision should be viewed from a consistent standpoint.

Taking your assumptions as a starting point, create a case study of that classroom.

Exchange case studies.

From another group's work try to recreate the assumptions which were used as the underpinning of their case study. Compare your deductions with the assumptions that they started with.

Activity 2

Divide into groups of two or three. Using one of the two scenarios provided, select three or four of the follow-up questions as the basis for group discussion. You may also choose to complete an Extremes sheet based upon your reading of the scenario. Identify the important and significant issues and share these with the rest of the groups.

If you have completed an Extremes Sheet, compare your analysis with that of another group.

Extremes Sheet

For each contrasting pair, circle one of the asterisks.

Central control of the curriculum and delivery methods	*	*	*	*	*	Minimal central control, maximum local interpretation
The emphasis is on the step by step acquisition of skills	*	*	*	*	*	Learning activities are integrated and process based
Learners are in charge of their learning progression	*	*	*	*	*	Assessment (by the teacher or an IT system) controls progression
Experience is largely system delivered (i.e. second hand through simulations)	*	*	*	*	*	First hand, practical experiences, are encouraged
Human contact is valued and provided	*	*	*	*	*	Human contact is unimportant and available only on a limited basis
Discipline is externally imposed	*	*	*	*	*	Children are self motivated and self disciplined
The teacher manages the children's individualised learning experiences	*	*	*	*	*	The teacher is the provider of tasks and information
Learners work on their own	*	*	*	*	*	In general, learners work in groups
Groups are based upon single ages	*	*	*	*	*	Groups are based upon mixed ages
The use of IT is evaluated thoroughly and scientifically	*	*	*	*	*	The evaluation of IT activity is superficial
Schools are staffed by professional teachers	*	*	*	*	*	Staffing mainly consists of untrained assistants
Children with special needs are integrated into mainstream education	*	*	*	*	*	Children with special needs are segregated
Adequate ongoing INSET is provided	*	*	*	*	*	INSET provision is inadequate
Technical support is available	*	*	*	*	*	There is little or no technical support
Developments in technology determine the use of IT in schools	*	*	*	*	*	Curriculum developments determine the use of IT in schools
IT is a delivery system for much of the curriculum and integral to learning experiences	*	*	*	*	*	IT experiences are fractured and not well integrated
IT use is designed to enhance learning	*	*	*	*	*	IT use is intended to develop IT capability
Children have unlimited use of IT systems which are provided by parents	*	*	*	*	*	Children have limited access to state owned IT systems
Children's experience of IT in the home is ignored	*	*	*	*	*	Pupils home IT experience is valued and built upon
Commercial software is adapted for use in education	*	*	*	*	*	Software specially designed for education is still developed
School management systems incorporate the use of IT	*	*	*	*	*	Management systems make no use (or inefficient use) of IT
Communications networks are easy to access and inexpensive	*	*	*	*	*	Communications networks are the same price as today, or at best, 50% cheaper
Information is relatively cheap	*	*	*	*	*	Information is relatively expensive

Student's First Impressions

Scenario 1

Visit to Cross Keys Primary School (19.5.10)

Sarah Finch (1st year student)

I arrived at the school at 8.30 and spent 15 minutes with Mrs Levine, the headteacher, who gave me a brief outline of the aims of the school. She told me I would be spending the morning with Mr Spencer who has a class of 9-10 year old children.

At 8.45 I was introduced to Mr Spencer. I helped him to distribute the power blocks for the computers. At 8.50 the children came into the room. They immediately replaced their power blocks and two children collected up the old ones and put them in the charging rack. As soon as this was done they all started work without Mr Spencer saying anything to them other than "Good morning". Mr Spencer told me that the class were engaged on a project entitled "Can we replace the Rain Forest?" and that the project was now in its fourth week. He suggested that I look at the books the children had produced so far.

I was very impressed by the quality of the books. They were printed in full colour, were professionally bound, and contained lots of superb photographs, maps and other illustrations. As my main interest is in Publishing Technology I asked Mr Spencer if I could see how the books were produced. He took me to a table where four children were working with a large screen. He said that the children would tell me all I wanted to know, which they did. The large screen showed several pages of a book which the children were about to publish. The large screen was useful as the small screens of the children's computers were unable to show more than one page at a time. The children told me that the colour laser printer was in a different room but pages could be sent to it from anywhere in the school. They were just doing a final colour check before printing their book. They couldn't agree on the choice of background colour for some of the paragraphs. I suggested they ask Mr Spencer for his opinion but they said that he would only say that they had to make the decision themselves as it was their book. In the end they decided to make two copies of the problem pages (by using the "duplicate page" facility) so that they could decide later which pages to use. One of the children left the room and came back a minute or two later with the completed book. The unwanted pages were dropped in the recycling bin. The book was a report on some experiments which the children had undertaken to determine which species of tree could be used to renew the forest in different parts of the world. I asked if they could tell me about their experiments and they said they'd show me what they'd done.

Their first activity had been to interrogate a land-use database to find out which parts of the world had areas of land available for growing trees. The map which resulted showed mainly the arid regions of the Earth so the next job was to discover which trees were most likely to succeed in such conditions. An email enquiry to the Forestry Commission Educational Service provided a list of several dozen trees. The 'experiment' was undertaken using several software modules from the "Investigations" suite. A number of trial areas were set up for each species of tree with each area having slightly different conditions eg rainfall, temperature, daylight and altitude. A fifty year trial had been selected and the children showed me the results in the form of on-screen graphs and maps. I asked if the children had thought of undertaking some real tree growing trials. They said that they would like to do so but thought the time required would make the project impractical. I thanked the children for their cooperation and was thrilled when they asked me to accept a copy of their book (which I asked them to sign).

During the rest of the morning I spent some time with each of the other groups. I noted that whenever Mr Spencer left the room, even for periods of up to 15 minutes, the level of activity and enthusiasm amongst the children remained consistent.

One group of children had spent an hour or so outside with a video camera. They selected several frames which they digitised and then manipulated. While two children arranged the frames to create an animated sequence the other two created a soundtrack to accompany the sequence. They explained that during the afternoon they would use the sequence to help them to put together a short piece of dance/drama.

Almost all of the other groups were engaged in creative activities. I was particularly inspired by the creation of a dynamic poem which utilised some amazing video effects. As I watched the words move I could almost see a majestic forest with its birds and animals, feel the pain as a chainsaw bit into a mighty trunk, and despair at the desolation once a forest has been cleared.

Just before lunch each group demonstrated what it had been working on, the big screen being used so that everyone could see clearly. The ease with which data could be transferred from one machine to another meant that everyone had a copy of everyone else's work within seconds.

The visit was very beneficial and made me realise that things have changed a lot since I was at primary school. The thing which impressed me most was the way in which all the children worked so enthusiastically. They said that they nearly always took their computers home with them to carry on with their work although there is no compulsion to do so. My only concern was that Mr Spencer didn't seem to have very much to do but I'm quite sure that if I had been observing him rather than the children I would be much more aware of how important his role had been.

Discussion Points

1. Identify, from the scenario, the aims of the school. What might Mrs Levine have said?
2. How do you think the theme for the project was decided upon? Does it relate to a National Curriculum?
3. What seems important; the process of producing the book or the published book itself?
4. What is Mr Spencer's role? What would you commend in him? Is this an example of good practice?
5. Should children always make their own decisions?
6. How would Mr Spencer sustain the motivation of his children over an extended period of time?
7. All of the observed activity occurred in groups. How could Mr Spencer deal with assessment of the individual?
8. What are the benefits of being a pupil in Mr Spencer's class?
9. Are there any dangers in adopting Mr Spencer's approach? How essential is he in the classroom?

Scenario 2

Charles Schmidt (1st year student)

Half-day school visit: Sir Samuel Wilson Primary

Headteacher: Mr Wang Classteacher: Miss Green Children: aged 10-11

The day began at 9 am with the children transferring their history homework to Miss Green's computer (part of a local network). The homework had been a test. She announced the results and made six children stand up and explain why their scores were unsatisfactory. I realised how fast the computer is in processing information and how valuable in giving the teacher extra time to do other things. At 9.10 each child's computer beeped and they had to enter their personal passwords. Miss Green pointed out to me that on her screen she could see the attendance figures for each class. She could see that this interested me so she then showed me that she could obtain attendance data for every school in the authority. She congratulated the class for being in the top band of the LEA attendance table.

She was about to give the children an assignment when one of the boys raised his hand. She said that she hoped he had something sensible to say. The boy said that the news screen in the foyer was giving details of a competition organised by the Space Agency in which the first prize was an opportunity to visit the Mars Project launch site. The competition required children to design a Martian base. He wanted to know if the class could take part. Miss Green said that she would see if there was time later but whispered to me that although she didn't like to dampen children's enthusiasm she couldn't really see much value in entering the competition.

Miss Green announced that the next half-hour would be devoted to Science Attainment Task 374e. She asked the children to look closely at their screens while she ran a demonstration concerning levers. She said that she knew the children wouldn't let her down and that they would do well in the test which would take place the following afternoon.

While the children went through the exercises with the levers Miss Green examined the modified profile components for each child. She told me that she was delighted with her children's performance so far this year and that although the salary bonus was welcome it was not as important as knowing that she was doing her best to equip her children for the future. I asked if the emphasis on technology ever concerned her. She said that the only times that there were any problems were when the technician was away. The previous week the complete system had gone down and it had been very difficult to continue work. Miss Green had taken her class for an observation walk in the morning and in the afternoon they had learned some poems. She said that as so much of the National Curriculum depended upon electronically-accessed resource material it was often difficult to find sufficient attainment work when the computers were out of use.

Miss Green told me that when she first started teaching there were no clear directives and she often had to spend her weekends planning the next week's work. The situation now, however, was much more satisfactory as national and local strategies meant that 90% of the working week was planned by curriculum committees. She firmly believes that the teacher's job is to implement the curriculum and thinks there is very little that could be done to improve the present system.

The rest of the morning was occupied by LEA-planned activities. The activities were similar in that they consisted of demonstrations followed by tasks. I was pleased to note that testing did not occur after each activity as I firmly believe that too much testing is not good for children.

I enjoyed my visit very much and I am really looking forward to becoming a teacher. Miss Green is obviously a very good and enthusiastic teacher and I would be pleased if any of my children were in her class. My only criticism is aimed at

the system rather than the school. My special interest is in the use and development of databases so I was a little disappointed to discover that children are rarely given the opportunity to look for information themselves. I understand that the LEA employs a research team who find relevant information and then make it available to the children. Perhaps this is a good thing as it does ensure that children (a) do not have to waste time interrogating databases and (b) will always have the best information at their disposal.

When I was about to leave the school I overheard a parent complaining to Mr Wang about a proposal to publish individual pupils' attainment results. She was saying that this would not benefit the less-able children. Mr Wang said that there was no stopping progress and that if the new technology allowed local results to be published immediately then that was bound to happen. Personally I think this a good thing as competition is very healthy.

Discussion points

1. What are the determining factors in what children learn in Miss Green's class?
2. Evaluate the strategy of drawing attention to failure (embarassing the children with the unsatisfactory history scores)?
3. What are the benefits of competition? Can you make out a case for persuading Miss Green that it would be a good idea for the children to enter the competition?
4. Analyse the scenario with reference to 'good practice'.
5. Is this scenario the result of the development of new technologies, or an emphasis on testing and assessment or other factors?
6. What is the relative importance of the teacher, the headteacher and the technician in this scenario?
7. What information would the prospectus for this school be likely to contain?
8. Does this school offer a child everything required for a rounded education?
9. Is this a re-enactment of the Victorian classroom?
10. Was there, or could there have been, a better educational experience when the computers broke down?
11. What kind of in-service training would be of value to Miss Green?

'One per Child' - appendix

(contributed by Mike Fischer, Research Machines)

By the year 2010, or possibly earlier, we will have reached the stage of one micro per child. This is based on the following argument:

- a) assume a starting point of a current £200 price laptop (eg Z88)
- b) this is about one quarter of the cost and one quarter of the function (memory, screen etc) of a full function laptop
- c) if full function laptops are to be available for £200 in 2010, then computer hardware function/price ratios will have to improve by about 4 times. This is $4^{1/20}$ per annum, ie. 7% per annum
- d) over the last 10 years computer function/price ratios have, on average, improved by 20% per annum. In the near term, the next five years, there are no apparent barriers to continuing this rate of progress
- e) therefore it seems safe to assume that by 2010, the equivalent of today's full function laptop, and probably much more, will be available for about £200.

In 2010 it is likely that this full function laptop will contain a full colour screen LCD display, an internal memory of 16 megabytes, and a low cost mass storage device. This could be a floppy disc with a much enhanced memory capacity or a 3" optical disk device. Battery life before recharge may only have improved by a factor of 4; and hence this will continue to be a problem with the need for children to 'plug in' their laptops as opposed to complete portability. Voice input is a realistic alternative, but a natural language interface is probably only a 50/50 possibility. Electronic text and exercise books will be with us. Expert systems for educational purposes will still be at an experimental stage. In terms of technological design, the laptop of 2010 may have reached, or surpassed, the sufficiency level as an educational tool.

Aside: This technology rich environment begs one key question. Although the technology will exist, will every child have one? Will it be bought by the parents or by the school? Will the school hold a central stock for children whose parents can't afford one? Could it create an educational elite?

Within every school there will also be a distributed network with the capacity to link up **all** the school laptops simultaneously. The 'server' will hold at least 10 gigabytes of memory. The effectiveness of the network will be transformed because of the enabling technology that will take the current transmission rate from 1 megabyte per second to 10 megabytes per second, accompanied by parallel loading. The same network cabling will carry the power to run the laptops connected to them. The network will be powerful enough to support full motion video. Networks must be recognised as a managed resource and staffed accordingly.

There may not be much progress in terms of wider area networking due to the prohibitive costs of transferring information nationally across BT lines. Only if education (or LEAs) could find the money to lay fibre optic cables will successful inter-school communication be promoted. Satellite communication will be common on a receive basis of one to many. It will not be used generally for schools to send information or to receive information in response to individual requests.

Aside: Note that over a period of 20 years, a doubling effect can be achieved on a 3.5% increase per annum. If we can maintain a 20% improvement each year, in, for example, performance per unit of cost, then over 20 years there will be a 38-fold increase in performance.

Yet above all, no technology changes the nature of the world - we must plan for and learn to harness the power and potential of a 'one per child' learning environment.

Communication: Towards 2010

by Niki Davis and Mike Aston

Introduction

This document is designed to assist reflection on the place of electronic communication in education in the future, say 2010. The first section briefly describes where we are in 1989 in terms of applications, most of which are in the pilot stage. The second looks at trends which may affect this development. Many of these are commercial because that is where the market is. The third stage considers educational issues which arise in the area of communications. The final section poses questions to stimulate debate. The document is intended neither to be exhaustive nor exclusive and we would hope that you will tailor it to your needs expanding as necessary.

Where we are now

Conferencing: there are isolated incidents of computer conferencing taking place in the UK; Ebenezer within Education 2000, Caucus on Campus 2000, plus similar initiatives in the USA. Activity is mainly confined to higher education. In Australia, phone conferencing is used with inservice teacher training and 'the school of the air' is having a significant impact in the outback. There is some difficulty with the software because it conforms only to the lowest common standards of the users.

Tutoring: applications in higher education use computer conferencing to support the role of the tutor and increase student communication, eg Open University (course DT200) and a similar University in the USA. In addition there is the use of electronic mail both to individuals and groups. Other examples are the use of electronic mail with students on teaching practice, and groups of pupils writing an epistolary novel with a writer in residence - all separated by some geographical distance.

Current information: access to news, sports results, weather forecasting, etc. is almost 'free' via broad band systems, eg teletext and regular radio/TV broadcasts. Other common carriers, such as national viewdata services, eg Prestel/Campus 2000, offer current information services at a significant cost. A wide range of current information services are available at a high cost normally out of the range of educational budgets, eg World Reporter, Citiservice etc.

Wide Area Networking: systems such as Dialcom, BITNET, JANET etc. are offering world wide standards for networking. Collaboration of pupils, classes and their teachers with a common purpose are exploiting WANs with positive outcomes. For example, data gathered on acid rain from different countries, instant reaction to world events (Toulouse University), or pupils from various locations seeking information on a historical theme.

Infrequently accessed data: most of this is only available in printed form and is not available in the majority of schools. Eg, principal exports of Sao Thome et Principe, or how many people died of cancer in the Orkneys during 1971?

The trends

Companies are finding it much cheaper to use video conferencing than to move executives across the world. Multi-national companies are improving communications and this may nudge education into European/global activity.

Part-time courses over a wide geographical area are increasing and economics are dictating this approach.

Companies are demanding accurate and real time information through on-line information systems. These value added services have shown a marked increase and we see no reason for this to cease as long as the commercial world feels that it is getting value for money. The trend indicates that the gap between budget and cost of this information will get wider.

Greenpeace has a network which provides both current information and comment across the world. It can mobilise forces and act as a focus for developing ideas. A number of global issues are capturing individual interests worldwide and there is a need for a means of expression beyond that normally available at a national level.

Proliferation of communication satellites will lead to increased capacity. The use of these in mass education in India has shown difficulties in tailoring the information to the learner.

A European Community initiative, DELTA, aims to produce an educational workstation for use in distance learning with integrated electronic communications. There are many strands to DELTA but one which may prove significant revolves around the launch and subsequent use of the educational

satellite Olympus. This may create a large user base in adult education. Another initiative, STAR, is putting optic fibre networks into disadvantaged regions. There is also likely to be pressure from the EC to reduce the cost of electronic communications. Without this pressure it is probable that the cost will only be reduced by a factor of 2 by the year 2010.

The issues

There is a lack of non verbal communication and personal contact.

The structuring and personalising of messages are limited. The volume of information can proliferate or be too sparse for support.

The ownership of information and the cost of access is contentious.

Access to these systems is confined to those in the developed world.

There are three factors influencing quality and cost: the information provider, the carrier and the PTT/broadcast system. The quality and access can also depend on time and location.

Open access to systems allows graffiti and unsociable activity to take place, eg market forces proliferate prostitution database on French Teletel. There are difficulties in determining standards and protocols both in terms of presentation and access.

The best classification of information depends on the user, therefore it is difficult to make it appropriate for all backgrounds. Indeed the mother tongue of users and their cultural background can obstruct meaningful access to information.

Questions for consideration

In an educational context, when is it appropriate to use computer conferencing, as opposed to a traditional gathering of people at the same location?

What is a good balance between personal and electronic contact? Can we develop useful protocols and/or standards for computer mediated tutoring?

How important is current information to education? Should it make do with yesterday's news and be at least one step behind what industry, commerce and even the home user can access?

Who places editorial control/structure within a global network? How and from where will standards and protocols emerge? How can users be encouraged to participate educationally?

What will be the emerging role of the school library? Will the facilities offered by local community libraries need to reflect developments in communications technology? If so, who pays?

Should educational information services be nationalised to ensure equal opportunities?

Is our present concept of 'copyright' applicable in the context of publicly available data for educational purposes?

Will the managers of educational systems block the use of electronic communication because authority and political control are seen to be threatened?

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Future Worlds

The future is, by definition, unknowable. We can make guesses — guesses which are based either on extrapolations of trends which are evident in the present, or by imagining some wholly new influences. Paradoxically, the making of such guesses can provide us with valuable insights into our current thinking, which in turn may lead to changes in our behaviour that in turn affect the contemplated future. Much of the future depends upon interactions between people as much as between people and the technology. The following two simulations allow an exploration of these interactions. The first is based upon the impact of technological developments on education in the next century, the second bears more upon the general theme of technology, change and human values. Both are very much intended for acting out rather than reading, and the debriefing which should follow the use of either should emphasise the need for reflection and discussion of participant's motives, thoughts and feelings. Neither have yet been used by students — so feedback would be much appreciated.

EDWORLD: A SIMULATION

Facilitator

You must divide your group into ten (see below). Read out the initial briefing and hand out copies of the appropriate group-specific briefings (every individual needs a briefing sheet). Announce the time constraints and any other matters of administrative convenience. It is important to set aside a substantial period of time after the simulation for a serious debriefing in which the main aims are:

- a) to air as fully and sensitively as possible all of the issues which people perceive as having arisen within the simulation;
- b) to consider how these are related to the specific issues you may be concerned with regarding computers and education.

During the simulation you should move between groups, making notes which will assist you in the debriefing.

Initial Briefing

Welcome to Edworld! An arena where you can pit your wits and nerve against some of the toughest competition you are likely to meet — yourselves. The year is 2010, the location is Milton Keynes and the setting is a high-level meeting convened by the Department of Trade and Industry (DTI) to consider 'an exciting new opportunity' for state education.

There are five groups: the school administrators, the teachers, the parents, the government and the manufacturers. Each group has an envelope containing the names of its delegation and details.

If necessary you are free to invent any further background details that may seem helpful, but these must be entirely consistent with the details with which you have been provided. Please take your roles as seriously as possible: this is not a game. Once we start my role is solely that of a visiting HMI.

GENERAL BRIEFING SHEET**Background notes****Delegation 1 — The school administrators**

These represent the professional body which was set up in 1998 in response to the pressures on school administration caused by Local Financial Management and the National Curriculum. All administration of a school is now in the hands of these professionals — they have a separate career structure and salary scale.

Delegation 2 — The teachers

This group is made up of representatives for both phases and subjects. They are primarily concerned with effective and efficient delivery of the National Curriculum. This concern stems from the 1998 amendment to the National Curriculum orders which demanded that teachers be responsible for using the maximally efficient and cost effective methods for instruction. There are delegations from NUTT (National Union of Teaching Tutors) and ALC (Association of Learning Consultants).

Delegation 3 — The parents

This eclectic group are made up of representatives of organisations such as SMUG (Society for the Maximisation of Unusually Gifted children), SMAC (Sensible Mothers And obedient Children) and PARC (Parents And Rights of Children).

Delegation 4 — The government

The membership of this group has representation — probably the Secretary of State and a number of civil servants — from MinEd (the replacement for the old DES), the DTI, and the MinIntAff — the latter is a new ministry which is responsible for employment, the internal revenue service and the new national police force. Finally, there is a possibility of HMI attending.

Delegation 5 — The manufacturers

This group consists of three main manufacturers which supply the UK educational market. IBM actually holds a 40% stake in each of these, but allows them considerable autonomy.

Background briefing for all groups

It is the year 2010. State schools are physically much as they were thirty years before. Sporadic attempts have been made to upgrade/replace some of the older buildings, but only limited progress has been made. Primary school buildings dating from the early 1900s are still a common sight. The National Curriculum is well established and no significant changes have been made since 1998 (this stability has been of great comfort to the major educational publishers). All schools now manage themselves; each has a head teacher responsible for the curriculum and a bursar responsible for administration. One consequence of this has been the disappearance of the smaller (<200 on roll) primary school.

There has been a steady build-up of technology in schools — some from central government initiatives in response to HMI reports and surveys, some funded by schools, and some provided by parents for their own children to use. In particular, access to computers is no longer a problem. This meeting has been convened under the auspices of the DTI to receive and consider a presentation from three manufacturers who have 'an exciting new product' which they would like made available to schools. It promises to change the whole approach to assessment.

Administrators

Briefing for the administrators

The flow of information within a school — particularly records of pupil performance — passes through your capable hands. Technology has been a good friend to you in the past, but anything which might diminish your pivotal role or cause a fall in your numbers is to be resisted. You would naturally never admit to this in public.

Teacher Group 1

NUTT

Briefing for the teachers

Assessment has been a considerable problem in the past but thanks to slimmed down SATs and the now extensive use of computers for the production of profile statements and reports, you feel the problem has been resolved. You welcome any innovation — providing it results in no extra work for you and if it won't give others a stick to beat you with.

Teacher Group 2

ALC

Briefing for the teachers

Assessment has been a considerable problem in the past but thanks to slimmed down SATs and the now extensive use of computers for the production of profile statements and reports, you feel the problem has been resolved. You feel the National Curriculum has become moribund. Anything which will stir things up would, you feel be a good thing. You are desperate for curriculum innovation.

Parents Group 1

SMUG

Briefing for parents

As always, you want the best for your child. There is a vague awareness of a growing disparity between the quality of state education and that provided by the private sector. You are far from convinced that the quality of teachers is as high as you would wish. You think that schools are not providing gifted children with a fair deal. Anything which would help provide evidence for this would be most welcome.

Parents Group 2

SMAC

Briefing for parents

As always, you want the best for your child. There is a vague awareness of a growing disparity between the quality of state education and that provided by the private sector. You are far from convinced that the quality of teachers is as high as you would wish. You firmly believe in the old-fashioned virtues of discipline, obedience and hard work. You are keen to see that children are kept up to the mark. Anything which would help do this has to be applauded.

Parents Group 3

PARC

Briefing for parents

As always, you want the best for your child. There is a vague awareness of a growing disparity between the quality of state education and that provided by the private sector. You are far from convinced that the quality of teachers is as high as you would wish. You feel that only lip service has been paid to the rights of both children and parents. Schools should be made more accountable. You know that the medical profession are now routinely sued for negligence. Its time that this salutary state of affairs obtained in education.

Government representatives 1

DTI

You have a majority of 50 seats in the House of Commons — latest opinion polls show that you are trailing the Opposition by 15%. A general election will have to be held sometime within the next eighteen months. A recent Prometheus programme on BBC6 showed that the 20% of children are receiving some form of coaching for SATs. You are really keen on supporting this venture. IBM have informally told you that there may 'be a need to rationalise manufacturing localities' unless there is an improvement in sales of equipment to education. You are chair for this meeting.

Government representatives 2

MinIntAff

You have a majority of 50 seats in the House of Commons — latest opinion polls show that you are trailing the Opposition by 15%. A general election will have to be held sometime within the next eighteen months. The police believe that criminality is a an attribute which can be identified at a early age. Even incipient criminality should be noted and monitored. The Inland Revenue are increasingly worried about the black economy. Anything which would help provide background information to help in the accumulation of circumstantial evidence against tax evaders would be most welcome. The employment section are concerned that employers still do not get enough information about school leavers. You are pledged to improve this situation.

MinEd

You have a majority of 50 seats in the House of Commons — latest opinion polls show that you are trailing the Opposition by 15%. A general election will have to be held sometime within the next eighteen months. A recent Prometheus programme on BBC6 showed that the 20% of children are receiving some form of coaching for SATs. This ministry is in low gear at present. Funds are hard to come by. In order to attract them you would have to convince yourself and other departments that something should be done for education which would win favour with the electorate and be easy to implement. Naturally you would like it to cost your department nothing.

Manufacturers

Manufacturers

A recent perfection and enhancement of WORM laser disc technology makes it feasible to offer this technology to education at a derisory price. Every single piece of work — individual or group — which a child was involved with can now be stored permanently and ineradicably on disk. You also have the option of it being stored in real time so that a record is kept of just how long children spend on each task. You have the vision of a child having all their IT related work from 5-16 stored on these disks, which would of course be the property of the school. Statistical analysis of this raw data could be of some commercial interest. This offers schools the opportunity of tapping a whole new source of funds.

Covert briefing for manufacturers representatives

These are issues which you should be aware of but not admit to in public. The profits for this could be staggering, particularly as you have had informal talks with commercial publishers who see an opportunity for the marketing of personalised software targeted at the needs of the individual child. There is a strong likelihood that IBM may be taking a 40% stake in some of these companies IF you can convince those attending this meeting to support your proposals. Your job (and promotion) depends on success.

Andre Wagstaff

ALIA:

A Simulation exploring Technology, Change and Human Values

Facilitator

You must divide your group into two (see below). Read out the initial briefing and hand out copies of the appropriate group-specific briefings (every individual needs a briefing sheet). Announce the time constraints and any other matters of administrative convenience. It is important to set aside a substantial period of time after the simulation for a serious debriefing in which the main aims are:

- a) to air as fully and sensitively as possible all of the issues which people perceive as having arisen within the simulation;
- b) to consider how these are related to the specific issues you may be concerned with regarding computers and education.

During the simulation you should move between groups, making notes which will assist you in the debriefing.

Initial Briefing

There are two groups: the Forest People and the Assembly. You and others live on the island of Alia. At the start of the simulation you meet as two separate groups. The Assembly has requested a meeting with the Forest People either inside or outside the Forest. The Forest People meet to consider the invitation and the Assembly meet to discuss what they propose to do in the meeting. These discussions may proceed to a meeting within the time available.

If necessary you are free to invent any further background details that may seem helpful, but these must be entirely consistent with the details with which you have been provided. Please take your roles as seriously as possible: this is not a game. Once we start my role is solely that of a visiting anthropologist.

FOREST PEOPLE

BRIEFING SHEET

Your people come from a number of different bands (each of up to about 25 members) which inhabit the dense forested part of the island. Bands meet others only once a year (when women choose a partner).

You live as hunter-gatherers, and, except in the winter you are able to feed everyone well by working for only a few hours each day. In winter most of your waking hours are devoted to finding food. In recent years winter hunting has become increasingly more demanding; game appears to be scarcer than you remember it once was. You may imagine a northern forest in which the game animals are mostly deer and small mammals. All but the youngest and oldest play a part in finding food. You do not have bows and arrows, but use spears, traps and stalking. You have no agriculture, and you would never cut down a tree.

You love life in the forest. If things do not go well then you sing to the trees and in the end all is as it should be. Everything in the forest is an animate being (including trees and rocks). The spirits of all the animals hunted are appeased by appeals for forgiveness.

Harmony is important within the bands. Personal possessions are limited to the tools for your work. Sharing is important. Aggression is invariably defused. All forms of boasting or behaviour which draws undue attention to individuals is discouraged (largely by joking and deflation). Praise is unknown. This applies as much to children as to adults, although adults are usually very tolerant of children. This does not mean that some people are not observably adept at doing particular things.

All decisions are based on consensus. In interchanges the emphasis is always on points of agreement (often expressed through paraphrasing). It is considered rude to ask direct questions. There is no fear of silent pauses. People do not interrupt a speaker.

Life has been this way since anyone can remember. You fear all forms of change, other than the usual cycle of the seasons. You seldom venture far outside the forest and know very little about people who live outside, although you are always keen to hear the stories that occasional visitors tell.

There is no writing in your culture: all exchange of information is by telling stories or anecdotes. Everything which finds its form in such a story is regarded as 'real' or 'true'. You have no formal counting system (although you use your hands to refer to one, more or many). You do not recognise the meaning of any words which do not represent something familiar to you in your own culture.

THE ASSEMBLY

BRIEFING SHEET

You are members of the ruling assembly of the island. You were democratically elected, but the proportion of the population who actually voted was very small.

Some of you were educated in western industrial countries. Your island has succeeded in sustaining its population for many years, but the growing urban population will make this impossible in the very near future. You went to the World Bank and they have agreed to provide whatever resources are necessary to bring about a sustainable economic future. However, they want to see a full involvement of all the people in the democratic process. They also insist that schools should be provided for every member of the population, so that everyone can at least read and write. These schools will be equipped with all the latest technologies.

The urban population is keen to take advantage of this arrangement, and it should not be too difficult to win over the villagers. However, the Forest People are another matter. Up until now the people who live in the dense forests have been largely left alone: they are a primitive people but they are unaggressive and seem happy. As western educated liberal intellectuals you have been keen to ensure that such a lifestyle is not threatened. However, the forest itself is now under immediate threat. Incursions are already beginning to be made, with agriculture being extended into cleared areas and with the hunting of forest animals by those who live outside it. The Forest People must be persuaded to cooperate in order to ensure their own survival. You would like to accomplish this with the minimum disturbance to their traditional way of life, but unless they make some adaptation they may lose their way of life altogether very soon.

Daniel Chandler

Pre-Conference Contributions

The following contributions were submitted prior to the Conference. They helped to give form and shape to the proceedings. They are reproduced here for completeness and interest.

Looking Back at the Future

(A cautionary contribution to "IT in Education, 2010" by Grant Alderson.)

Rather than dream my own scenario for the future I have looked back at the predictions that a few forward thinkers have made during the last dozen years.

In "The Mighty Micro" (Victor Gollancz Ltd, 1979) Christopher Evans attempted to predict the nature of change that would be brought about by computers. His main visions for education by the end of the 1980s were the development of the pocket computer, great investment in the development of software and rapid advances in AI techniques providing "genuinely smart" open ended conversational dialogue. He also anticipated that the printed word would be virtually obsolete by the end of the century, being replaced by book sized read-out terminals with plug-in book chips.

*"The pocket teaching computers will soon be upon us
... as cheap as today's calculators." (p121)*

*"... the computers of the 80's will be cheap and
common rather than rare and expensive..." (p122)*

*"By the early 1980s... commercial organisations
will have begun to pump colossal sums of money
into investigating the nature of the teaching
process and developing powerful and effective
teaching programs as a result. By the mid-to-late
1980s their research will probably begin to make
headway and for the first time Man may develop a
true Science of Education, and with it a real
understanding of the nature of learning." (p126)*

*"The smart encyclopedias of the late '80s will
do their own research, acting literally as study
partners ..." (p109)*

*"The 1980s will see the book as we know it ...
begin a slow but steady slide into oblivion."
(p106)*

"By the late 1980s its (the novel) computerised equivalent could be available at something like ten pence, as raw material and distribution costs reduce sensationally with miniaturization." (p107)

Where are the "cheap and common" pocket computers with 10p chips? Who is pumping vast sums of money into educational research and software development? Is Artificial Intelligence about to make a significant advance?

Evans also referred to some of the latest developments in 1978, including calculators, children's toys (such as Speak and Spell) and the Lexicon language translator. Have these changed significantly during the last 11 years?

Another British crystal ball gazer is Tom Stonier of Bradford University. In "The Three Cs: Children, Computers and Communications", written with Cathy Conlin (John Wiley, 1985) a positive future for IT in education is justified on economic grounds:

"Over the next few decades education will grow to become the largest industry in post-industrial societies - and its number one employer."

because

"... education adds information to people, thereby increasing their economic value." (p190)

Stonier and Conlin also predict the development of powerful, cheap learning computers and suggest that if the government decided on a single mass produced model, every pupil could be supplied with a computer, monochrome display, modem and printer for about £100 each. They estimate the cost of this, spread over 6 years, to be £3000m or about 5% of the North Sea Oil revenue!

They are concerned that in the short term unequal IT provision will lead to an information elite but that

"... by the year 2010, those divisions will have eroded (p184)

due to an expansion of the middle classes and the fact that because new technology is so cheap it will permeate virtually all homes.

Another point raised by Stonier and Conlin is the effect of IT on education in the Third World and whether they will lag further behind or be enabled to leapfrog the developed countries.

Al Bork of the University of California, Irvine in "Personal Computers for Education" (Harper and Row, 1985) also gives economic justification for developments in IT in education.

"... computers, although little used in education at present, will eventually become the dominant delivery system in education at all levels, ..."
(p161)

"... in the future computers will unquestionably be the least expensive way to establish a new educational system." (p162)

He also anticipated an expansion of software production by educational publishers and saw a growth of home computers potentially leading to the home being the major place for learning.

No Comment!

"Four ENIACs should provide all the computing power needs of the world"
(approximate quote of J P Eckert, 1946)

"IBM appear totally committed to mainframes and to have missed out on microcomputers" (Chris Evans, "The Mighty Micro", p90)

The I.T. Extrapolation

(a personal view by Mike Aston, Advisory Unit for Microtechnology in Education at Hatfield.)

This view is coloured by my own history. Whilst in the Upper Sixth at school (around 1956/7) we built a binary adder which actually worked. My enlightened Maths & Physics teachers took groups of us to see ACE at the National Physics Laboratory and LEO at Joe Lyons - I was hooked. What would be the equivalent activity today? An even harder question is what those enlightened teachers might be doing in 2010? In 1970 I found myself pioneering the 'A' level AEB Computer Science syllabus and testing the OU's first on-line remote terminal in the St Albans Centre.

My first two scenarios in each cameo are based on that personal experience, the last on a statistical unlikelihood - in that we almost certainly do not have to wait that long, or might suffer a catastrophe which will dwarf these issues anyway.....

The (Examined) IT Syllabus

1970 Only 'A' level Computer Science, taught and examined in very few schools and F.E. colleges. The C.S.E. for Computer Studies being trialled in a few schools under Mode 3. Content confined to history, main-frame workings, algorithms, number representation, program writing and working case studies (eg airline seat booking systems). The 'A' level had options on statistics and numerical methods.

1990 1/4 million pupils on an examinable IT course - mainly GCSE - focussing on applications, packages, programming, algorithms. Most other pupils will have some element of IT either contrived or via other subjects. The introduction of the National Curriculum gives opportunities for all children to have some I.T. in their curriculum including primary and special needs - but little guidance and major confusion over 'how' and the 'what'. Introduction of attainment targets and testing at 4 stages in compulsory education period.

2010 Learning about computers confined to small elitist group of pupils, studying in specialist centres. All other children continually assessed on their performance, with I.T. being the main form of delivery. They will have no understanding of how they are manipulated by the technology or of how it works.

Software

1970 Only available on University/Polytechnic/Local Authority mainframes on a 'grace and favour' basis. Development funded by academics. Written by computer scientists to solve mathematical problems (i.e. number crunching - in languages such as Algol, Fortran, POP2. Dartmouth BASIC (Kemeny and Kurtz) not yet available!!) Significant knowledge of computers and software needed to run programs, enter data etc. Line-by-line output, monochrome, no cursor control and no graphics.

1990 Software available from multi-national vendors, traditional book publishers, specialist software publishers and some government funded agencies. A very mixed economy. Price of a software package equivalent to a good meal out with wine. WIMP environment, multi-coloured high resolution graphics, learner driven, some sound/voice, some interaction with real world. Three distinct groups with little overlap - games/educational/business. Some bundling.

2010 Software indistinguishable from hardware (i.e. all bundled or available via satellite at 'touch of button'). Written by international elite known as 'super-psychologists'. No distinction between games, educational and commercial. Term 'user friendly' dropped as being obsolete. MIND environment, real world portrayal of all senses. Software has same feel to it as electricity and water. Data carried in pocket on coin sized media.

Hardware

1970 Mainframes - non-portable. Available via teletype/modem/telephone using paper tape or on-site punched cards/paper tape. Turn round time as long as one week (in Kent it was two!). Jobs queued according to priority - schools bottom of list, no general public access. Cost - the major item in an institutional budget. Fifty or so schools in UK have some access.

1990 Portables with same power (or more) as 1970 main frames - many other facilities. Cost - 1/10th of average annual salary. Ten million or so home owners. Average of 2.5 in primary schools and 25 in secondary schools. Some have over 100 microcomputers. One company (IBM) dominates world market.

2010 Pocket-sized; plugs into public telesat network. Access via human voice. Instant response. Cost - a good meal out without wine. All learners have at least one PORTIT. Archimedes spotted at jumble sale in Potters Bar, but unfortunately no software available to test whether it still works.

2010 A School Odyssey

by John Attfield

Distributed Networks in Schools

In 1982 we received our first Acorn Atom on which we could play prior to the arrival of two BBC Bs in July that year. One computer in a school can make very little difference. Yet one computer in a classroom can have just as little impact. We have more than one in each class (eight classes) as well as a network (level 3) though the possibilities are not being exploited to even ten percent of what is possible. It is 1989, seven years on.

By 2010 several of us on my staff will have retired, deceased or both. Some will still have a number of years to work before reaching the mandatory retirement age of 50!! Nowadays, there has to be a certain dogged determination by staff to see the usefulness of a computer within a classroom. I have argued for computers around the building whether as stand-alone or network. More recently, with the installation of the network, we can now move ten machines to one location quite easily. Then the complaints start: 'Where is MY computer?' My own thinking - we wired the network so that each pair of classes (a year group) could house six work stations - seemed far sighted for 1987/8 yet now we feel it to be limited and inadequate.

By 2010 the building will be as now: the 1896 part will be fine; the 1965 section will have to be re-re-re-roofed, windowed etc. I have heard of a new primary building with network wiring in as standard and network sockets in the middle of class noticeboards! On a practical note, I hope that the network leads of 2010 will have been replaced by something technically superior - infra red controls or voice commands to omni-receiving network points. It seems to me that we must be able to see a way to dispose of the spaghetti. It has been good to take delivery of an Archimedes with just one piece of spaghetti. Yet the cables do seem to computers what blue touch paper is to rocket firing. I hope that video discs like MIST will be able to be accessed via the network to each work station. I realise the technologies are different now but something must be possible or are video discs already a thing of the past. Did I blink?

I feel sufficiently unaware of the continuing developments that I might be told that all I have focussed on in the context of twenty years from now has already been solved. If that is the case, by all means send me away, though first please give me the information!

It is interesting that there are also two other networks in school, both linked through the telephone: TTNS and an LMS arrangement. But how well equipped are the new teachers in the IT realm? This is something that we must have changed by 2010. Now they are being taught/lectured by staff who have probably not integrated IT into their own primary or secondary experiences. In twenty years time, the new teachers in schools will be those who have experienced IT throughout their own schooling. They are being born this year! They will also have experienced the National Curriculum. Will there still be significant numbers of teachers whose attitude to IT is similar to the effect of ice cubes in the sun; they hope IT'll go away.

There is a need for sensible, practical induction of teachers into IT as part of a whole teaching strategy. If you are thinking 'what about laptops for all?' then I will just say:

- a) make the new breed of IT far more friendly to the adults responsible for their use as teaching tools (in primary that may well still be every teacher).
- b) make the hardware far harderwearing
- c) encourage teachers to share ideas for the production of excellent software
- d) encourage manufacturers to make interchange between computers and systems standard so that those without degrees in computer science (see (a)) will be able to continue to work in school.

... or perhaps school will be centrally conducted via the home based fax IT module beam me up scottie so that I may receive my lunar travel credits for an excellent piece of recently rediscovered generosity.

Education 2010 - A Fantasy

Alan Freed is nearly 11. Next year, he will leave elementary school and either go to St Mungo's and St Wilfred's, the local State Education Centre or to a special streamed school such as the Hanford's Insurance College. Partly, the choice will be up to him and his parents (and will depend on what they can afford) and partly it will depend on the results of the Attainment-11 Tests that he has just taken. Recently Alan visited both schools and was asked to write an essay describing how he felt about them...

I really liked the Technology Suite at St Mungo's. It was full of kids doing these new Australian programs. They had a new one about flying that was great - just like the series on Orbis-TV before Christmas with all the same people and great monsters. I hope if I go there I can learn trigonometry that way. I wish they would get around to doing one based on The Mammoth Hunters - Jack and I accessed it on Odins-Eye from Sweden.

The next class I visited was Japanese. We went into this huge room with hundreds of kids sitting on the floor. The show is beamed from Japan all over Europe. The classroom assistants were a bit stupid - they don't seem to be able to speak English properly. I got told to shut up when I asked a question. My brother is having to be a classroom assistant next year until his Advanced Education Certificate comes through.

St Mungo's has a huge Science Centre. I spent ages using the class tele-disk on magnetism. After that I used the dissection simulator. It must have been awful doing it in real-life.

Hanford's Insurance College has a horrid uniform. We were shown one of the classes doing Basic Accounting. It was strange that only sixteen boys seemed to be there that day. Everyone seemed to be picked on by the Professor. He spends lots of time telling them things. I bet I would not remember all of it. The boys spent ages typing things he said into their PADS.

We had suisi for lunch and I chatted to Khan who came to Hanford's last year. He said that he wished he had gone to Dingly's Leisure College instead and that he was trying to get his dad to get him a transfer. This boy called Billi said that Hanford's was organising a trip to their head office in Tokyo next month. Khan

said his dad could'nt afford it. Bill offered to show me the Science Park.

Each boy has his own lab-console. I didn't expect so much science at an Insurance College but Bill said that they did all sorts of things. They even use real chemicals sometimes but the experiments always seem to go wrong. I told him about the tele-disk on magnetism that they had at St Mungo's. He said that they had got an update of it from Poland last month and that he had copied it and taken it home.

We walked back to the main building and I saw lots of boys playing tennis. Bill had Language Studies in the afternoon and I went along to see how they did it. It was a bit boring because all he had to do was write onto the terminal the translations for some sentences. He had done this lot before and soon got the 70% so that he could go to football. My Russian is useless but Bill said that it was easy because you didn't have to speak it

Bill's brother went to Hanford's and now has a great job in the City. I liked St Mungo's because it felt really free but Hanford's was a lot cleaner. Perhaps I should look at Dingley's before I make up my mind.

Alan Freed

or

Jonathan H Briggs

Increased Polarisation of IT in 2010

By Niki Davis, Exeter University

It is 2010 and there are now a much wider variety of ways to learn, but IT is not equally accessible by all. Education (or is it training?) is now compulsory to 18, although it may be part-time from 14 years old. 50% of adults are retraining, many at home alongside children. There are a large number of refugees in some areas due to climatic and other upheavals.

The use of microelectronic devices is widespread, except for the disadvantaged. Personal computers use limited speech and personal knowledge structures. Talking programmable toys start informal IT education very early. Expensive simulations are very real using the 'data bodysuit' and a head mounted telescopic display, but due to expense they are accessible only in adventure parks and museums. Education receives free services of data communications and educational value added networks (from dues paid by commercial users). Information centres are available in many communities to supply value added networked services. A subset of these are for under 18 educational accessed by the EC Delta workstation network first developed for adult open learning. Satellites are plentiful but underused.

The place and amount of IT in education depends on where pupils are educated. Their choice depends on location and money. There are four categories:

1. Academic public and grammar schools provide their pupils with an IT familiarity and competence based certification. Some pupils take GCSE type O and A levels. These schools remain most interested in getting pupils to university.
2. Other schools are permeating IT in the National Curriculum with varying degrees of success. The objectives have not changed a great deal from good practice in 1990. IT in Primary/Middle schools has been raised to level 5 standards to prepare some pupils for part-time schooling. Implementation of NC IT took a long time to reach more than 30% of schools. Resourcing still holds some of this work back in the poorer areas. The major piece of new equipment is the single Delta workstation per school (sponsored by the P.T.). This is usually placed in the library/community resource area. Technical problems and lack of teacher awareness have limited its use. However some LEAs have made good use of it for staff development. A multitude of pupil networks communicate nationally and internationally, using these workstations in conjunction with their personal computer.
3. In disadvantaged areas which have large temporary population or a very low rural population, the lack of resources often means token use of IT, except for the very able. Enforcement of the NC has been unofficially abandoned in these areas.
4. Part-time schooling, added to apprenticeship schemes, can occur where the pupils can receive better support at home or in the community. Friendship groups learning in this way are often a range of ages including adults. These pupils use an EC Delta workstation connected to the educational value added network. Linked resource centres supply a range of supported self study materials in many media. The pupils receive their academic tutoring, guidance and assessment from software, from distant tutors, from local school or community tutors and from the

rest of the group. This is a more costly alternative to ordinary school, so the parents ensure motivation. IT is an integrated part of this mode of study and so is covered well beyond levels of the NC, and is frequently extended into a subject study in its own right.

Sources of inspirational data:

J Whiting and N Bell (ed) 'Tutoring and monitoring facilities for European open learning' Elsevier 1987

MW Rogers 'Information on the Delta programme' Proceedings of the Sixth International Conference on Technology in Education, Florida 1989 Vol 1 137-141.

JA Mariani 'Computers in 3000 AD' The Computer Bulletin May 1989 11-14

Open University course DT200 'Introduction to IT for social sciences' course booklets and computer conferences 1988

Several Horizon and Arena etc. TV broadcasts

Further General Reading for 2010:

Mohn C and Rodda A (eds) 'Insights: learning for an interdependent world' Insights, 15 Rue des Morillons, 1218 Grand Saconnex, Geneva, Switzerland (1989)

D Stone 'Future directions for education' in Insights p15-19 (1989)

Council of Europe 'Thoughts at a Colloquy' in Insights p87

R Finnegan, G Salaman and K Thompson (ed) 'Information Technology: social issues' Open University (1987)

E Scanlon and T O'Shea (ed) 'Educational Computing' Open University (1986)

Further reading for 'Communication Towards 2010':

J Feitas 'Lets talk' in Insights (1989) p41-43

R Austin 'The European Studies (Ireland and Great Britain) Project' in Insights p111-116

Information Technology in Teacher Education

Getting to 2010

The King's Shilling.

Recruiting to the teaching profession seems to increasingly take on the features of trying to recruit infantrymen for the Flanders trenches in 1917. The prospects are not good. The possibility of a painful experience from which rehabilitation will be difficult has increased and the esteem which accompanies the role has diminished in what seems to be equal proportions. The solution in former times was virtually to trick recruits into taking "the King's Shilling".

Teacher Shortages in the 1990's.

The reduction in applicants will clearly be a major factor over the next ten years as demographic trends work through. The licensing of "suitably qualified" persons to fill teaching roles without formal teacher training provides an indication of the desperate situation we face. It also exacerbates the problem. The need for initial training in-post confounds further the attempts to maintain and promote good practice in teaching through continuing education for trained teachers.

Loans, Bursaries and Free Gifts.

Of course there have been other initiatives. Bursaries for science trainee teachers stand out against a background of moves towards increased fees for Higher and Professional Education and Universities, Colleges and Polytechnics vying against each other for the best promotional gimmick. We could even be entering the era of the "Free-Gift" course. Which is where my off the wall idea comes from.

Lap-tops for Student Teachers.

By 2010 we could well have completed an IT conversion for the teaching profession which might begin with a free lap-top for anyone committing themselves to at least, let's say, three years at the so called computer/helper assisted learning kit [CHALK] interface. The cost might appear prohibitive but it would pale into insignificance if every graduate, for example, could expunge the loan taken out over three to seven years training by spending a similar amount of time in teaching or some other low status but essential public service.

A 20 Year Programme of Upgrading Skills.

The opportunities for using PC's to enhance teaching effectiveness and efficiency are endless. The need for IT to reach those parts of the curriculum so far unreached by any other means in order to re-invigorate them is already enshrined in many aspects of the National Curriculum. The chance to provide a potential partial solution to the recruitment problem and to provide a common vehicle for both pre-service and *in-situ* training should be very attractive.

Teaching Learning Skills.

I would want a "give away PC" to be supplied with a basic analysis/synthesis package that would guide beginning teachers through the planning, realisation and evaluation of their attempts *to help learners become more skilful learners.*

Learning Teaching Skills.

The software would have to be progressive and take the beginning teacher through a spectrum of teaching styles appropriate for the needs of pupils and the demands of the subject matter. The extension into administrative roles (registers and report writing are examples) is easy enough to imagine but the basic package would need to be flexibly open ended to allow the spark of imagination to catch hold.

The Axiom.

The axiom on which to build the software is central to Mosston's [1981] approach to teaching styles. It states that the process of teaching is "a chain of active decision making". Styles are "defined" in terms of the balance of decision making between and amongst the participants about a learning/teaching episode. It can be seen as a spectrum in which a shift in the balance leads to different development implications for the participants.

Unfortunately Mosston's framework for analysis (and hence synthesis) of the teaching process has been hidden under the mantle of physical education. However, such a framework offers a great starting point and a valid *raison d'etre* for IT in the training of all beginning teachers. If we could use IT as a vehicle for such a framework we could revolutionise methodology in initial teacher education. All we have to do is to ask for a lap-top for every student entering initial teacher education. The Minister might find that outrageous; but what's a shilling worth these days? It could become a unifying resource for teachers, a liberating mechanism for imagination in teaching and the means by which we can ensure that education will still exist in 2010.

John Fazey

Education 2010

There is no straightforward, clearly defined, path ahead for educational computing; an exciting future beckons but the opportunities for missed turns, U turns and cul de sacs are countless.

If we get it right (and this depends above all on Education because the pressures from the domestic consumer sector provide the greatest threat) we will be / will train the knowledge counselors, guides and co-explorers who are privileged to see the first generation of knowledge engineers develop as the information age dawns.

The key to all this lies in the way that children react with, and express themselves through, information. The threat comes from passive knowledge and passive information systems. The electronic encyclopedia that suggests you should *"Slump down at the end of a tiring day and choose a meaningful learning experience from the thousands on offer in your own home"* (if you think it's far fetched look at the pre launch publicity for CDI) steals from children the opportunity for personal expression.

How children express themselves through the information media on offer is the key. Our embryonic Knowledge Engineers will work with multimedia, multi-sensory information systems. They will express themselves through the way that they author video material, linking it to textual and aural sources as they weave a presentation or project that stamps their individuality and their path through the information for their co-explorers to enjoy. Their work will be a diverse mix of collaborative effort, individual creativity, family / vertical learning patterns and the physical limits of the classroom will be bounded technology and access rather than bricks and mortar.

There are a number of current technological examples ("exemplars" is a bit hopeful this far out!) which point the way ahead:

- The Multimedia Lab at San Francisco have developed a Visual Almanac; what is important about this is not the seamless weave of sound, video, text and the like (which is exciting enough) but the way in which users' experiences, perceptions, text and images can be stored and structured as a tangible outcome in itself. After using the Visual Almanac you take away something that is unique to you, or to you collaborative group.
- Similarly the BBC's Interactive Television Unit version of the Ecodisc on CD authored in HyperCard has a "BackPack" feature that allows images, data, sound and text to be stored and organised after the investigation of the initial computer media.
- At Brown University a Unix front end to the distributed network that serves the campus plots pathways through for individual users. A geologist pursuing volcanic data might be drawn to basalt outpourings in Antrim whilst a student of mythology might also be drawn to data from the Antrim in the pursuit of Giants. When they get there an icon indicates the other student's pathway and a rich opportunity for cross curriculum (but not random) exploration unfolds.

Authoring will be free and easy. But less predictable are the really key issues: how do we assess the processes involved when children collaborate and express themselves creatively in a multimedia world? How do children make sense of the complex information webs that characterise multimedia? What language is appropriate (because "original", "finished" and so on won't be).

Perhaps the greatest challenge of all is that 2010 is only five B.Ed courses away. And for sure, the Conference at Bangor that year (Education 2030!) won't ask for 500 WORDS of TEXT!

Professor Stephen Heppell

Educational Change over the last 20 years

A Synopsis of the Annual Thatcher Lecture at London School of Economics

July 15th, 2010

Ever since the ERA of 1988, the pace of educational change has been the subject of sustained momentum. The aftermath of LMS was the realisation that education could never be made cost effective while staffing costs were such a high proportion of the total bill. The advent of Information Technology in schools, together with the National Curriculum, created the climate by which cost cutting could be achieved. The famous Hazelgreen Case of 1993 was the catalyst. The Governors supported the Head in sacking a member of staff who they felt was totally ineffective. The repercussions only attracted national headlines when they decided to replace the teacher with a 16 station network. The school was already IT literate. The children themselves were demanding more access to powerful IT tools; word processors, DTP, CD-ROM databases etc. The school saw this situation as a liberating opportunity.

For the next six years the network was in continual use. There was always at least 25 pupils in the room, fully engaged, supported only by a technician at 0.4 of a teacher's salary. By 1999 the school decided to update their network with the latest technology, and a financial review of the last six years illustrated the dramatic savings that could be made. The NFER, who had monitored the experiment, judged that there had been significant new opportunities created in terms of curriculum development and that enhanced learning had taken place. During these six years many other schools followed this example.

The new network installed in 1999 presented a different set of problems. With cable and satellite information exchange, the LEA (now nothing more than a localised DES clearing house and administrative centre) decided that the 'file server' could be centrally located and operated by one technician. There was no need for a technician in every school. After all the original concept had been pump priming, never an on-going commitment. Behavioural problems in unsupervised rooms could be monitored by video, although such problems were very rare now that education had changed to become more responsive to individual needs. The software was also changing. The educational software houses of the 1980s had disappeared; they simply hadn't got the resources and

funds to program for the more powerful machines (8 megabytes of internal coding was not unusual). The bigger commercial companies had taken over and were imposing their will on education. The IBCL suite of programs for example were designed to test pupils on the ATs in Maths and Science and although there was talk that the Orders might be changed to make it easier to do this (by removing some of the process based and practical ATs), this was not achieved until 2002.

Laptops had increased in popularity although always lagging behind the technology of the micros. However, the in-built CD players meant the children had access to vast quantities of information (text, sound and pictures) which together with full colour flat screens had revolutionised the sale of laptops. But the crucial breakthrough was that the new networks and laptops were truly compatible. This was the next source of major savings. Why not set pupils work to do at home on their laptops, attend school for only half a day, download their work into a network station which would then produce the teacher a written analysis? This would then form the basis of the next assignment. In effect, each member of staff could then accommodate twice as many pupils, dealing with two classes for half a day each. This system (HILLTOP) is still being developed but all the indicators show that it is possible to achieve up to 40% savings on the total salary bill.

The effect of this change over the past 20 years is that the curriculum has become technology driven and the pendulum has swung away from process learning, practical activity and experience. Testing, simulations and personalised programmes of study are now the key phrases.

(HILLTOP: Home-based Individualised Learning with Laptops.)

R.Keeling

PEBBLES

Information, data, and collections have always accompanied civilisations, but the form, content, context and quantity has developed and expanded. There is already a vast amount of data available to us from a variety of sources. The great library at Alexandria was one such example from long ago. Current libraries in wealthy countries have moved swiftly to microfilm, microfiche, and latterly to computerised databases, often accessed by phone. The fact is that our collections of books, articles, newspapers are now so huge that we can no longer afford to actually keep and handle them first hand for a variety of reasons; space, cost of purchase, cost of storing, cost of cataloguing, cost of maintenance..... Even our collections of artifacts such as those found in the British Museum are so extensive that they cannot be shown regularly. In fact some exhibits aren't, they never see the light of day! Figures for the rate of growth of the number of articles published in scientific journals each year are quite staggering. Knowledge, facts, and printed material are threatening to engulf us. I dread to think what it might be like by 2010.

There is a great need to personalise large databases.

If you think for a moment about your books, your library or indeed any collection you may own or have access to, and consider how you know your way around it, there is inevitably a personal side to that knowledge. You may use a catalogue and a number system, but also it is highly likely that your own personal experiences before, during and after your various uses of the collection, have coloured your view, mental map and ultimately the way you feel and think about the collection. Most of us know our books by colour, shape, where they go on the shelf, and inside, we pave, mark, underline, make notes, put in paper slips or fold over corners.

Pebbles is an attempt to describe a way of personalising vast amounts of data.

On the Apple Mac in Hypercard, the system assuming the human user to be somewhat simple and easily confused, keeps a record of the last 20 screens visited by the idiot human.

Some years ago Bob Kowalski, talking about developments in Prolog, proposed the very simple but incredibly useful idea of SYMMETRY. He explained that if the Prolog system couldn't answer a query from the user, then the system could ask for more information by querying the user. This whole notion of symmetry between the system and the user seems so obvious, but when we either feel in control of the system or know that it controls us, we don't think of symmetry, only our role and that of the system. Hansel and Gretel stole bread and crumbled it so they could find their way home again, but the trail had a finite length, like the Mac's breadcrumb trail. Moreover, Hansel and Gretel were in control of the distribution of the bread at least, but it was when they used pebbles that they found their way home. I term the objects with which I am going to suggest we personalise databases, PEBBLES. Pebbles are hard and durable, they have been used for thousands of years for counting and playing games, and painted pebbles have been found in prehistoric sites. Pebbles can be re-used, unlike breadcrumbs, which were eaten by the birds, as H & G found to their cost.

Pebbles can come in different shapes, sizes, patterns, colours, surfaces, and densities. In computing terms, they can be described as objects. I propose that these objects can be given various properties, ultimately as part of an object oriented programming environment. But I rush on too far, too fast. The user is in control of the pebbles, not the system with its breadcrumbs.

Some ways of using Pebbles.

The user browsing a vast database with a handful of pebbles can choose to drop a pebble at any point. Any page of interest, any piece of interesting data can be marked using a pebble. Pebbles can be dropped in any order.

At the end of a session, the references marked by the pebbles can be requested, and a second selection made. Pebbles can be taken back if the reference is not deemed worth keeping. References can be reordered and saved as a set of references.

The important concept is that pebbles can have as many or as few **properties** as required.

In reality pebbles are simply property lists stored on a disc linked to the user or other property lists. Hard copy of the material can be obtained depending on the system being used; pebbles merely keeps track of where you went and which pages or references etc you wished to mark.

Students could use prepared routes marked out by pebbles. This doesn't preclude them from browsing the system. Students could use their own pebbles like a signet ring to mark pages in which they were interested. The database would appear to show which pages in a text or set of newspaper articles were deemed important by the students. Of course, the teacher could lay down a paper trail, or just leave a few clues lying around.

Pebbles can be collected in with their references, sifted, sorted and ordered into a linear sequence. The pebbles, when drilled, can be strung together, making a bead necklace, bracelet or anklet.

Branching strings of beads can be produced, as can networks. They can be built up over a period of time without actually touching or changing the original data as it exists on a CD ROM or whatever. Networks can be hierarchical, in that large pebbles denote important routes, whilst small ones denote minor routes. The metaphor could be changed to roads, and travel in general. Remember tracking and scouting; consider the marks made by rich and poor sedentary and mobile peoples. Pebbles is a system, not unlike buttons in Hypercard. Pebbles can build up simple or complex networks, fractals if you prefer, of information based on how we as individuals think and come to that information. Pebbles is a metaphor, which hopefully will allow us to personalise vast amounts of information, making them our own. At its simplest, pebbles should save us from getting lost in the myriad knowledge which threatens to engulf us.

Henry Liebling in thoughtful mood.

Computer Memories

(extract from Mike Matson's retirement speech, July 2nd, 2010)

I started teaching in 1969, software-writing in 1982 and, at long last, full-time bonsai growing this year. After 41 years of being unable to see the wood for the trees I now spend all my time deep in my own miniature forest, occasionally remembering the days when computers needed disc drives and monitors.

I've often been asked when I think IT came of age. I always answer "1989". That was the year when the 32 bit revolution really started and I was convinced it was time I called it a day. When I thought about the apparently limitless potential of the new generation of machines it reminded me of how, as a child, I had tried to visualize infinity. It was all too big and I was much too small.

For many people the 32 bit revolution was a time for mourning as it became apparent that LOGO, Adventures and Simulations were destined for extinction. But, like a Phoenix, the Workshop arose from the ashes of cremated micro philosophies, and while the die-hards were still muttering disparagingly about "Tools wrapped in tinsel" the visionaries were realising the potential of the new approach.

Workshop Software, from the software developer's point of view, was a great liberator: it widened the demarcation between the creative and technical tasks of production. I was happy to leave the time-consuming task of encoding to someone else while I devoted all my energy to both capturing and generating the images and ideas which were what distinguished the Workshop from the earlier open-ended applications. It wasn't easy at first because of the restrictions imposed by portable media (who remembers discs?) but, with the arrival of crystal storage, imagination became the only limiting factor.

The other question which has been asked so many times is "Do you really think education is improved by technology?"

Two of my grand-children attend a Technology-Free School. This causes me no concern (or embarrassment!) whatsoever. When I compare them with the two who attend a regular technology-orientated school I see few differences in their characters, personalities, abilities and knowledge which can be attributed to the type of school which they attend. It's no surprise to me as I've always maintained that, while the routes may be different, children always arrive at the same destination when their teachers are equal in enthusiasm and dedication.

For me the magic of computers disappeared a long time ago but there are still occasions when I experience a hint of mysticism. If I wasn't retiring I'm quite sure I'd be excited by the potential of DXT. On a practical level Data Exchange Technology may do no more than ensure that a child's homework is automatically transferred to the teacher's terminal each morning but, on a more creative level, I envisage some exciting applications when children are able to exchange stories, poems, illustrations and so on with a minimum of effort. How laborious it used to be when the mini-portables needed plugs and sockets and cables. And I'm still amazed at how children cope with the ether screen. I know I could never get used to my stories floating in space.

Yet I'm just as excited when I visit a classroom in a Technology-Free school. I have no time for the 'experts' who would have us believe that education was ineffective in the pre-computer era. Technology is good for those who need it.

Beware of Technological Determinism

Martin Owen
University College of North Wales, Bangor

Dyma ni yn awr ar daith ein gobaith
(Here we are now on our journey of our hope)
Morgan John Rhys, *Ŷ Cylchgrawn Cymraeg*, 1795

A conference which is addressing the future is essentially a chance for us to exercise our hopes and perhaps progress the world closer to our personally defined Utopias...we wish to journey from the present.

The erudition that found the quotation which opens this contribution is not mine but Raymond Williams. Williams' analysis of the development of culture, because of its quality, needs to be addressed in considering our visions of possible education systems of the future. Education systems and cultures are not determined by technology, or by the existence or application of any particular technology. Essentially they are part of a complex political economic picture. A map of our "journey of hope" should display features of the political topography.

Prediction is difficult... and prediction about the future especially so (Anon). There is an increasing tendency to automate labour in both the service and manufacturing sector, there is a finite limit to resources, and there may well be a finite limit to consumption (how many Bank Accounts or Hamburgers can you consume?). The demand for human labour in the production of commodities and services is in decline. These beg important political questions:

- How is the remaining labour to be distributed?
- How is the wealth to be distributed?
- How will the time released be utilised?
- What will be the effects upon our culture?

It is not difficult to extrapolate from the current scenario. The employed class (albeit shrinking) is accruing greater parts of the produced wealth. They alone are able to participate in the consumption process. However an increasing *lumpen* proletariat augmented by low status low pay service workers doing jobs difficult to fully automate: teachers, nurses...fast food trainee managers are being increasingly excluded. The equation "Job=Economic Participation" has yet to be broken. We are developing a two tier economy. This is not difficult to imagine, it is common in the neo-colonial areas of the Third World, and is increasingly common in Western cities. Such a society, as Williams points out, is liable to be unstable and "more actively authoritarian and more criminal society" (Williams 1983).

Stratification and policing would be the prime purpose of an education system in such a society. Picking winners and keeping the rest as occupied as much possible. The application of IT to this stratification process is already becoming available. Techniques of profiling and testing using computers are becoming increasingly commonplace because of the imperatives of testing imposed by the National Curriculum eg Cheshire LEA have already developed a system in which records of attainment targets for the Science NC are computerised for each

pupil, and at a recent meeting of Science teachers in North Wales on their use of computers in their Departments, one school reported that the only significant use was in the generation of reports on pupils. One can foresee the development of expert diagnostic systems applied and implemented on computers which not only automate the report generation but also do the examining, and these welcomed by hard pressed teachers.

Undoubtedly this society would have a market for "home education" , particularly as those still with economic power would wish to maintain this advantage for their families, further it would undoubtedly be perceived as an important consumer market as suggested by Bill Gates¹.

A social democratic (and probably Eastern European "socialist") response to the problems outlined above would involve paying people to consume. The social relationships governing commerce and industry would not change. The market ethos would be as strong. The orientation would be towards a client population in a state of dependence. Subtler ways of social control would reinforce the same economic structures. Gorz (1985) suggests that state organised institutions such as education will largely be concerned with producing "normal citizens" whose ideology and aspirations conform to society's requirements.

"Once the child has reached school age the state will provide...normalising computer games..whose rules are virtually impossible to break or challenge because there is no visible subject prescribing them against whom the child can rebel"

Fortunately these are not the only choices available to us. Technology can be applied in other ways, but the application requires the political structure to enable it. In choosing the directions for our journey into the future we must include a political as well as a technological dimension.

Gorz, A "Pathways to Paradise", Pluto Press , London, 1985
Williams, R. " Towards 2000", Chatto & Windus, London, 1983 (also Pelican 1985)

¹ Quoted in Byte June 1989, p24

Diary of a teacher for July 23rd 2010

My 9th year English class asked me today what it was like when I first began teaching in 1989. I think they were perhaps a bit disappointed that we are not so advanced by comparison as they thought! There is a big difference, though. It's hard to put your finger exactly on the reason, but it may just be that there's more technology around and we've somehow come to take it for granted. Anyway, their question set me thinking so tonight I'm going to write down all the things I can think of which are different about my professional life now compared with then.

I think the biggest thing is that some of the drudgery has gone. I remember all that dreadful fuss over teaching spelling and now that everyone has access to spell checkers the problem has simply gone away. Handwriting too. I was looking at my form's entries for the calligraphy contest last week and really marvelling at how beautiful they were. I never could write like that myself. But then these kids have never had to write in a tearing hurry to finish an exam paper - so I suppose their writing has never been ruined.

The big advantage they have is easy access to simple technology. I don't think we realised how much difference laptop computers were going to make. There are only three kids in my class who don't own their own laptop and the loan scheme seems to work pretty well for those three. Of course the school's machines don't have the power of some of the Burberry Plus laptops, but they can do all the simple operations - word processing, graphs and spread sheets - and produce at least rough copy on their in-built printers.

In some ways, of course, life was simpler then. It was still possible to know more than the kids were likely to be able to find out on almost any topic. I can still remember the fit of sheer panic I felt when the county's new package of CD ROM discs first arrived in the library. I even managed not to use them for the first couple of years. But then the kids began to complain that they couldn't get enough information from books and some of it was out of date and unreliable . . . and anyway, by then, we were all getting our network access, direct from the classroom, to the Mega Mega CD player in the library . . . so the thing was unstoppable.

But I am still worried about the copying thing, despite what we are told about the value of information processing, as opposed to the tedium of writing everything out again. I suppose I just resent the fact that the kids don't have to work as hard as kids in the 1980s did. I mean, does Jacintha really know as much about heavy atom music after information processing her project as the Traceys and the Darrens did about heavy metal in 1985 when they had had to find magazines, use scissors to make cuttings, and write a piece in their own words to bring it all together?

The big thing that has held us back I suppose is the commercial implications of the technology. Information certainly isn't free! I must say I resent the way that papers make their profits by charging a lot for on-line access to their back numbers. I still feel instinctively that yesterday's newspaper is out of date and should go in the bin. Yet, here we are paying through the nose for access to every paper we can think of in the past 25 years. It's very useful, of course, but is the information really as reliable as it was when it came mainly from books? There's something more ephemeral about this information which hasn't been scrutinised so carefully before going into print. I suppose the only good thing to be said is that the standard of journalism has definitely gone up a bit! . . . and I must say it is nice to get daily papers delivered for free.

The biggest saving for me personally comes from my Dictacomp link to my laptop and the ease with which I can gain access to a high quality lazer printer when I need to. Just sitting in a chair and dictating straight onto the screen - look no hands! - is a

marvellous leap forward for womankind! (sick joke, it has meant the end for the traditional female secretarial role). Of course, it has cost me a lot to buy the system and I know that some people feel it should be provided free to all teachers . . . but it saves me so much time that I feel it is worth it. I've worked out my own routine for using it which I feel is very creative. I speak everything just as it comes first of all. Then I read through and re-dictate any sections which need major reworking. Finally, I revert to the keyboard and word processor to work up the final draft (though, much of that can be done by deleting by hand and dictating single words and phrases to fill gaps).

Thank God we don't still have to assess every movement of every pupil every moment of the day. That was really something, wasn't it? There was a time when I was really afraid that technology might just make it possible to do it . . . so we would have to go on making the attempt! I think it was the dullness of the teaching that resulted which actually brought it all to an end. It just wasn't possible for kids to survive the leap between the excitement of autonomous learning at home with IV linked to the Open College and TV Play-Learn station . . . and the tedium of step-by-step skill acquisition linked to endless "can do" tests! It was when the truancy rates soared and the government began to realise that the end of organised schooling would mean the end to social conditioning that it was clear that something would have to be done about the curriculum. It wasn't that the National Curriculum ever actually went away - I mean, it's still formally on the statute books! - but, once the testing began to ease off and the emphasis was moved to estimating kids enthusiasm and aptitude for learning rather than measuring their mastery of a set of narrow skills, the National Curriculum ceased to exist as it was first conceived. And that was really quite a relief. Just think what we would do now if we still had to test kids on the handwriting attainment target!! That's a real anachronism!

Bridget Somekh

Thinking about 2010

A collection of thoughts, by Ralph Tabberer

1. A major issue to be faced is the expansion of people in the "Third Age"; increasingly it will not be uncommon for people to live twenty-five years between retirement and death/inactivity. Education in general (like other sectors, including industry and advertising) will have to address this group:

(a) they will be a large market force, with a high proportion of their income disposable, and with a proven past interest in educational courses (what are schools going to do; do they need to become community schools with full involvement of the older population in day and twilight activities? Will increasing numbers of twilight courses give pupils more flexibility to build a timetable of lessons to suit them as well?);

and

(b) they are potentially a resource, with experience and expertise to offer education (currently licensed teachers are perceived as a threat, or an expedient to tackle teacher shortages; perhaps we should be more open-minded about the idea and try to identify a place, perhaps not as full teachers, for those with experience who can further support the teaching/learning process).

2. What is the scope for improving flexible learning arrangements, supported by IT? Currently many schools are experimenting with more flexible learning arrangements (or supported self-study); in other words they are working at

(a) resources - ensuring their resources are extensive and fully-catalogued for easy access,

(b) tutoring - ensuring that teachers are ready and able to negotiate learning with students/pupils, reach contracts of specified tasks and resources to be used, and evaluate progress,

(c) management - of resources, of staff development, and of record-keeping.

IT (a recent NCET study shows) is starting to help with:

i) resource organisation (better stores of bibliographic information inside schools and through NERIS, better search software, desk top publishing packages to enable teachers to create attractive materials and study guides),

ii) tutoring (increasing availability of email and teleconferencing links, better potential to word process diaries of progress and pupil/student work), and

iii) management (packages to record achievement and progress).

IT will be able to do more *as and if* we commission easy-to-use flexible learning management software, to help tutors and resource organisers supervise work more systematically.

3. The new technologies appear to be making ready access to huge datastores more and more feasible, including stores of images and moving images as well as text. Some people will exploit the interactive nature of the new technologies, using IV for example to offer exciting surrogate learning programmes (which should go a long way past existing programmed learning, just because of the range of options that can be offered and followed). Others will seek to get students to take control of large datastores, manipulating them, stretching their skills of selection and rejection of information to the fullest, producing the packaged outcomes for themselves. The availability of appropriate software is extremely important..

4. As the technologies make huge datastores more readily available, there may be a temptation for teachers to package material to teach students this and that, without the "pain" of searching for themselves. Perhaps the availability of a National Curriculum will in part encourage such an attitude, I am not sure. My feeling is that the more we can move teachers firmly into the arena of assignment-planning and setting, and more away from materials (and worksheet) preparation, the better. Horrid the thought that teachers will individually use desk top publishing and word processing to mass-produce pre-digested materials for pupils. Independent learners can only be developed on the foundation of a *variety* of tasks (variety in terms of resources to be used, in terms of length and scale of task, in terms of form of presentation of outcome, for example). And that takes the close involvement of the teacher as an assignment-organiser with time to negotiate and plan; not an ideas-processor.

5. The single most important issue in all this is teacher education and support. How we create environments (Mike Torbe called them "learning climates") for teachers to experiment, take risks, implement and amend change, is central. That is why the PALM project is important; it's about supported exploration within a strong and protective LEA environment. That is why we should look to other ways that we can extend to all teachers quality teacher education, without compromising ourselves on the costs.

6. Another tangential thought. The software crisis (=shortages) is worst where and when there is confusion about standard machines. When we have clear development paths and one or two key machines in the ascendant, there is enough of an incentive to develop software commercially, perhaps with some government help; the problem is that with the pace of technological change, the stability of having two major machines can soon be unsettled - and then the panic sets in about which machines to target and whether or not there will be a market. Fine, it can all be better settled with clearer standards and less proprietary development which accentuates the peaks and troughs; and work on standards and protocols is probably the major legitimate concern in NCET's technical role; but standards will always lag slightly behind developments.

7. (a) Where do we really want to go in terms of individualising learning? Continuing group work? Changing the teacher/tutor role? Improving through the micro the amount of practical, investigative work by pupils? Concentrating on higher as well as lower cognitive skills? In developing learners' ability to talk about and criticise their own learning? etc

(b) Do we have any evidence to say some or other of these goals are good?

(c) How do we take the technologies on to enable, or perhaps prevent, some of these outcomes?

Looking back from 2010

by John R Whittell

Twenty-five years ago it was prophesied that schools as they were would disappear. They did. But the buildings are still there. So are the teachers and the children. If anything there are more teachers.

But something has changed! There is a very great difference in what is going on between the teachers and the learners.

You may ask what led to these changes in the role of the teacher. I should answer: professional realisation and the power of IT.

Education had been a simple affair. From the teacher to the learner, knowledge and skills flowing (with varying efficiency) from the one to the other. "Learn this information" and recall it on demand. "Learn this skill" and reproduce it. There was little learner involvement in the identification of the task, little consideration of alternative strategies, and little evaluation by the learner at any stage. An IT system could do all this and more!

The national curriculum played its complementary part. It made parents aware of what should be done. The great highway to home-based learning was open. A computer, a few expert systems, a modem ... and the world of learning was every child's oyster. With tumbling prices this reality was but a step away.

It was simple: education was a two ended line an IT system and a learner.

But, education is not a two ended line. It is the four cornered tetrahedron that we all now know so well (not so well that a rough copy is not attached). Four corners and six connections. The teachers' role is to act as conductor, coach and counsellor guiding the learner from vertex to vertex as necessary, developing strategies that will be of service in whatever context the learner is placed.

It is no surprise to us that children soon became very proficient in the matter of extracting information from relevant data bases. It is not a matter for comment that they learn with little trouble how to use text, graphic, symbolic, sound processing and communications packages.

Twenty years ago the question would have been: "If they can do all this for themselves ... what is the role of the teacher?"

Very much that of:

- * structuring relevant tasks and transferring ownership of them to the learners,
- * bringing learners together at appropriate times to develop collaborative strategies,
- * encouraging and facilitating talk, for without vocalisation there is little real learning,
- * developing individual's strategies,
- * acting as independent assessor of the outcomes at any stage,
- * suggesting appropriate movement,
- * and above all, acting as joint evaluator.

Evaluation and reflection skills have at last been accepted as central.

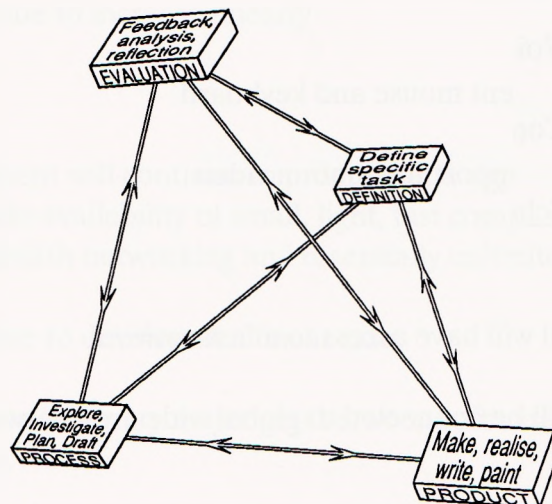
So here we are.

The teacher as enabler has arrived with all the power of IT to aid in the processes. But it remains the ability of one human to see and respond to the needs of another which has always been and will always be the essence of education. The conductor reacts to nuance and the infinite variety of human learning needs.

So, twenty-five years on, the buildings are still there, the teachers and children also ... but the roles are very different.

The mixed age, fluid groupings of pupils and their relationships to their tutors, their untroubled use of their bag-pack computers and the powerful networks, the power of their learning: these were only guessed at twenty years ago ... or dreamed about by those who saw visions.

Today we wonder that things could ever have been any different.



Appendix A - Future Technologies

(a copy of OHP transparencies, Mike Fischer, Research Machines)

Background concepts to looking 20 years ahead:-

Some developments will progress arithmetically
(e.g. G.N.P. @ 2% p.a. = x1.5)

Some developments will follow historical patterns
(e.g. it generally takes about 10 years
in IT for a major new technology or
concept to progress from laboratory
conception to volume use.)

Some developments are of a breakthrough nature but more
or less predictable
(eg. practical full voice input will probably be
generally available by 2010)

The invention and volume use of spreadsheets was not predictable

So what can we reasonably predict?

Workstations:

There will be a 10 fold to 20 fold increase in power/memory/function per unit cost

All screens will be flat and light

All new computers will be portable

It is reasonable to assume unlimited access to computers by students and staff at
school and at home

Voice input will complement mouse and keyboard

Computer graphics will support full motion video

School Networks:

All computers at school will have access to a fast network

Local area networks will be connected to global wide area networks.

A reasonable fraction of all reference material in the world will be available over the network

Networks may or may not be fast enough to support general networking of full motion video

Staff and students will 'only' have to be skilled in using the applications and information services provided by networks. Network management will be done by specialists.

Wide Area Networking:

Some access to school and other networks will be economically available from home, but at quite limited data rates, possibly 100 times to 1000 times less speed than that provided by a school or local area network.

Applications:

All applications will be 'Windows'

80% will conform to a dominant standard

Voice input will complement keyboard and mouse input

Software availability will progress gradually:

Cost of writing software may carry on increasing

20 years is only two generations in the software world

The quality and value of software will continue to increase linearly

Conclusion:

Hardware development will continue to progress at a significant arithmetic rate. This will provide wide availability of small, light, fast computers with good graphics, high bandwidth networking and essentially unlimited mass storage.

Software will continue to develop at a linear rate.

There will continue to be a very major gap between software demand and software availability.

Appendix B
Conference Delegates

Grant Alderson, Roehampton Institute, London

Mike Aston, AUCBE, Hatfield

John Attfield, Kingston-upon-Thames LEA

Jonathon Briggs, Kingston-upon-Thames Polytechnic

Graham Brown-Martin, Next Technology

Daniel Chandler, The University College of Wales, Aberystwyth

Margaret Danby, NCET

Niki Davies, Exeter University

John Fazey, University College of North Wales, Bangor

Mike Fischer, Research Machines

Steve Heppell, Anglia Polytechnic

Roger Keeling, Newman and Westhill College

Henry Liebling, St Mark and St John, Plymouth

Mike Matson, 4Mation Software

Martin Owen, University College of North Wales

Maelor Rowlands, University College of North Wales

Dave Siviter, Y Coleg Normal, Bangor

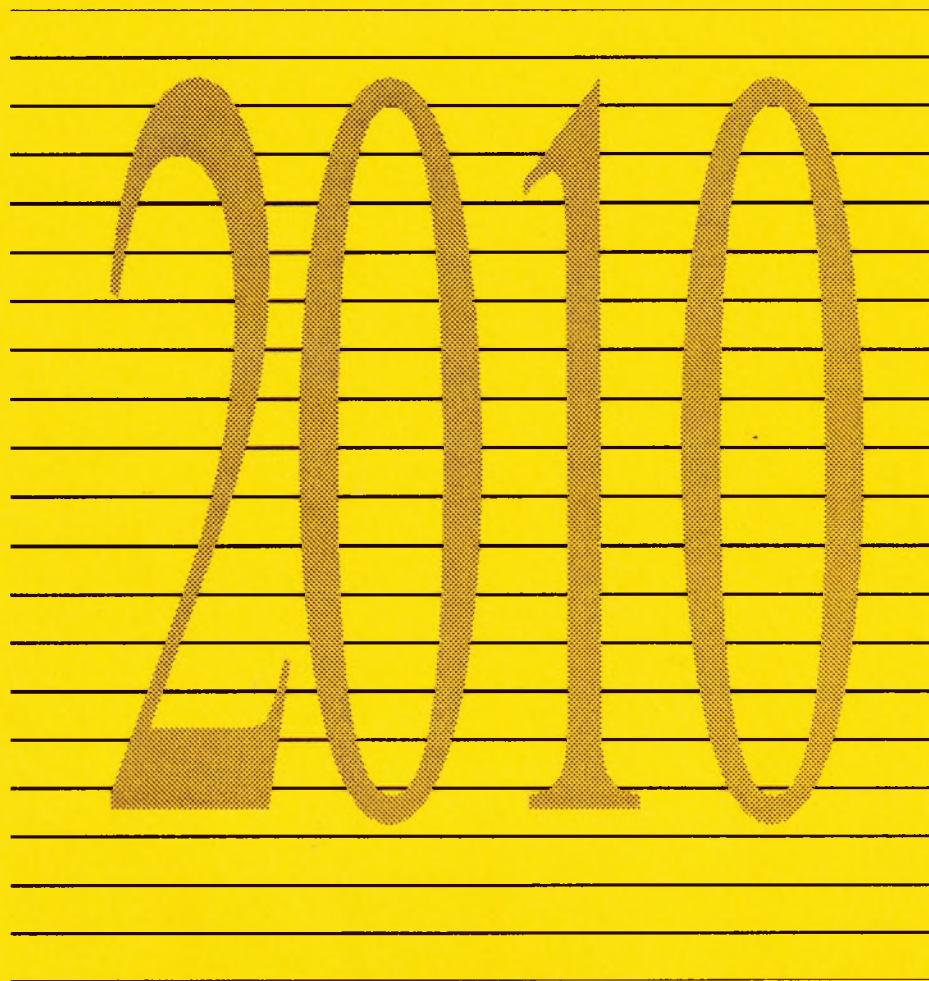
Bridget Somekh, CARE, University of East Anglia

Andrea Tapsfield, NCET

Andre Wagstaffe, NCET

Senga Whiteman, Newman and Westhill College

John Whittell, Solihull LEA



Education

(Bringing the future
into focus)