IFIP-Melbourne Conference:

ICT and the Teacher of the Future

IFIP

THE UNIVERSITY OF MELBOURNE

St. Hilda's College,

The University of Melbourne, Australia

January 27th – 31st, 2003

Conference Handbook

AUSTRALIAN COMPUTER SOCIETY
Advancing IT Professionals

ACCE

ICTEV

Papers

Monday: 1050-1230

Roles of the Teacher

1. **Margaret Cox** (UK) — *Do attitudes, pedagogocal practices and teachers' roles need to change to enable them to incorporate ICT in the school curriculum?*
2. **Nancy Law** (Hong Kong) — *Innovative classroom practices and the teacher of the future*
3. **Raymond Morel** et al (Switzerland) — *From teacher education to professional development for e-learning in an e-society*
4. **Dianne Chambers** (Australia) — *Developing ICT leadership skills for the teacher of the future*

Tuesday: 0900-1040

The Teacher as a Professional

1. **Sigrid Schubert** (Germany) — *New qualification and certification for specialist ICT teachers*
2. **Jose Valente** (Brazil) — *In service teacher development using ICT: First step in lifelong learning*
3. **Niki Davis** et al. (USA) — *A path to the future: Generative evaluation for simultaneous renewal of ICT in teacher education and K-12 schools*
4. **Vittorio Midoro** (Italy) — *Developing a European pioneer teacher community for school innovation*

Tuesday: 1400-1540

Teaching Environments

1. **Geoff Romeo** (Australia) — *Technology matters but good teachers matter more*
2. **Wolfgang Weber** (Germany) — *Professional development needs of teachers managing self-guided learning*
3. **Giampaolo Chiappini** (Italy) — *Mathematical teaching and learning environment mediated by ICT*
4. **Andrea Kárpáti** (Hungary) — *ICT and the quality of teaching – Some Hungarian results of the OECD ICT Project*

Friday: 0900-1040

The Teacher and Society

1. **Jari Multisilta** (Finland) — *The teacher in the mobile world*
2. **Paul Newhouse** (Australia) — *Using portable computer technologies to support learning environments*
3. **Ferran Ruiz Tarrago** (Spain) — *E-learning, ICT and learning portals for school education*

Short Papers

Monday 1400-1530

Session 1

1. **Terry Cannings** and Sue Talley (USA) — *Bridging the gap between theory and practice: The use of video case studies*
2. **Roger Carlsen** (USA) — *Using an educational census to reach educational technology tipping point*
3. **Tony Jones** (Australia) — *ICT and future teachers: Are we preparing for e-learning?*
4. **Elizabeth Hartnell-Young** (Australia) — *From facilitator to knowledge-builder: A new role for the teacher of the future*
5. **Kristian Kiili** (Finland) — *Technology reachability: Resources wasted to separated computer rooms*

Session 2

1. **Andrew Fluck** (Australia) — *Why isn't ICT as effective as it ought to be in school education?*
2. **Steve Kennewell** (UK) — *Developing research models for ICT-based pedagogy*
3. **Ted Clark** (Australia) — *Disadvantages of collaborative online discussion and the advantages of socialibility, fun and cliques for online learning*
4. **Trena Wilkerson** and Douglas Rogers (USA) — *Multiple platform videoconferencing to support education and professional development in mathematics*
5. **Clayton Pessoa** (Brasil) — *Internet projects – International cooperation*

Tuesday 1110-1240

Session 3

1. **Richard Hogg** (Australia)
2. **Debora Goldman** (Australia) — *Reality bytes: A reflection of the perception versus the reality of teaching with ICT*
3. **Nick Reynolds** (Australia) — *Musical composition and creativity in an ICT-enriched learning environment – a case study*
4. **Nicole Veelo** (Norway) — *Conditions and possibilities for integration of ICT in open teaching in secondary schools – A comparative study in preparation*
5. **Theda Thomas** (Australia) — *Cooperative learning and object-oriented development methods*

Session 4

1. **Bronwyn Disseldorp** and **Dianne Chambers** (Australia) — *Selecting the right technology for students in a changing teaching environment: A case study*
2. **John Murnane** (Australia) — *Teaching teaching with information technology*
3. **David Passig** and Adva Margaliot (Israel) — *A model for training future science teachers to master the cognitive skill melioration with ICT*
4. **Janine Bowes** (Australia) — *The emerging repertoire demanded of teachers of the future: Surviving the transition*
5. **Hélène Godinet** (France) — *Virtual and distant actors on a digital campus, or sharing and crumbling pedadogical responsibility*

Note: Names in bold indicate the author who is attending the conference and presenting.

Wednesday 1400-1530

Session 5

1. **Tim Denning** et al.(UK) — *Thinking skills and ICT used in the classroom?*
2. **Carolyn Dowling** (Australia) — *The role of the human teacher in learning environments of the future*
3. **Wing-Wah Ki** (Hong Kong) — *Teacher empowerment and minimalist design*
4. **Alberto Rizzo** (Australia) — *Activity centered professional development and teachers' take up of ICT*
5. **Toshinori Saito** and Hajime Ohiwa (Japan) — *Roles of the teacher in media literacy education*

Session 6

1. **Rosa Bottino** (Italy) — *ICT, national policies, and impact on schools and teacher development*
2. **Terry Cannings** (USA) — *Online constructionism and the future of teacher education*
3. **Mike Kendall** (UK) — *Realising an environment for the teacher of the future*
4. **Johannes Magenheim** (Germany) — *Social, affective and normal aspects of learning in ICT-enriched learning environments*
5. **John Vincent** (Australia) — *Individual differences, technology and the teacher of the future*

Thursday 1100-1230

Session 7

1. **Josie Hopkins** and **Anne McDougall** (Australia) — *Constructionist learning and teaching in a computer clubhouse environment*
2. **Henk van Dieten** (Netherlands) — *Slash 21*
3. **Lyn Regan**, Elaine Robertson and Des McKenzie (Australia) — *Integration of ICT into the primary curriculum at Anderson's Creek Primary*
4. **Valentina Dagiene** (Lithuania) — *Focus on the pedagogical dimension in ICT literacy for teachers*
5. **Trees Haaksma and Hans Puper** (Netherlands) — *ICT and the new roles of the teacher in Dutch secondary school*

Session 8

1. **Jill Vincent** (Australia) — *A technological environment for promoting mathematical reasoning: A dynamic approach to geometric proof*
2. **Bernard Holkner** (Australia) — *Four platforms: Moral perspectives on information technology*
3. **Joyce Currie Little** (USA) — *Using cases to increase interest in ICT and computing as a career*
4. **Ian Webb** and **Toni Downes** (Australia) — *Raising the standards – A proposal for an ICT standards framework for teachers*
5. Martin Boyle and **Anne McDougall** (Australia) — *Formal and informal environments for the learning and teaching of computer programming*

Wednesday Program

Wednesday's program includes four invited speakers:

Greg Hunt: Manager, State Education - Melbourne Museum
Old learning, new learning: Education at Melbourne Museum
Margaret Robertson: Executive Manager, Royal Children's Hospital Education Institute
Deborah Fels: Visiting Scholar, Royal Children's Hospital Education Institute, Associate Professor, School of Information Technology Management, Ryerson University, Canada
Kids in hospital, kids in school
Garry Putland: EdNA (Education Network Australia)
Working together building Australia's knowledge networks

Chairs

Keynotes (Auditorium)

Monday 0915	Anne McDougall, Pieter Hogenbirk
Wednesday 0900	Anne McDougall
Friday 1400	Pieter Hogenbirk, Anne McDougall

Papers (Auditorium)

Monday: 1050-1230	
Roles of the teacher	Bernard Cornu
Tuesday: 0900-1040	
The teacher as a professional	Raymond Morel
Tuesday: 1400-1540	
Teaching environments	Rosa Bottino
Friday: 0900-1040	
The teacher and society	Niki Davis

Short Papers

Monday: 1400-1530	
Session 1	Wolfgang Weber
Session 2	Jan Wibe
Tuesday: 1110-1240	
Session 3	Sigrid Schubert
Session 4	Harriet Taylor
Wednesday: 1400-1530	
Session 5	Ferran Ruiz Tarrago
Session 6	Jari Multisilta
Thursday 1100-1230	
Session 7	Terry Cannings
Session 8	Margaret Cox

Reports of Focus Groups

Friday 1110-1230	Rosa Bottino and Wolfgang Weber

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	Registration **Conference Office** 0830-0900	**Papers:** **The Teacher as a Professional** **Chair: Raymond Morel** Schubert; Valente; Davis et al; Midoro. **(Auditorium)** 0900-1040	**Keynote** **(Auditorium)** **Barry Harper** **Chair: Anne McDougall** 0900-1000	**Focus Groups** 0900-1030	**Papers:** **The Teacher and Society** **Chair: Niki Davis** Multisilta; Newhouse; Tarrago. **(Auditorium)** 0900-1040
	Welcome and Formal Opening Auditorium **Anne McDougall** **Pieter Hogenbirk** 0900-0915				
	Keynote **Bernard Cornu** 0915				
	Coffee 1020-1050	**Coffee** 1040-1110	**Coffee** 1000-1040	**Coffee** 1030-1100	**Coffee** 1040-1110
	Papers: **Roles of the Teacher** **Chair: Bernard Cornu** Cox; Law; Morel et al.; Chambers (20 + 5) minutes × 4 **(Auditorium)** 1050-1230	**Short Papers** **Session 3 (Auditorium)** **Chair: Sigrid Schubert** Hogg; Goldman; Nick Reynolds; Veelo; Thomas. **Session 4 (Common Room)** **Chair: Harriet Taylor** Disseldorp & Chambers; Murnane; Passig et al.; Bowes; Godinet. 1110-1240	**Margaret Robertson & Deborah Fels** Royal Children's Hospital Education Institute **Greg Hunt** Museum of Victoria **Garry Putland** EdNA **Chair: Geoff Romeo** **(Auditorium)** 1040-1225	**Short Papers** **Session 7 (Auditorium)** **Chair: Terry Cannings** Hopkins & McDougall; Van Dieten; Regan et al.; Dagiene; Haaksma & Puper. **Session 8 (Common Room)** **Chair: Margaret Cox** Vincent; Holkner; Little; Webb & Downes; McDougall et al. 1100-1230	**Reports of Focus Groups** **(Auditorium)** **Chair: Wolfgang Weber** and **Rosa Bottino** 1110-1230
	Lunch (Dining Room) 1230-1400	**Lunch** 1240-1400	**Lunch** 1225-1400	**Lunch** 1230-1315	**Lunch** 1230-1400
Registration (Common Room) From 1600	**Short papers** (15 + 3) minutes × 5 **Session 1 (Auditorium)** **Chair: Wolfgang Weber** Cannings et al.; Carlsen; Jones; Hartnell-Young; Kiili. **Session 2 (Common Room)** **Chair: Jan Wibe** Fluck; Kennewell; Clark; Wilkerson et al; Pessoa. 1400-1530	**Papers:** **Teaching Environments** **Chair: Rosa Bottino** Romeo; Weber; Chiappini et al.; Kárpáti. **(Auditorium)** 1400-1540	**Short papers** **Session 5 (Auditorium)** **Chair: Ferran Ruiz Tarrago** Denning et al.; Dowling; Ki; Rizzo; Saito et al.. **Session 6 (Common Room)** **Chair: Jari Multisilta** Bottino; Cannings; Kendall; Magenheim; John Vincent. 1400-1530	**Excursions** **Depart 1320**	**Keynote and Close (Auditorium)** **Deryn Watson** **Chair: Pieter Hogenbirk, Anne McDougall** 1400
Opening and Welcome (Common Room) IPC and Organising Committee 1730-1830	**Tea** 1530-1600	**Tea** 1540-1610	**Tea** 1530-1600		
	Focus Groups 1600-1730	**Focus Groups and Posters** 1610-1730	**Focus Groups** 1600-1730		
	Happy Hour (Common Room) 1730-1830	**Happy Hour (Common Room)** 1730-1830			
	AGM WG 3.1 1800	**AGM WG 3.3** 1800			
	Evening Informal Restaurant Groups	Evening Informal Restaurant Groups	**Conference Dinner** Aussie Barbecue (1900)	Evening Informal Restaurant Groups	

ICT and the Teacher of the Future

IFIP Working Conference (WG 3.1 and 3.3)

Melbourne, January 27-31 2003

FOCUS GROUPS

Briefing for conference participants

Aim

As this is a Working Conference, the Focus Groups constitute a major strand of the program. The main objective of the Focus Groups is to ensure that all participants of the Working Conference are actively involved in small group discussions, sharing their points of view and experiences.

Each Conference participant is expected to be a member of one of the Focus Groups and to take part in its activities.

Focus Groups will produce, within the scope of their theme, a position paper in which a forward view is taken of different aspects of the conference themes. After the conference this position paper will be used by IFIP Working Groups 3.1 and 3.3 to identify future activities. The papers will be published in the post-conference book.

For participants, a Focus Group is a success when:

- they meet interesting colleagues,
- the discussions in the group are interesting,
- a quality report that they can take away and use in their own environment is produced.

Final outcomes

The focus group will work towards the production of a written report (max 3 pages – around 1500 words) by the end of the week, and an oral report to be presented on the concluding day of the conference.

Focus Group Reports will be included in the post-conference proceedings book (to be published by Kluwer Academic Publishers) with the names of all participants, the chairs and the rapporteurs.

Participation in Focus Groups:
Since this is a working conference, **each participant in the conference should join one of the focus groups**. Participants are expected to take part in all activities of the chosen Focus Group, including the writing of the group report. This implies that they cannot switch between groups during the conference week.
The Program Committee formed the Focus Groups on the basis of the interest expressed by each participants. Focus Groups are organised around the following themes:

A. The teacher as a professional
B. Roles of the teacher
C. Teaching environments.

6 Focus Groups are planned (two for each of the 3 themes). Chairs of the Focus Groups are:

For the two Focus Groups for the theme "The teacher as a professional":
Raymond Morel and Sigrid Schubert

For the two Focus Groups for the theme "Roles of the teacher":
Margaret Cox and Wolfgang Weber

For the two Focus Groups for the theme "Teaching environments":
Mike Kendall and Jari Multisilta

Rapporteurs are under definition.

Chairpersons are responsible for stimulating the discussion of Focus Groups. They should support the Rapporteurs in the preparation of the oral and written reports emerging from the Group discussion.
Rapporteurs are responsible for summarising Focus Group discussion (but all participants should help) in order to:

- prepare the posters for exchange with other Groups (a session of the conference will be dedicated to this aim at the end of the second meeting – Tuesday 28 in the afternoon);
- prepare the oral report on the Group work for the final session (Friday 31 in the morning);
- produce a written report about the Group discussion to be published in the post-Conference book. This report must be available by the end of the conference.

Each Focus Group will have a Rapporteur.

Focus Group meetings

The focus groups will meet together on three occasions during the conference. The aims of the meetings are:

- Starting (first meeting: Monday 27th – 16.00-17.30):

The first meeting begins with a briefing on the topic of discussion prepared by the Chair and the Rapporteur; then each participant presents him/herself with particular relevance to his/her specific interest in the topic of the focus group. A discussion around the topic (sharing of experiences, concerns and views) follows.

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- Exchange (second meeting: Tuesday 28th – 16.00-17.30):

Discussion is finalised to the production of a poster for exchange with the other focus groups

- Reports (third meeting: Wednesday 29th - 16.00-17.30):

  Production of the oral and written reports.

  At the end of the conference there is a general session (Friday 31 – 11.00 – 12.30) dedicated to the presentation of the results from Focus Group working sessions. The Rapporteur of each Focus Group presents these results in 10 minutes, followed by 5 minutes of discussion.

General Organisation

The following members of the Program Committee are responsible for the Focus Groups:

- Rosa Maria Bottino and Wolfgang Weber are in charge of the general organisation of the Focus Groups
- Carolyn Dowling and Kwok-Wing Lai as Editors have the task of "coaching" the Rapporteurs.

Themes

Focus Groups will center their discussions around the following three themes of the conference:

A. The teacher as a professional
B. Roles of the teacher
C. Teaching environments

Brief description:

A. The teacher as a professional

ICT is confronting teachers with new challenges, but also demands new competencies and qualifications. Teachers of the future are life-long-learners about and with new technologies.
In this theme we will concentrate on the following topics:

- What are common and realistic ICT-competencies for teachers
- What are the qualifications for specialist ICT-teachers
- What methods are used for assessment of ICT-standards for teachers
- How ICT is incorporated in teacher certification
- How the professional development of teachers takes place
- How ICT is integrated in pre-service teacher education
- How teachers can be supported in their classroom use of ICT
- What teacher learning communities can contribute to the teacher as a professional
- ……..

B. Roles of the teacher

The integration of ICT stimulates teachers of the future to change the way in which they can look at the teaching and learning process. New roles for teachers arise and … new problems.
In this theme we will concentrate on the following topics:

- How the relationship between teachers and learners changes
- How the teacher can promote collaborative and cooperative learning with ICT
- How the teacher can cope with societal and ethical issues relating to ICT and promote positive attitudes and behaviours
- What new roles emerge in schools: ICT-coordinators, ICT-specialists, ICT-assistants
- How ICT can support new pedagogical visions
- How the teacher can develop student responsibility for learning
- …….

C. Teaching environments

Effective teachers of the future must practise within collaborative learner-centred situations. So new teaching environments must emerge, both physically and virtually, with ICT supporting both teachers and learners.
In this theme we will concentrate on the following topics:

- How to design new teaching and learning environments
- What effective models are there for ICT-enriched environments
- What are the methodologies and approaches for researching ICT enriched learning and teaching environments
- What methods of practise are used within these new environments
- Which ICT-skills are needed for teachers to manage these new environments
- What methods of on-line teaching best promote learning
- What the role of educational software can be
- What the physical aspects of new environments are
- What demands there are for ICT in vocational education
- ……

Some suggestions for the running of the Focus Groups

Each Group should keep to the central theme "ICT and the Teacher of the Future", considering the specific theme chosen as the point of view from which to look at it.
After an introduction of the theme by the Chairperson and a brief introduction of each participant, a Focus Group should identify the main issues, some crucial questions and problems, a set of recommendations, and conclusions.

La Villa Media

european residence for educational multimedia

[Grenoble – France]

the new arts of **learning**

VILLA MEDIA

The Teaching Profession: A networked profession in new networked environments

Prof. Bernard CORNU

La Villa Media

Grenoble, France

La Villa Media
European Residence
for Educational Multimedia

- *A European « Villa Medici », an international Residence for Research, Reflection, Creation*
- *Hosting Residents, to carry out Projects in the field of Educational Multimedia*
- *For rethinking Pedagogy with the help of Information and Communication Technology,*
- *Working in partnership, in networks*

http://www.lavillamedia.org

ICT:

Not only a tool to improve teaching and learning

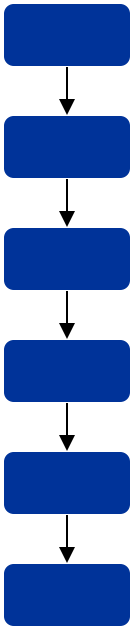
But profound changes in Society, in Education, in Knowledge, in the Teaching Profession

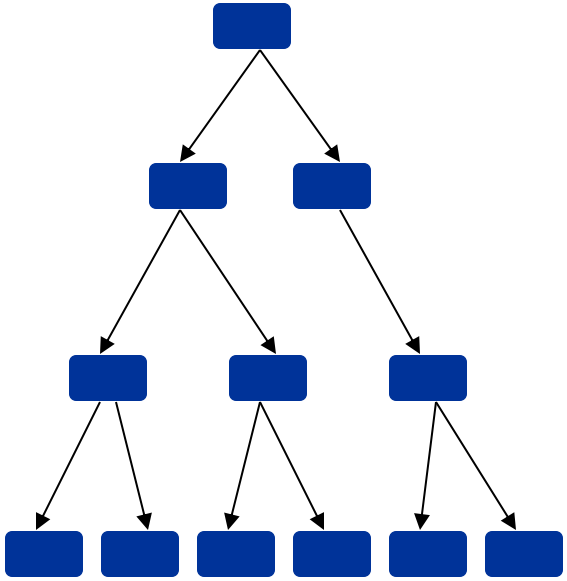
1. A Networked Society.
2. New knowledge, new access to knowledge.
3. Collective Intelligence
4. New Profession, new Professions
5. Scenarios for the future
6. Teachers and national Policies

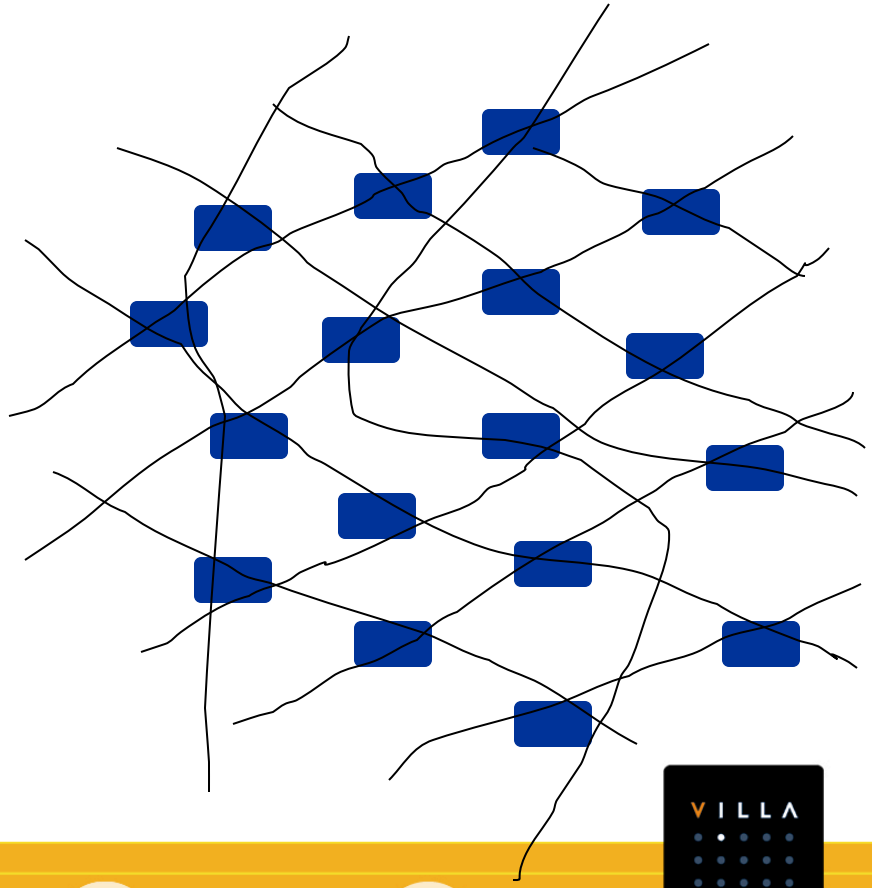
A major change: Networking

A Networked Society

From chain to pyramid and to network..



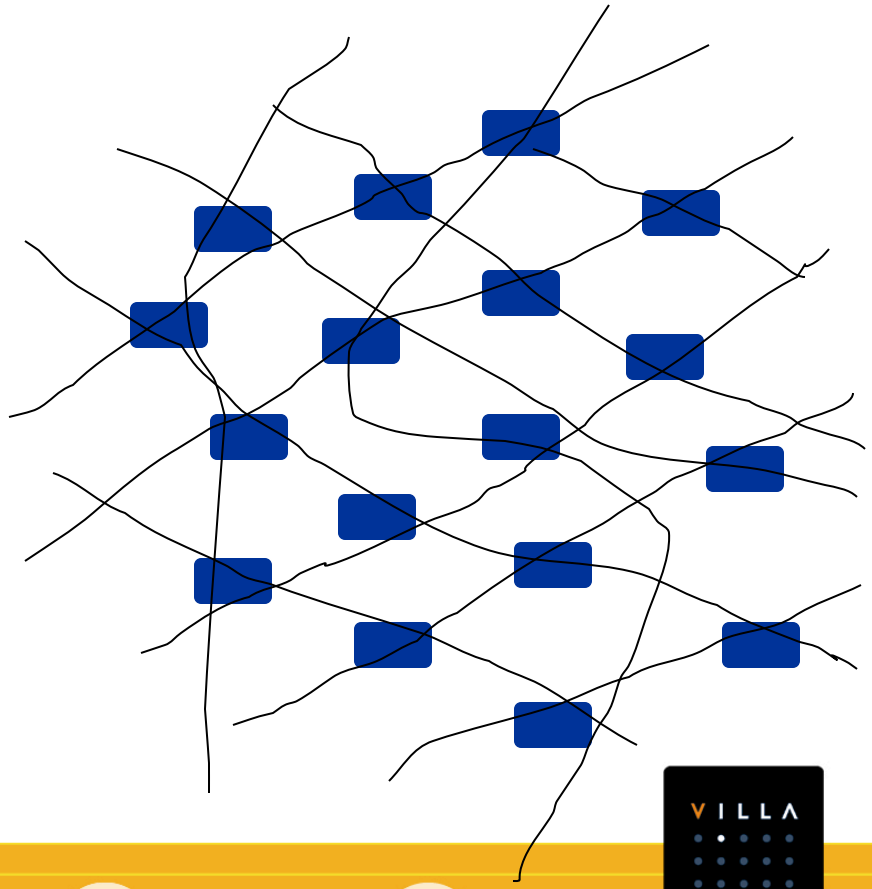




A Networked Society

Network:

- Edges and nodes
- Complex
- Evolving
- Several paths from one node to another

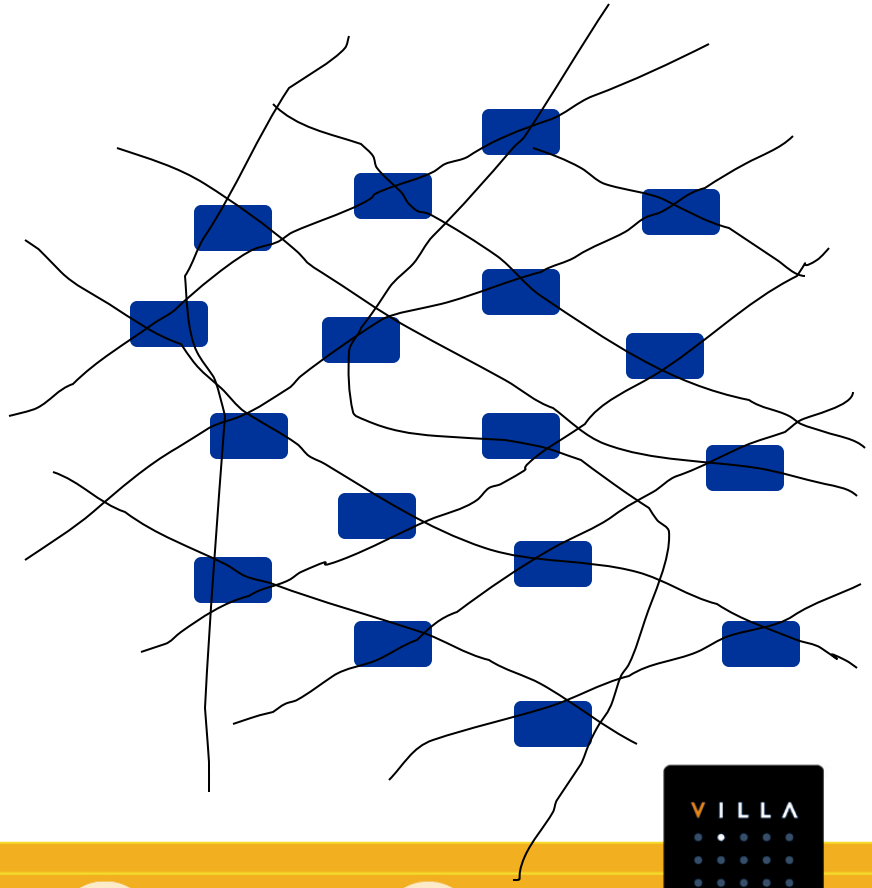


A Networked Society

Networks are permanently enriching and complexifying

network people

network informations



The Networked Society

Linking people / Linking objects

Communication:

one to one

one to all (media)

all to all

From hierarchical communication to networked communication

Examples:

-accessing an information in a book
from the « hierarchical » way
to the « network » way

-communicating with people
-organisation of educational systems

The spider…
(trap; emptiness)

(Stefan Merckelbach et Pascaline Dupas, Ordinata)

A Networked Society

… or the giraffe

(Stefan Merckelbach et Pascaline Dupas, Ordinata)

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A Networked Society

…the links or the nodes…

Connect people.
The way they are connected is important:
it creates proximities, sub-networks, new relationships.

A Networked Society

the Network structuration of Society has consequences on economy, social life, leisure, politics, etc…

… and on Education:

major consequences on knowledge itself,
on the way one can access knowledge,
on educational systems,
on teaching and learning,
and particularly on the teaching profession.

1. A Networked Society.
2. New knowledge, new access to knowledge.
3. Collective Intelligence
4. New Profession, new Professions
5. Scenarios for the future
6. Teachers and national Policies

New Knowledge, new access to Knowledge

- ICT change knowledge itself:
- Each discipline, its concepts, processes, methods, resources available…

New Knowledge, new access to Knowledge

- Information / knowledge
- Internet: a network of information.
- Education needs networks of knowledge
- Role of the links (the edges): contributing to the elaboration

  of Knowledge

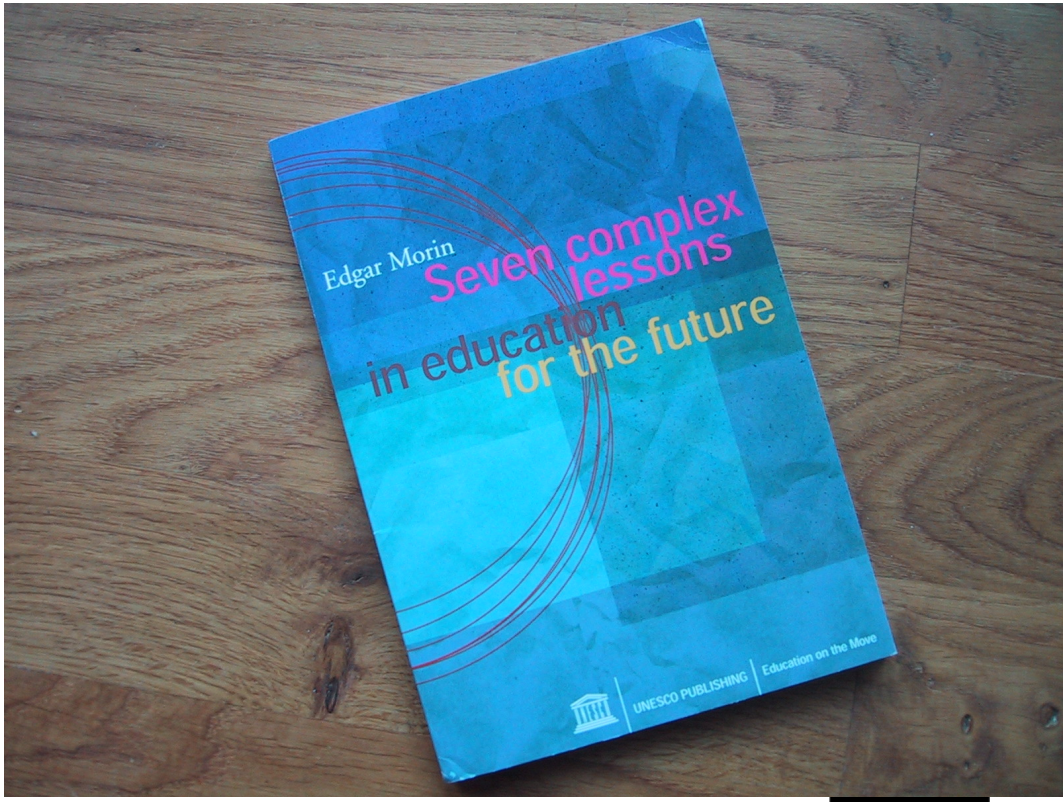
New Knowledge, new access to Knowledge

- Complexity and networking:
  networking enables to structure complexity

- more complex implies more networked, more networked makes it more complex.

New Knowledge, new access to Knowledge

An example: Edgar Morin (*Seven complex lessons in education for the future*)



New Knowledge, new access to Knowledge

1. Detecting error and illusion: **Teach the weaknesses of knowledge**: what is human knowledge? Teach its errors, its illusions; Teach to know what to know is!
2. **Principles of pertinent knowledge**: One must be able to take into account global and fundamental problems, in which partial and local knowledge will then be used. The knowledge cannot be split into disciplines. One must be able to consider the objects of knowledge in their context, in their complexity, in their whole.

New Knowledge, new access to Knowledge

3. **Teaching the human condition**: Teach the unity and the complexity of human nature. This needs input from biology, from human sciences, from literature, from philosophy. Teach the relationship between the unity and the diversity of what is human.
4. **Earth identity**: Teach knowledge at a worldwide level. Teach the history of the planetary era, teach the solidarity between all the parts of the world.

New Knowledge, new access to Knowledge

5. **Confronting uncertainties**: Sciences have established a lot of certainties, but they also have revealed many uncertainties. Teach the uncertainties in physics, in biology, in history.
6. **Understanding each other**: Teach understanding; understanding in all its meanings, mutual understanding between human beings. And teach what misunderstanding is. It is a crucial basis for peace education.

New Knowledge, new access to Knowledge

7. **Ethics for the human genre**: Teach the world. Teach the ethics of humanity preparing citizens of the world. Teach how democracy relates to the mutual control between society and individuals.

New Knowledge, new access to Knowledge

ICT change the way one can access knowledge.

- *find appropriate paths in complex networks.*
- *validate the knowledge found*
- *find appropriate knowledge*

New Knowledge, new access to Knowledge

A major role for the Teacher: help the pupils circulate in the network of knowledge.

1. A Networked Society.
2. New knowledge, new access to knowledge.
3. Collective Intelligence
4. New Profession, new Professions
5. Scenarios for the future
6. Teachers and national Policies

Collective Intelligence

Individual / Collective intelligence

the networked society needs a collective intelligence.

Collective Intelligence

Internet is mainly a tool, the more recent we found for **perfecting our intelligence through cooperation and exchange**… The true revolution of Internet is not at all a revolution of machines, but of communication between human beings… **Internet enhances our capacity for collective learning and intelligence**… Each community realises that it is one of the dimensions of the production of human sense… Internet forces us to experiment new ways of being together… The ethic of **collective intelligence, consisting in interlacing different points of view**… (Pierre LEVY, 2000)

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Collective Intelligence

Example: ants

Building bridges
Cooperating for transportation
of heavy material
Finding the shortest way

Example: ants

« stigmergy »:
Specific actions
related to the environment
(not to other ants or
to a « chief »)

Collective Intelligence

Connectivity makes
collective intelligence exist

« connective intelligence ».

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Collective Intelligence

The classroom is the first place where collective intelligence can be built and used.

…A major role for the teacher.

1. A Networked Society.
2. New knowledge, new access to knowledge.
3. Collective Intelligence
4. New Profession, new Professions
5. Scenarios for the future
6. Teachers and national Policies

New Profession, new Professions

A lot of new competencies
are needed for teachers:

- *Technology*
- *new pedagogical possibilities*
- *new knowledge*
- *new networked form of knowledge,*
- *new expectations of Society*
- *…*

New Profession, new Professions

Master the Knowledge
Help accessing the Knowledge, sorting it, hierarchising it, organising it
Master the processes of teaching and learning
Transmit the knowledge
Teach conceptualising, theorising, modelling, abstracting
Transmit the taste for knowledge
Arise curiosity
Make pupils be successful at their exams
Be a guide, a tutor, a mediator
Be an advisor, an organisator, a leader, an evaluator
Contribute to producing Knowledge and Teaching
Use and question research
Be a technician, an engineer
Put in action an educational policy
Guarantee equity
Transmit the fundamental values of society
Prepare the citizens of tomorrow

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New Profession, new Professions

Master the Knowledge
Help accessing the Knowledge, sorting it, hierarchising it, organising it
Master the processes of teaching and learning
Transmit the knowledge

Is it possible ???

Be an advisor, an organisator, a leader, an evaluator
Contribute to producing Knowledge and Teaching
Use and question research
Be a technician, an engineer
Put in action an educational policy
Guarantee equity
Transmit the fundamental values of society
Prepare the citizens of tomorrow

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New Profession, new Professions

A Collective Competency (a team profession)

An evolutive Competency (Lifelong Training)

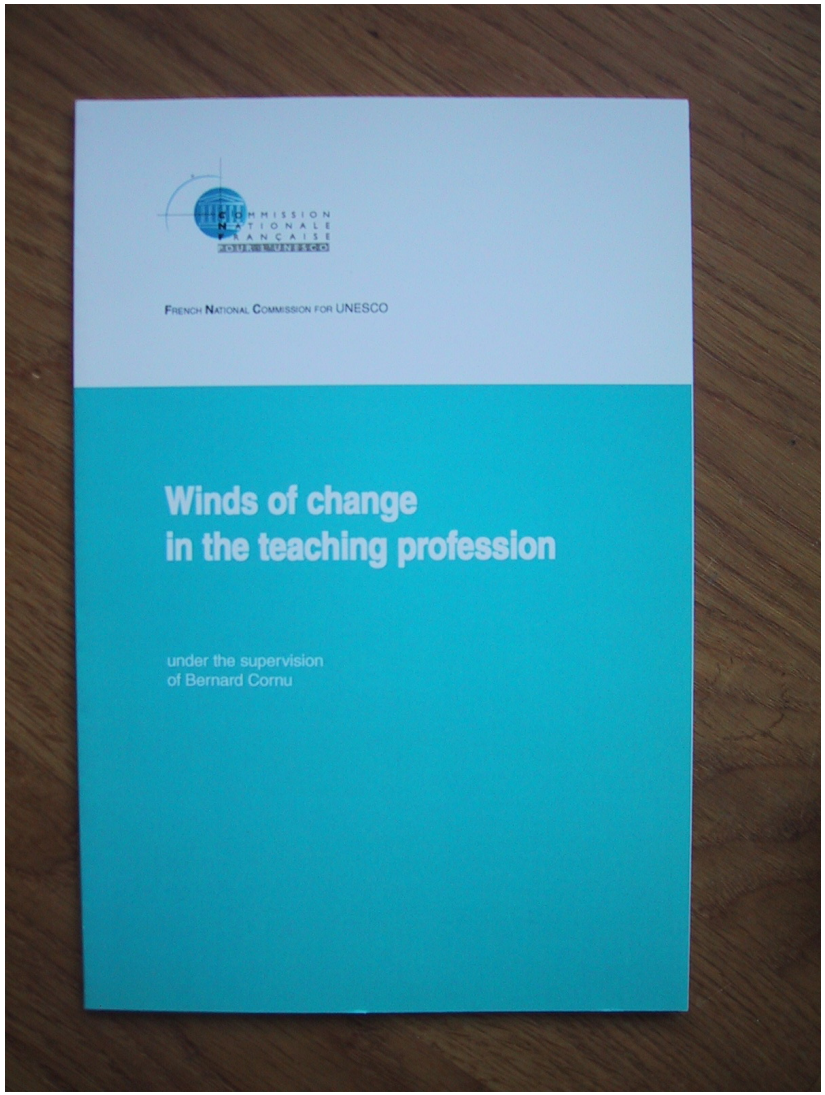
New Profession, new Professions

A Collective Competency (a team profession)

An evolutive Competency (Lifelong Training)

A new Teaching Profession
New Teaching Professions

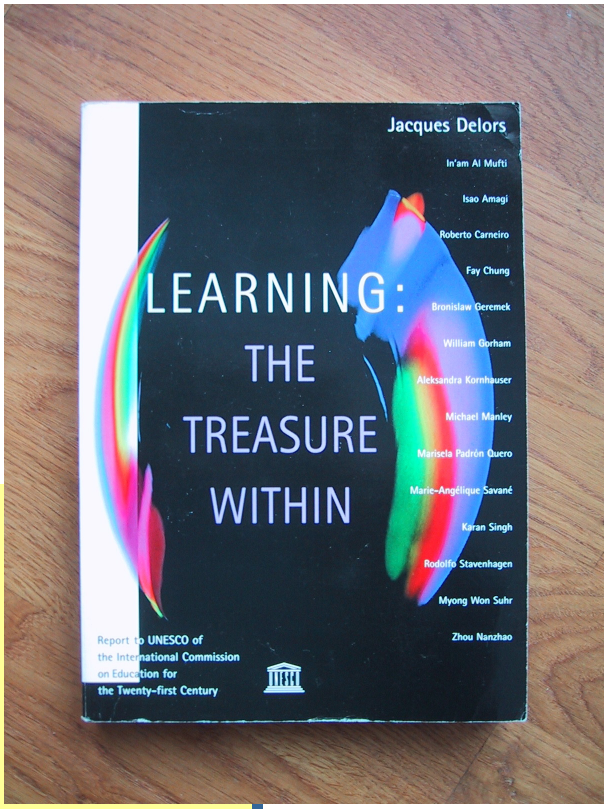
New Profession, new Professions



New Profession, new Professions

"Learning : The Treasure within"

Jacques Delors (1996)



The four pillars of Education :

Learning to know
Learning to do
Learning to live together, learning to live with others
Learning to be

VILLA MEDIA

New Profession, new Professions

A world marked by increasing tensions…

- *Local / Global*
- *Tradition / Modernity*
- *Short Term / Long Term*
- *Equality, Equity / Competition, Elitism*
- *More and more Knowledge / Human Assimilation Limits…*
- *Spiritual / Material Values*

New Profession, new Professions

democratisation
complexification
globalisation :

new dimensions for Education

New Profession, new Professions

Teachers have two major roles:

-**Forming citizens** in a world marked by change and dominated by the ephemeral; transmit the basic values of society and the universal values of humanity.

-**Instilling knowledge**, when knowledge has changed and accessing knowledge has changed.

New Profession, new Professions

ICT confirm the essential
and core role of the teacher:

be the MEDIATOR
between knowledge and the student

…the face-to-face relationship
between the teacher and the pupil
remains essential

New Profession, new Professions

Francis BALLE:

" ICT do not profoundly affect the status of the teacher, neither the fundamental vocation of school, but enable them doing better the best things that they do and that only them can do. "

New Profession, new Professions

The human dimension of teaching supported and enhanced by technology

New Profession, new Professions

A "new teaching profession",
not in the fundamental missions,
but in the way the profession is practised everyday, in the tools and resources available, in the diversity of possible pedagogical methods.

New Profession, new Professions

New professions are appearing in Education:

engineers and technicians,
technological assistants,
pedagogical assistants,
educators of different types

...

1. A Networked Society.
2. New knowledge, new access to knowledge.
3. Collective Intelligence
4. New Profession, new Professions
5. Scenarios for the future
6. Teachers and national Policies

Sovereign Hill, Ballarat, Australia

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6 Scenarios

"What schools for the future?"
CERI, OECD, 2001.

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6 Scenarios

There is no fatality in the future:
actors must decide where they want to go

"status quo »
"Bureaucratic School Systems Continue »:

Strong school systems, resistance to radical change,
Individual classroom and teacher models remain dominant.
Growing use of ICT without changing schools' main organisational structures.
Teachers form a strong corps.
Role and status: continuation of the present situation.
Teaching is considered as an "individual art".

"status quo »
"Teacher exodus - The 'meltdown scenario'"

Teaching profession rapidly ageing, less and less attractive.
ICT appear as a possible response to teachers shortage.
Salaries increase in order to attract more teachers,
but it has detrimental consequences for investments
(ICT and physical infrastructure).
A major difficulty in recruiting enough teachers,
the market of "school at home" is developing,
with new types of professionals.

"re-schooling"
"Schools as Core Social Centres"

Focus is on socialisation goals and schools in communities.
Schools: the most effective bulwark against social, family and community fragmentation.
Much attention is given to non-cognitive outcomes, values and citizenship.
School facilities open to the community.
ICT are used extensively, especially for communication.
Teachers have a high-level status.
Many other professionals, community players, parents, etc.

"re-schooling"
"Schools as Focused Learning Organisations"

A stronger knowledge orientation. ICT extensively used.
Schools look like "learning organisations".
Flourishing research on pedagogy.
Schools management uses teams, networks…
Teachers enjoy favourable conditions and are highly motivated,
R&D, continuous professional development,
group activities, networking (including internationally).
Contractual arrangements might well be diverse,
with mobility in and out of teaching.
"Networked teachers in a networked society".

"de-schooling"
"Learning Networks and the Network Society"

New forms of co-operative networks.
Abandonment of schools in favour of learning networks.
The emerging "network society" leads to dismantling of school systems.
Small group, home schooling and individualised arrangements.
Substantial reduction in public facilities for schools.
No longer reliance on "teachers"; New learning professionals emerge, consultants (home teaching, educational "hot lines", office consultancy…).

“de-schooling”
"Extending the Market Model”

Existing market features in education are extended;
governments encourage diversification.
New providers stimulated to come into the learning market.
The most valued learning determined by choices and demands.
There is a substantially reduced role for
public education authorities
Entrepreneurial management modes are more prominent.
New learning and educational professions are created
in the market.

6 Scenarios

- Teaching: an art, a vocation, or a profession?
- How will the teachers' shortage affect the nature of the profession?
- Will education focus mainly on knowledge and disciplines, or on values and citizenship?
- How will the status of teachers evolve?
- How will the market affect the teaching profession?

1. A Networked Society.
2. New knowledge, new access to knowledge.
3. Collective Intelligence
4. New Profession, new Professions
5. Scenarios for the future
6. Teachers and national Policies

Teachers and National Policies

A major role for teachers
in national educational policies.

- The social status of teachers
- public service / private educational actors
- new tasks for teachers
- The official duty of a teacher

Teachers and National Policies

not only one way to be a teacher,
but a diversity

Teachers and National Policies

the “Recommendation concerning
the Status of Teachers” (Unesco, 1966)

Teachers and National Policies

Teachers and
globalisation, internationalisation

political and ethical questions

Conclusion…

Teacher: more and more a profession

Conclusion...

- ICT have first emerged as
  new concepts, new tools, new resources
- applying ICT to teaching
- integration of ICT into education
- transformation

Conclusion…

ICT can no longer be simply considered as tools for improving teaching and learning; a profound transformation has started

Teachers are the main agents of this transformation.

European
Residence
for Educational
Multimedia

http://www.lavillamedia.org

From Teacher Education to Professional Development for E-learning in an E-society

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Abstract: This paper concerns the development of a scenario aiming at the improvement of teacher education in Geneva in the field of media, image and ICT (MITIC) in a media- and pedagogy-oriented process instead of technology-driven action as is usually the case. Among a lot of observations, experiments and constraints, the key factors we address are the lack of well-educated teachers of teachers (level F3), willingness to enhance coherence in teacher education together with pedagogical research (innovative projects), the need to take into account the evolution of the demography of teachers in professional development and the necessity to promote an attitude to and an awareness of practices in collaborative and cooperative work. In this process we have built a prototype of a new concept of teacher (F3-MITIC), and we have cooperated in a national incentive policy and proposed an agenda for the remaining problems to be solved. We conclude the presentation of our contribution by the assessment of the fundamental necessity to put in action a real e-piloting including a set of strategies, as well as projects and tools which will have to be elaborated with the actors in the field, in the four following directions: sharing data, re-defining teachers' competencies, taking care of innovative projects and designing pedagogical models of e-learning.

1. INTRODUCTION

1.1 Change of paradigm: From teaching to learning

During the last decade, changes to the role of the teacher have been widely and frequently discussed. Some particularly instructive international studies have included the CERI-OECD study (2001) suggesting six scenarios for the school of the future, and UNESCO-IFIP Curriculum (2001) which stresses the strongly interdependent multicomponent approach (teacher education is a basic component) with implementation levels (emerging, applying, integrating, transforming), not forgetting the need to preserve local implementation conditions (languages, cultures, institutions, etc.) To go further and produce concrete proposals to promote and put them into action, we took into consideration Jacques Tardiff's

(1998) ideas and also the main results of a three-year EU project named FETICHE (Formation des Enseignants aux Technologies de l'Information et de la Communication: Changements et Evolution). At the national level we elaborated a prototype of an incubator of pedagogical projects to stimulate scenarios of integrating ICT (Plan d'Actions, 2002).

1.2 The need for coherence in teacher education

It is very important to identify and build a grid to maintain some coherence between skills, competences and professionnal development with respect to generic objectives and more general competencies (levels F1, F2, F3).

1.3 The bottleneck: From big announcements to reality in the field

National policies, e-Europe, e-Learning, declarations of targets and deadlines during the last 5 years forgot the reality in the field: instead of merging or converging initial teacher education, in-service teacher education and pedagogical research, what actually happens has often been poorly linked and far removed from the 'theory'. The result in some countries is an important bottleneck characterised by a lack of well-educated teachers of teachers who have a good understanding of institutional priorities and the change of paradigm.

1.4 The urgent need for more new teachers

The demographic evolution of teaching staff in the next five years shows that in many countries there is a need to educate an average of 40% of new teachers. Considering that, according to the most optimistic evaluations, the number of today's teachers presently mastering ICT amounts only to 20%, the huge gap stresses the urgency of bridging the chronic deficiency in educating the specialist teachers in particular.

2. THE F3-MITIC PROJECT AND THE TEACHER OF THE FUTURE

According to this picture of what to do for the teacher of tomorrow, the professional development (PD) programme for teachers was oriented towards a **model called F3-MITIC.**

We considered it necessary to expect from all teachers of teachers, irrespective of the didactics used or of teaching level, education competences in and through media, i.e. the capability of integrating MITIC in assisting the construction of knowledge.

2.1 F1, F2, F3 networked across the educational system

The following codes are used in the project to define 3 different levels of education:
F1 = education received by students (independently of the level of education)
F2 = initial and/or continuous teacher education received by teachers (independently of the levels of education)
F3 = education received by teachers of teachers.

2.2 Some features of F3-MITIC

The programme is designed to focus on pedagogy, adult education, integration of ICT, collaborative learning, evaluation, basic and sustainable skills like producing document, exchanging of experiments, communicating, elaboration of scenarios, capitalising /mutualization of the production of the learners, piloting the PD through the learners i.e. the teachers of teachers, etc. The whole conception of this project is designed, as mentioned earlier, as pedagogy- rather than technology-driven. The spirit is close to Bent Andresen with his 'Design of Teacher E-Learning – the Scenario Model' (cf. IFIP WCC'2002 at Montreal August 2002).

3. THE PROTOTYPE OF F3-MITIC IN 2001-2002

A group of 25 existing teachers of teachers (practitioners of initial and/or in service teacher education) experimented with this model for one year (2001-2002) (Project FETICHE). The prototype F3-MITIC 2001-2002 offered very interesting observations in different directions, namely:

- implementation of the content
- environment for collaborative work
- new methods to introduce, to experiment or to apply the prototype
- modalities for piloting, measures for accompanying the plan of action
- organisational matter,
- different modalities for evaluation
- follow-up tools
- diffusion of the information**.**

70 scenarios were produced throughout the 10 modules. A draft analysis in the form of a typology of all the scenarios was achieved by a fellow researcher of the Faculty of Science Education, University of Geneva (http://wwwedu.ge.ch/cptic/f3mitic/0102/scenarios/analyse_f3mitic.pdf). A web site summarizes the whole activity (http://wwwedu.ge.ch/cptic/f3mitic/welcome.html).

4. A BRIEF DESCRIPTION OF THE PROJECT CALLED *F3-MITIC LEARNING PATH* FOR PROFESSIONAL DEVELOPMENT (PD) IN TEACHER EDUCATION IN GENEVA

F3-MITIC is a learning curve for teacher of teachers (F3) in media, image and ICT (MITIC) started by the Education Department of the Canton of Geneva.

The aim of the F3-MITIC process is to develop the motivation and competence of teaching professionals to provide courses to further teachers or to operate as resource-persons in teaching institutions. The project is included in the general program of integrating pedagogical utilisation of MITIC in the teaching and learning processes at all education levels and is an attempt to answer the growing needs in education of teaching personnel in this field.

4.1 Learning objectives

The objectives of F3-MITIC are to ensure the education of teachers able to perform the specific education of teachers of teachers and of resource-persons for pedagogical integration of media, image and ICT (information and communication technologies) (MITIC) at the initial education level (IFMES) as well as inservice education. The F3-MITIC program is designed for teachers at the three education levels: primary, secondary (compulsory and post-compulsory) and professional.

4.2 Contents and organisation of this learning path

The F3-MITIC learning curve is distributed throughout the school year and brings together 25 teachers per cycle. In 2002-2003, 8 trainers from upper secondary education in Valais participated in the learning program. The program is composed of 10 modules of one to two days representing 100 course hours in class, completed by about 150 hours of distance collaborative work. Each module based on a theme provides the opportunity for the groups (two to three persons) to develop a pedagogical scenario of an innovative project using MITIC in teaching/learning and aims at developing strategies specific to adult education. From this perspective, reflexive analysis and the critique of the individual experience in each module is an integral part of this programme.

The F3-MITIC program which welcomes experienced teachers from media, image and/or ICT is not a place where new knowledge specific to each of these domains is presented but is rather a place for experimenting, exchanging practices and building up new competencies.

4.3 Programme

The programme is composed of the following 10 modules. It is completed in three half-days which enables the analysis of the pedagogical scenarios produced by the participants, three times a year (E-I, E-II, E-III).

4.4 Module list

1. Which new pedagogical competencies are required by the evolution of communication tools and practices?
2. Pedagogical and conceptual approaches to using MITIC in education.
3. Consolidation of the participants' technical and practical competences in MI, ICT (3A) and media based communication (3B).
4. Consolidation of the participants' pedagogical competencies in the areas of didactic use of fixed image or didactic use of information and communication systems.
5. Consolidation of the participants' pedagogical competences in the areas of didactic use of moving images or didactic use of modelling and simulation.
6. Didactic use of a multimedia document.
7. Realisation of a multimedia document.
8. Realisation of pedagogical Internet services.
9. Group communication using devices based on text, image and sound.
10. Ethics and social impacts of MITIC utilisation.

4.5 Information

Address of website: <http://wwwedu.ge.ch/cptic/f3mitic>.
Contact Jean-Claude Domenjoz, coordinator (jean-claude.domenjoz @edu.ge.ch).

5. TOWARDS A NATIONAL PROJECT (2002-2007)

During the present school year (2002-2003), the model F3-MITIC is being implemented at the national level through a 100 MCHF Project called 'PPP – ICT and Teacher Education' (5 years, 2002-2006, 2600 persons concerned ca. 2% of the teaching staff) (Communique De Presse, 2001).

The way to promote collaborative work through cantons (with different educational systems) is a key issue.

6. AN AGENDA FOR SOLVING THE REMAINING PROBLEMS

Such a plan obviously involves a series of problems to be considered and questions to be answered as soon as possible.
Some current issues:

- how to further reinforce the professional development phases of teacher education to encourage lifelong learning of the teaching staff ;
- for the teachers of teachers, how to implement continuing education plans to allow them to continue this evolution. How should they be certified? How to best use them after the F3-MITIC education ("rights and duties", "mixed" statutes – coexistence of statutes, working conditions, etc.)
- In the on-going generalisation the existence of a resource centre appears as a key factor to successfully complete the process. How to stimulate the establishment of such structures where they do not yet exist?
- How to stimulate the generation of innovative projects in the area of MITIC from the existing conditions in the field where partners are as numerous as spread-out, either at individual or institutional levels? (Plan d'Actions, 2002).
- Regarding competences developed by actors of F1, F2 and F3, how to ensure coherence which would favour learning with utilisations in phase with institutional objectives and priorities?

7. CONCLUSIONS

At federal as well as at cantonal levels a growing attention has now been given to the needs to **implement an e-piloting** going beyond simple ratios not reflecting the real situation. Therefore a plan of action "e-pilotage-CH" is being finalised by the Task Force "ICT et Teacher Education". The objective is to **develop a series** of strategies, products and tools in co-operation of actors active in the field, to allow them to **better manage the integration of MITIC** in teaching and learning in Switzerland thanks to the following activities:

- Data sharing
- Competence profile
- Management of innovative pedagogical projects
- Pedagogical models and e-Learning platforms.

Such a study program is certainly to be shared in the spirit of the meetings organised by IFIP (there is surely an opportunity to seize with the Focus Groups of the Working Conference).

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The text in black is the formulation of the Stellenbosh Declaration proposed by Peter Waker. The text in red are the proposed changes/additions made by Rosa Maria Bottino.

THE STELLENBOSCH DECLARATION

Preamble

We, educators from six continents, who have gathered at Stellenbosch, South Africa from 4 to 7 July at the 8th World Conference on Computers in Education sum up the result of our declarations in the declaration below.

This declaration deals with the knowledge society and more specifically with the Place of Education in the Knowledge Society.

It lists a number of recommendations followed by a set of recommended actions at 3 levels:

- L1: Societal level
- L2: Learning and teaching level
- L3: Technological and infrastructure level

1. DIGITAL SOLIDARITY

Digital solidarity means dealing with the access to ICT infrastructure on one hand and admission to digital content and media on the other. It requires strong and joint actions of all stakeholders (political decision makers, education systems and industry) to guarantee the right of participation in the digital society for all students in the world:

Recommendation: We suggest to enforce a **Digital Solidarity Act**. In this act all stakeholders agree on the importance of fighting the digital divide and principles for doing this as described above.

- Define it as a the most important aim for the next five years, that every child in the world has access to digital information and communication infrastructure.
- Support project for collaboration of students and teachers on global level.
- Expresses the will to share digital educational content among education systems of different countries respecting the International Property Rights.

Action:

L.1.1 Provide equal and open access to digital information, content and media for all students and their teachers.

- Everyone should have equal access to essential/basic ICT products, services and user knowledge in their own native language.
- Making content free and open on the web is a powerful way of reducing the knowledge gap and reducing confusion and intolerance between developing

and developed countries. (Could a statement for free and open access be in contradiction with the respect for IPR ?)

- Create a climate of collective ownership and responsibility for the development and implementation of ICT policies;
- Frameworks for partnerships need to be guided by clearly defined policies and objectives of governments;
- Adopt a citizen centric focus; cooperative in nature, seen as seamless from the beneficiaries, and transparent and accountable in decision-making.
- It is important that the World Summit for Cities and Local Authorities focus on the development of an integrated ICT action plan, as well as the development of training as leverages for growth competitiveness.

L.1.2 Approach to networks for digital communication and support to establish interaction and collaboration among students and teachers in different parts of the world.

- Create common criteria for quality assessment of e-learning. Jointly accepted credit system, eg. European Credit Transfer System (ECTS).
- ITC must be embedded in local government policies.
- Local governments must take a long term view on achieving the goals of an information society – no quick fixes.
- Users, that is learners, teachers, trainers, etc., have to assert themselves as a driving force and not only as consumers. It is necessary to maintain the focus on the social dimension of education related activities which cannot be reduced only to business and market issues.

L.1.3 Provision of an infrastructure for a global collaboration between students to share knowledge, experience and different perspectives.

- We need standardisation of electronic interaction.
- All educational institutions need a free broadband internet connection.
- Broadband is important to facilitate teaching and governmental support is needed to provide it.
- Governments should create an electronic portal (e-government) to support the concept of creating an information society, and this e-portal should be based on citizens' needs.
- A city's and local government information and communications network should be established by the United Nations, to communicate information within local government and government in general.
- DSF must promote low-cost access to telecommunications and Internet;
- DSF should promote free and open source software (FOSS).

2. LEARNERS AND LIFE LONG LEARNING

Every learner is a life long learner who needs to adapt to the knowledge-based society and actively participate in all spheres of social, cultural and economic life, taking more control of his/her future.

Recommendation: Breakdown of barriers between education and real life. ICT should be used for this purpose.
New and emerging key skills are to be identified and promoted. This impacts on curricula, learning content and methodologies.

L.2.1 Changes in the Education system.

- The process of change does not involve only the methods and the tools for education but also the contents and their priorities.
- Measuring ICT knowledge and skills must be part of all learner evaluations in today's society (digital/information society).

- Avoid introducing technologies in educational processes without considering cultural and social contexts.
- Technology and pedagogy are to be considered together as it is pointless, from a pedagogical point of view, to make ICT based tools available if the educational strategies, and the activities the learners engage in are not suitably revised.
- Shift e-learning emphasis from content to activity.
- ~~Informal learning should be better exploited and applied in structures and conditions of work at school so learners can better accommodate and be more effective~~. *I propose to substitute the previous statement with the following :*
- Technology cannot refer only to pedagogical assumptions and to the organisational structure of existing educational institutions. New models and roles for teaching and learning, also in non-institutional or non-formal settings, need to be studied
- ~~Internet safety is of great concern on a global basis and the world's youth are at risk unless parents, students and communities are educated on safe internet use.~~ *This statement can be moved in the L.2.3 list (see below).*
- Learning for socially-disabled can be highly motivated by use of ICT.
- Students should learn more collaborative skills at school. ICT provdes avenues throught which this can be done.
- Education in ICT is a gender issue as girls have different learning styles, social support needs and certain relevant abilities (e.g. spatial skills) are also gender related.
- Computer games are a neglected but very important area of computer supported learning which can promote critical thinking, stategical and logical skills, as well as cooperative and negotiaton capabilities. ~~Cultural and skills development issues both have to be tackled.~~
- Schools need to adapt to young students who enter education already possessing significant ICT skills.
- Online learning environments need to be designed carefully and appropriate instruments developed for reflection on what works and what doesn't.
- Lifelong learning is required to ensure economic, social, cultural and political development of education through ICT.

L.2.2 Develop basic skills and competency of literacy and numeracy.
(*May be this list can be avoided because it seems to me at a different level of details of the others and also because some concepts are mentioned in other parts of the document*)

- ~~Student use of technology must be authentic for it to be of real use in their lives.~~
- ~~E-learning is a good supplement but not a substitution for traditional classroom learning – students still value human interaction with their teachers/tutors.~~

~~• Teaching information literacy is essential for effective use of the internet in education.~~
~~• It is essential that students and teachers respond well to having choices in the technologies they use for learning and teaching rather than compulsion.~~
~~• Interruption to school education resulting from prolonged hospitalisation and rehabilitation can be addressed by using ICT to maintain connection with the student's classroom.~~
~~• Make education and communication relevant to market needs.~~
~~• Investigate the putting up of technical ICT centres that will provide industry standard instructional and training programmes that would maintain up-to-date certification requirements;~~

L.2.3 Accessible, affordable, inclusive, and secure ICT.

- Internet safety is of great concern on a global basis and the world's youth are at risk unless parents, students and communities are educated on safe internet use.
- More attention/awareness rising for the accessibility of digital learning environments and digital learning materials for students with a handicap/functional impairment.
- Recognise that accuracy, relevance and timeliness of data about students is of prime importance in enabling an effective educational management system.
- Learning tailored to the individual student's requirements by using metadata-tagged source material.
- Learning systems should be possible to be tailored to the students requirements and allow for collaborative work.
- There should be improved international and professional collaboration in the ICT professional collaboration in the ICT professional field i.e. try new mergers between international and political organisations/EU-UNESCO-etc.
- Develop portals for difference age groups. To make sensible use of the immense data provided by a meta digital library.

3. DECISION-MAKING STRATEGIES

The delegates expressed concern that decision-makers often worked without adequate information or insight.

Recommendation:
Use a systemic approach, involving all stakeholders and promoting regional and international cooperation.

Use innovation and success stories of others to create and promote future ICT policy and implementations.

Decision-makers should use the results of research; researchers should make their results readable and usable by decision-makers. There is therefore a need for more practical implementation oriented research.

Promote trust and security in the use of ICT.

Action:

L.3.1

- We need an understanding of the learners 21St century culture place learners at the heart of any e-learning system. (?)
- We would like to see national initiatives and policy that support educational technology and communities that use technology.
- Much more attention needs to be paid to what is meant/understood by integration in national policy.
- In a changing world, we need to have an idea about what LL Learners do in their professional life and personal life to be able to develop effective policies.
- Public-private partnership must be policy driven though a framework.
- ICT is more than computers. Mobile phones are forgotten in the area of education.
- Civil Society should be included in public-private partnerships, as well as in Digital Solidarity Fund.
- A gender caucus should be held, as well as a youth caucus (?) .
- The above groups' voices should be heard by the political and industry players presently dominating the decision-making processes.

L.3.2

- Maintain the focus for the use of technology i.e. curriculum delivery enhancement.

L.3.3

- Encourage the use of open source software.
- Provision must be provided for the managing, affording and sustaining of these technologies when moving forward.
- As a principle, funding proposals should have an ICT component built in (e.g. an application to improve roads in an area should have a budget line for laying of fibre optic cables at the same time) (for education too?)

4. **NETWORKING**

The Knowledge Society is networked in
Global networks and
Local networks
This has a consequence on policies, on the way systems are organised, and on educational systems

Recommendation: Make people be part of networks
In each community
In each country
Internationally

Actions:

L.4.1 All countries should take part in international educational projects - "I am a child of Africa and a citizen of the world."

- The concept of network of excellence should be extended not only to European level, but also on a world basis.
- Forums should be used for collaborative learning and debating.

- Creativity should be an encouraging underlying principle in education (and teacher training).
- Virtual communities won't work unless people have a common goal to pursue.
- Network municipalities, schools, universities, health organizations, etc, through digital infrastructure, to increase information sharing (share information and facilities to realize economies of scale).

L.4.2 Encourage and develop partnership.
Involve all stakeholders.

L.4.3 Use ICT to facilitate collaborative work, exchange, co-operation.
Facilitate interactivity.
Create new learning spaces for activity.

- Encourage the use of collaborative facilities such as, for example, XML/SOAP/ web services in creating interoperability infrastructures.
- Use of virtual collaboration tools can improve the cooperation process.

L.4.4 Provide ICT collaborative and learning environments.

L.4.5 Develop e-Learning as a way for Education for All.

5. RESEARCH

The development of ICT based education and training processes is a growing reality. Evidence of this can be seen by progress made in distance educational and training systems, the development of Virtual Universities, the development of a variety of learning environments, and in the drive towards the definition of standards for the field of e-learning. Corporate training and professional re-skilling systems are another area in which important developments have taken place.
Despite the positive developments in the field so far, there is therefore a need to continue research work on the development of these technologies and their applications. A certain realignment of research priorities is necessary, and in particular there is the need for research on the following aspects :

- Bridge the gap between technology and pedagogy. In the field of ICT-supported learning, pedagogy and technology have often been treated separately, pedagogy often being based around what the technology appears to permit, rather than fully integrated as a basis for technological design.
- Development of Solid theoretical frameworks. The possibility to rely to solid theoretical frameworks is one of the key factors that can enable conception of the many positive experiences already taking place in order to arrive to the definition of reliable innovative reference models.
- ~~The integration of ICT in education.~~
- Develop an understanding of the use and the effects of ICT in Education. This means considering positive aspects as well weak or problematic ones.
- Find an appropriate balance between fundamental, applied, and development research as well as between public research and research made by private enterprise.
- ~~The adapting to the ways of the knowledge society.~~

Recommendations:

– The output of research should be made widely available, as open source, for:

- Improving practice.
- Decision-making.
- Resources development.

– Take into account all cultures in research, not only western.

– Critically look at results in terms of possibility of generalising and adapting to different cultures.
h
- Establish a mutual understanding between researchers and practitioners.
- Carry out research exploring different learning settings, including informal learning.

Actions:

L.5.1
- ICT use in education must be effective and regularly evaluated.
- Reinforce research on ICT's education issues outside western countries (which dominate).
- Student evaluations of e-learning should be more rigorously assessed and fed into the design of e-learning environment.
- Focus online learning research and practice to include issues of student diversity.
- There is a need for dedicated software for teaching, as smart as commercial general purpose products, but with pedagogical attributes.
- The shift of focus from teaching to learning necessitates a shift of focus from input to outcome, and rom outcome to impact (?).
- The quality of the research in ICT in Education needs to improve to reach the same level as the research (?)..
- It is important to introduce young researchers into research networks in order to expedite their integration into top research activities.

L.5.2
- ICT use in education must be effective and regularly evaluated
- The design of educational technology should include examples of meaningful pedagogical processes based on a widespread consensus derived from appropriate pedagogical research.
- There is the need to address research questions regarding what teaching and learning practices are successful and how it is possible to map effective teaching and learning in order to be able to reproduce the processes involved.
- ~~Evaluation of interventions making use of ICT need to take place sometime after the intervention.~~

L.5.3
- We must use the technology to represent analysis of research more imaginatively (?).
- We have to build a reliable system to allow cooperation between universities and industry so that good ideas and prototypes are quickly transformed in products.

6. TEACHERS

The information and knowledge society provokes a continuous change in the role and the mission of teachers, possibly best summed up by the remark: *"Technology matters, good teachers matter more."*

Recommendations:

- Empower teachers with teaching skills and ICT integration skills.
- Make the teaching profession attractive.
- Increase the number of (good) teachers.
- Teachers should support students to become ICT literate.
- Empower innovative teachers, promote communities of practice for innovation, in order to facilitate the dissemination of innovations.
- Teacher professional development in the context of Lifelong Learning should include ICT knowledge and expertise. This knowledge should include not only technological abilities but also cultural and cognitive roots of computer and computer science, such as, for example, a knowledge of the history of the field, which is essential for understanding the present - its beliefs, desires and intents for ICT in education and how it might evolve.

L.6.1

- Empower practitioners and insist on collaboration between researchers, practitioners and decision-makers.
- The most important enabler for computers in education is the teachers. More focus should be given to training and motivating teachers.
- Teachers in all countries should get a tax break on technology
- Counter the effects of cultural, educational and pedagogical imperialism during the transmission of learning packages across cultural levels.
- Teachers need the philosophical underpinnings for inquiring into their practice.
- Teachers should automatically think of using ICT in their other lessons.
- The teacher has to maintain its leading role in the classroom – too much technology is detrimental.
- An international agreement on skills and competencies for teacher professional development may improve training in ICT.
- The time teachers spend in planning and organising ICT-based teaching and learning activities should be considered within their current job timetable and not as an additional activity they have to perform at home ouside their current school timetable.

L.6.2

- Developing teachers' communities of practice using ICT is a valuable possibility to foster a greater involvement of teachers at all school levels.
- ~~A knowledge of the history of the field is essential for understanding the present - its beliefs, desires and intents for ICT in education and how it might evolve.~~ I have put this statement in the L.6.1 list (see above).

- Choice of software to support online learning should be undertaken by IT experts in consultation with the teachers.
- Good use of IT in education requires modifications in pedagogy.
- **Good teaching skills are more important than good IT skills in effective use of IT in education.**
- Learning Management Systems should not control the pedagogy. They should not hide or steal the presence of the teacher.
- Basic skill training in ICT is still needed , but this should be carefully pitched at the adult learner level. This model is particularly useful for developing countries.
- An exemplary “computer engaging” teacher must conscientiously plan for opportunities where they can actively support children using computers during quality task based computer activities.
- Anchoring fundamental concepts of ICT in subject-matter problems is essential to getting students to “Being Fluent with Information Technology”!
- That ICT teachers (in schools) be given adequate training in ICT. Too any are learning about what they are teaching without training.

L.6.3

- Educators should be given access to free computers and software.

A Path to the Future

Generative Evaluation for Simultaneous Renewal of ICT in Teacher Education and Schools

Niki Davis

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Also Institute of Education, University of London

President of Society IT in Teacher Education

IFIP WG 3.3 Chair

My Perspective

IFIP WG 3.3 for research

- To inform research on IT in education
- AGM today – welcome to observers
- Complexity of education, particularly teacher education – to simplify is to cut up and loose it –(characteristics of complex systems)

Bernard Cornu:

"Collective intelligence" interpretation:

Intelligence collected through education facilitated by teachers, teacher educators, student teachers, students …

VS Collective lack of intelligence

Lack of intelligence of group due to the need to respond to the lowest common denominator due to lack of teacher

Simultaneous Renewal

"What comes first, good schools or good teacher education programs? The answer must be that both come together …" (Goodlad, 1994).

PT3 initiative across the USA where leaders heroically struggle to lead simultaneous renewal – Preparing Tomorrow's Teachers to use Technology (ICT)

… BUT how is simultaneous renewal evaluated??

TechCo: Technology Collaboratives
Simultaneous renewal in HE & schools

- Teacher Ed.
- Other Colleges
- 4 Schools in Iowa
- Local area agency

Novel Research Technique
Generative Evaluation

Recognizing models of change in education (Ellsworth, 2000 survey + Bosserman …)

Previous success with illustrated interviewing for needs analysis in European teacher ed. (Davis et al in T3)

Complex system characteristics (Davis, 2002)

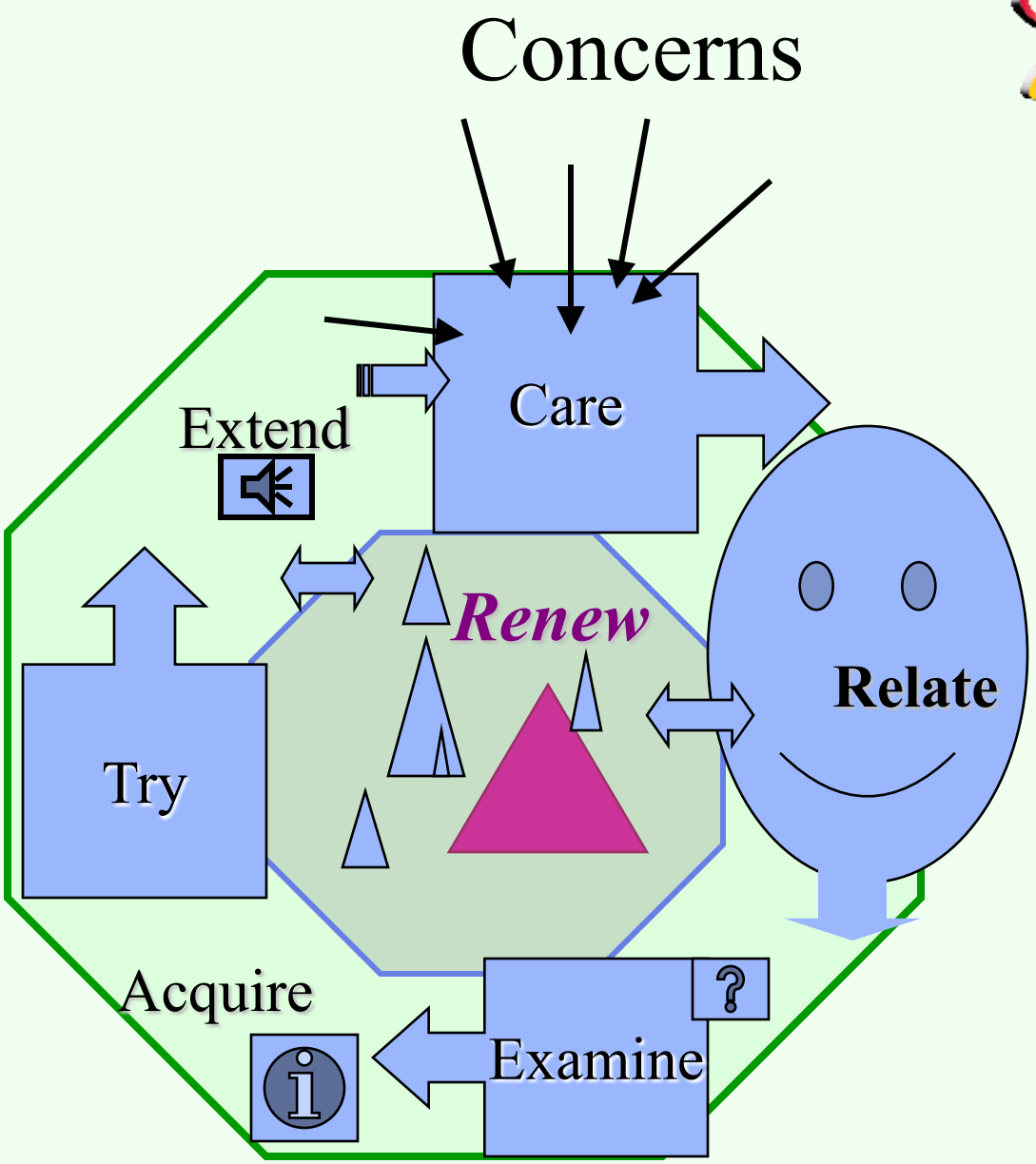
Educate leaders on change & give support to reflect at systemic level

Will it work and capture simultaneous renewal?

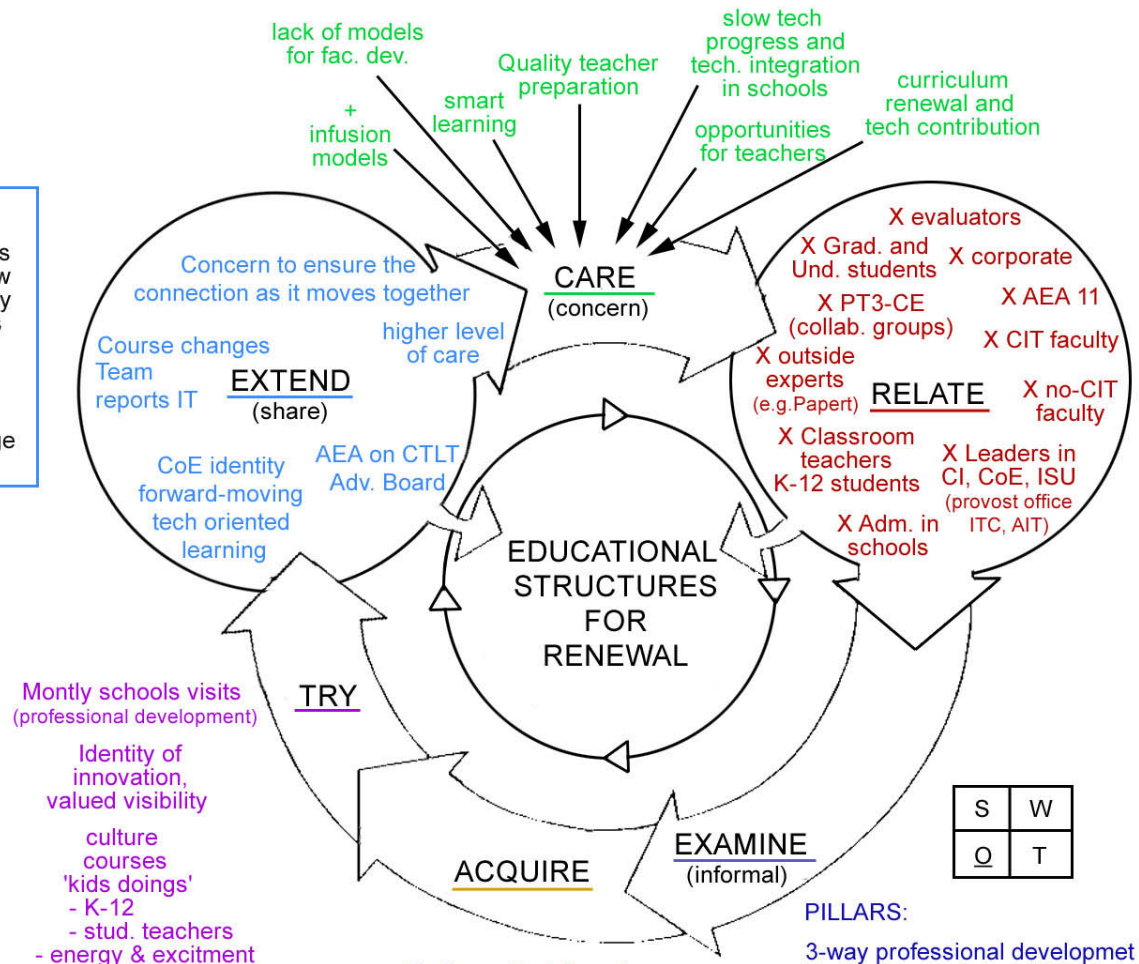
Framework for planned change:

CREATER+Niki

(after Havlock & Zlotolow, in Ellsworth, 2000; + Niki/Marie Kemis and kellogg change model)




©2001 TechCo



Extended Events:
Add meetings tech scholars
* dept. reports & ext. review
publications by more faculty
project sharing by schools
conferences:
ITEC, NECC, SITE
Relationships
Schools closer together
PT3 Collaborative Exchange

Related Events:
Proposal Prep.

↓

e.g. TechCo Celebration
(Reiman Gardens)
(Papert Event)

↓

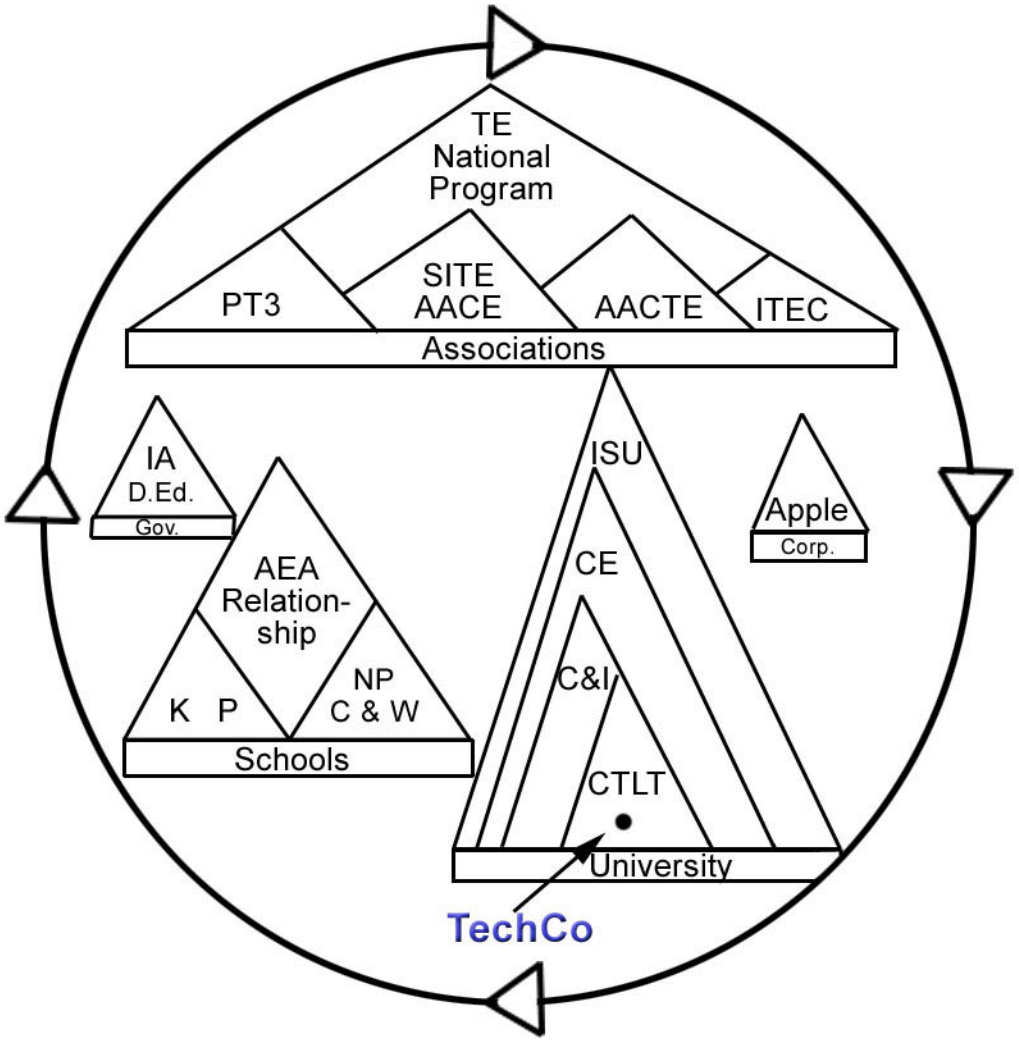
partner meetings

Clyciane - Proj.Coord.
(point person now)
Han-Chin - Comm. Coord.
iBooks
Space expansion - priority
Chris - Master Teacher

PILLARS:

3-way professional developmet (eCOMET)
Technology scholars (CI610 mentoring)
Cohort group (Project Opportunity)
Toying with technology (Engineering course into structure)
Master teacher (MathCo)
Other acquisitions
TE x dist.ed.: closer relationships

Educational Structures within TechCo Focus

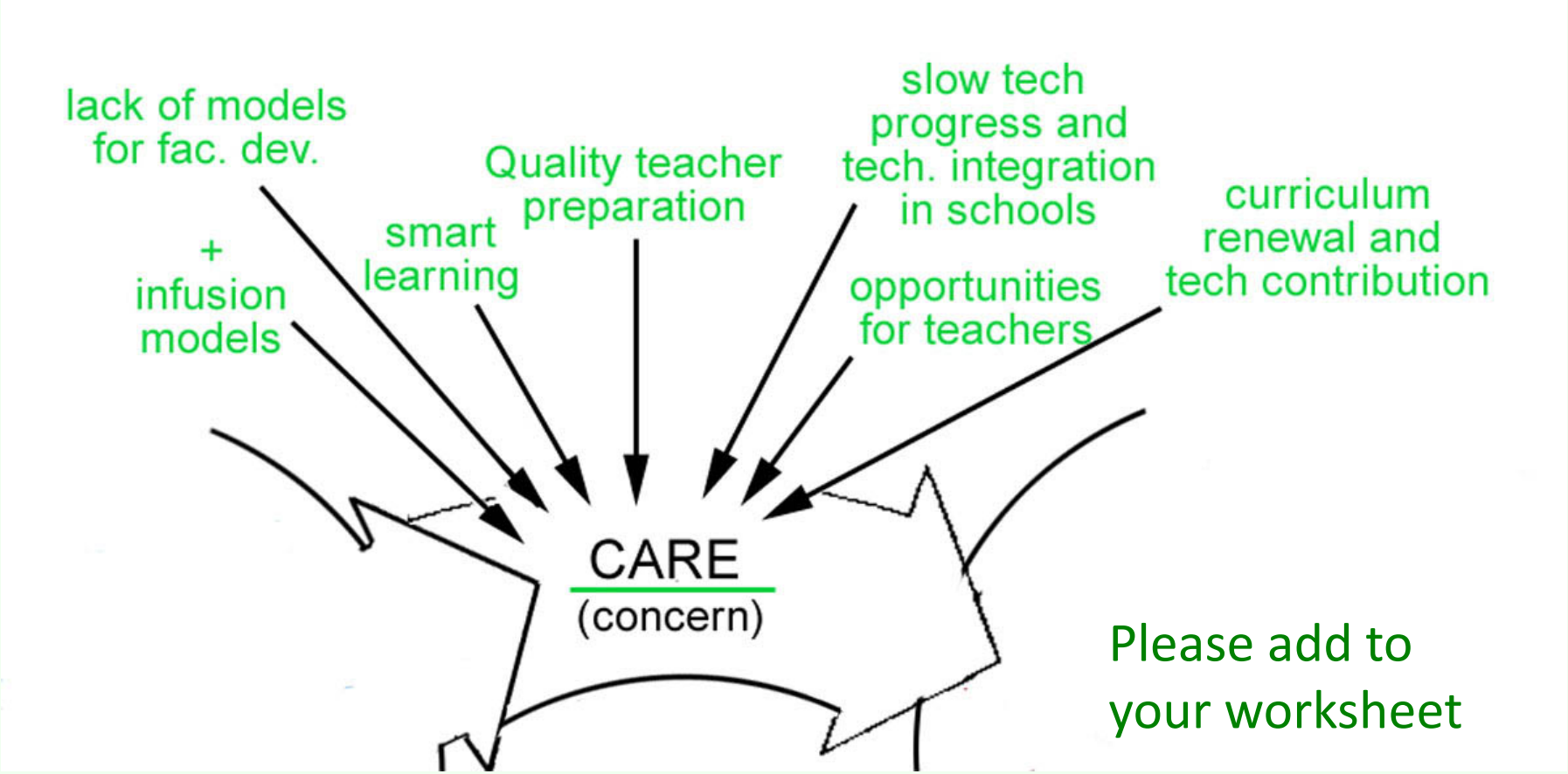


In the center,
the focus of change:

Formal organizations
& relationships

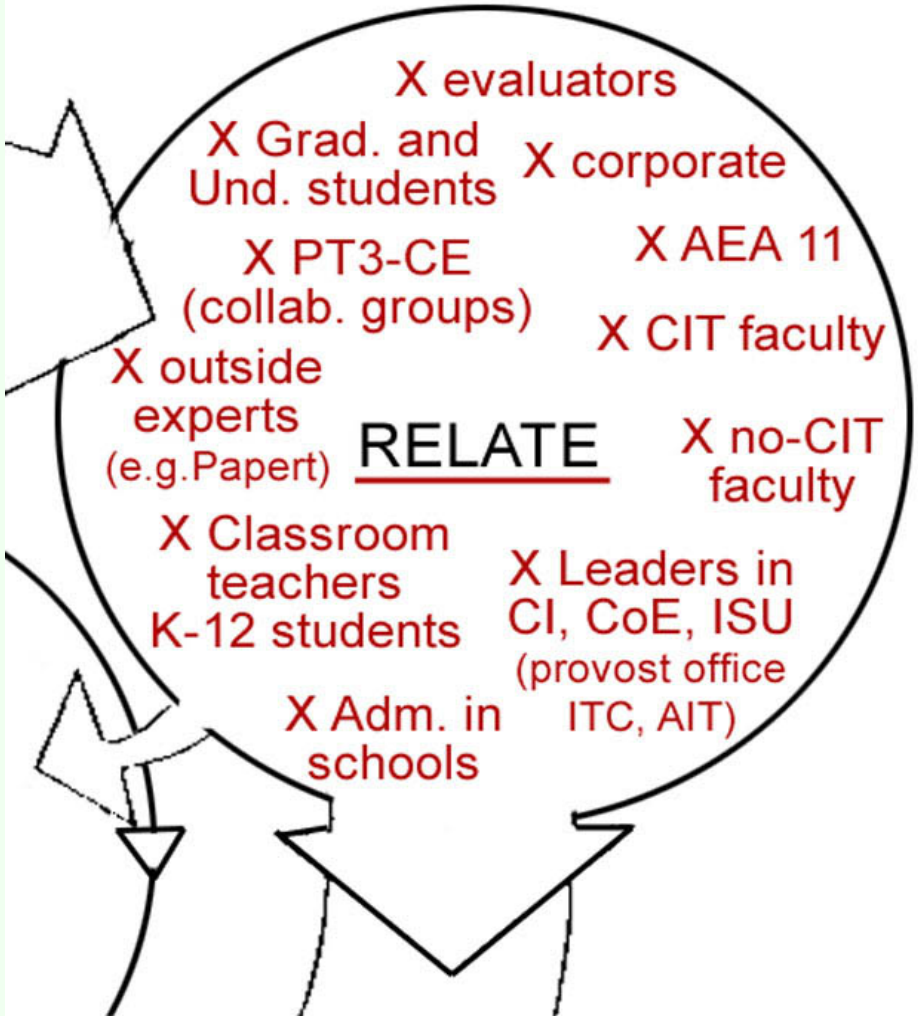
Concerns

from Ann Thompson



Please add to your worksheet

Relate stage



Related Events:
Proposal Prep.

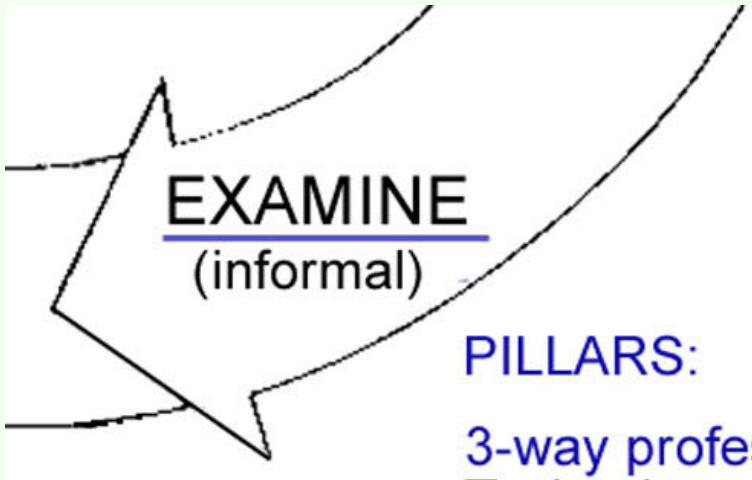
↓

e.g. TechCo Celebration
(Reiman Gardens)
(Papert Event)

↓

partner meetings

Examine (inc. prior success)



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PILLARS:

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Chris - Master Teacher

People
ICT
Space

Please add to your worksheet

TechCo Trys

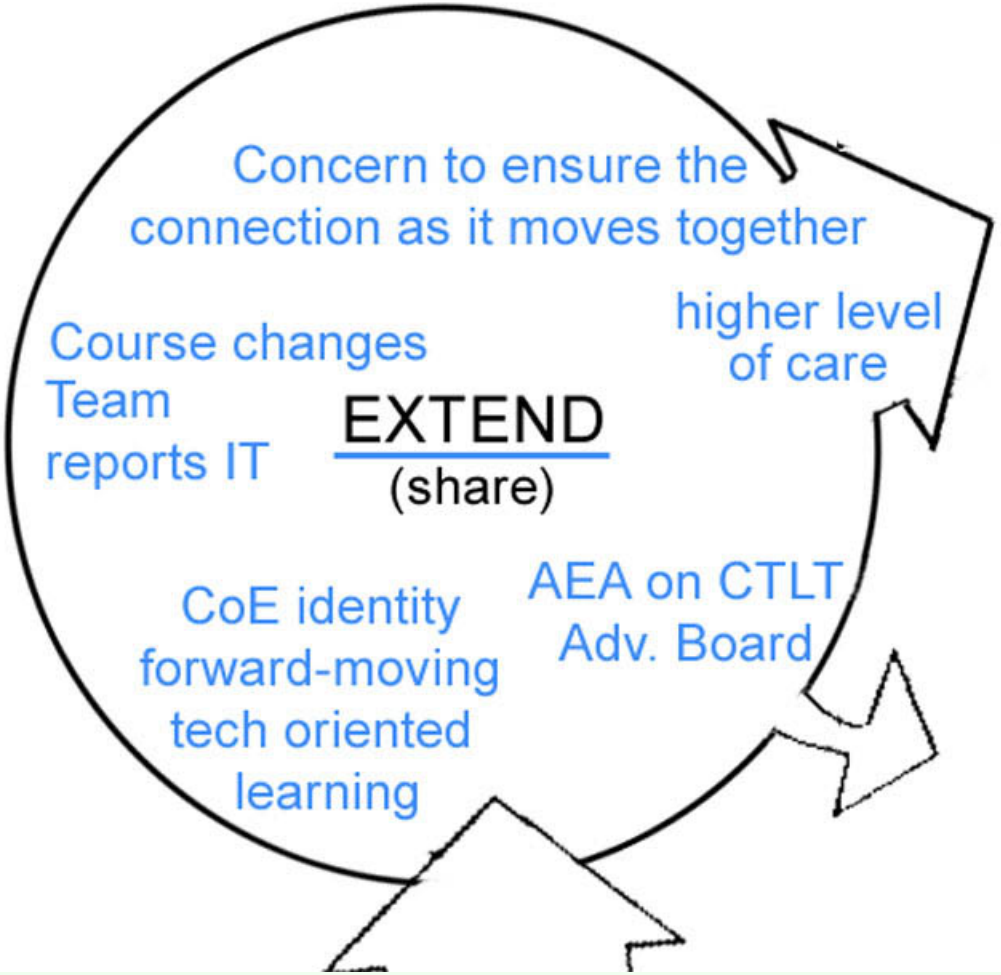
TRY

Montly schools visits
(professional development)

Identity of
innovation,
valued visibility

culture
courses
'kids doings'
- K-12
- stud. teachers
- energy & excitment
of using IT
- faculty (culture change)
- collaboration
environment

Extended Events:
Add meetings tech scholars
dept. reports & ext. review
publications by more faculty
project sharing by schools
conferences:
ITEC, NECC, SITE
Relationships
Schools closer together
PT3 Collaborative Exchange



Second interview changed to ‘lessons learned’ rather than the extending/share events, and timed report on earlier stages to leave time for this.

Your views?

- Value to inform leaders?
- A form of Action Research?
- Other?

More widely:

- A need to inform research approaches and techniques in ICT education
- A need to disseminate research agenda and review of research?
- A role for IFIP WG 3.3

Acknowledgements

Preparing Tomorrow's Teachers for Technology (PT3) program and its own systemic approach for USA teacher education and ISU colleagues.

Kellogg Foundation for HE leadership development in ISU.

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Somekh B. & Davis N. (Eds.) (1997) *Teaching effectively with IT. Studies of preservice and inservice teacher education.* London: Routledge.

The Teacher as a Professional

Fostering professionalism

Raymond Morel (chair) (CH)
Paul Nicholson (rapporteur) (AU)
Terry Cannings (US), Valentina Daigiene (LT), Niki Davis (US), Deborah Goldman (AU), Leon Guss (AU), Richard Hogg (AU), Vittorio Midori (IT)

Keywords
Professionalism, standards, ICT, community of practice

1 INTRODUCTION

Globally, there is a need to improve the status of teachers in Society. The status of teachers depends on a range of political and cultural factors that impact on the way in which teaching is perceived – whether as a trade, craft, or profession — and how these are valued. We argue that all teachers of the future will need to have a high status in their societies if they are to help those societies to realise the potential benefits of an increasingly technological future, and that a key step in achieving this is through the formation of professional associations that foster the development of structures to support a professional community of practice, and which create and enforce national or international standards for membership in a similar fashion to medical and engineering professional associations. By adopting such professional characteristics, and by allowing for the professional recognition of all levels of teachers at all levels of education, the influence and actions of these professional associations will, over time, lead to an increased status for teachers and improved external perceptions of the profession. There are a number of key issues that these societies will need to address:

- How to complement and ensure coherence in teachers' professional knowledge & skills?
- How to enhance the status of youth and students?
- How to articulate and collaborate with multiple stakeholders?
- How to develop didactic pedagogy into adaptive pedagogies?

2 DEVELOPING PROFESSIONALISM

To make effective and culturally appropriate use of ICT in the curriculum, teachers need to develop competencies in the areas of content knowledge and pedagogy, collaboration and networking, technical issues and social issues (UNESCO, 2003). In recognition of the importance of context and situation in teacher learning (e.g. Putnam & Borko, 2000) these are situated in larger themes such as leadership, context and culture etc. (Figure 1) so that they both draw from, and contribute to, these larger themes. It is this bi-directional interaction between classroom practice and societal and educational issues that is at the core of professionalism — providing a conduit to influence society as well as to operationalise its needs. Informed, evidence-based decision-making is another key attribute of professional behaviour, and for this reason research in learning, teaching, and ICT is a central element of the UNESCO framework. We see the role of professional associations being to both implement this framework with its members, and to adopt it as a basis for defining the professional context of teachers of the future.

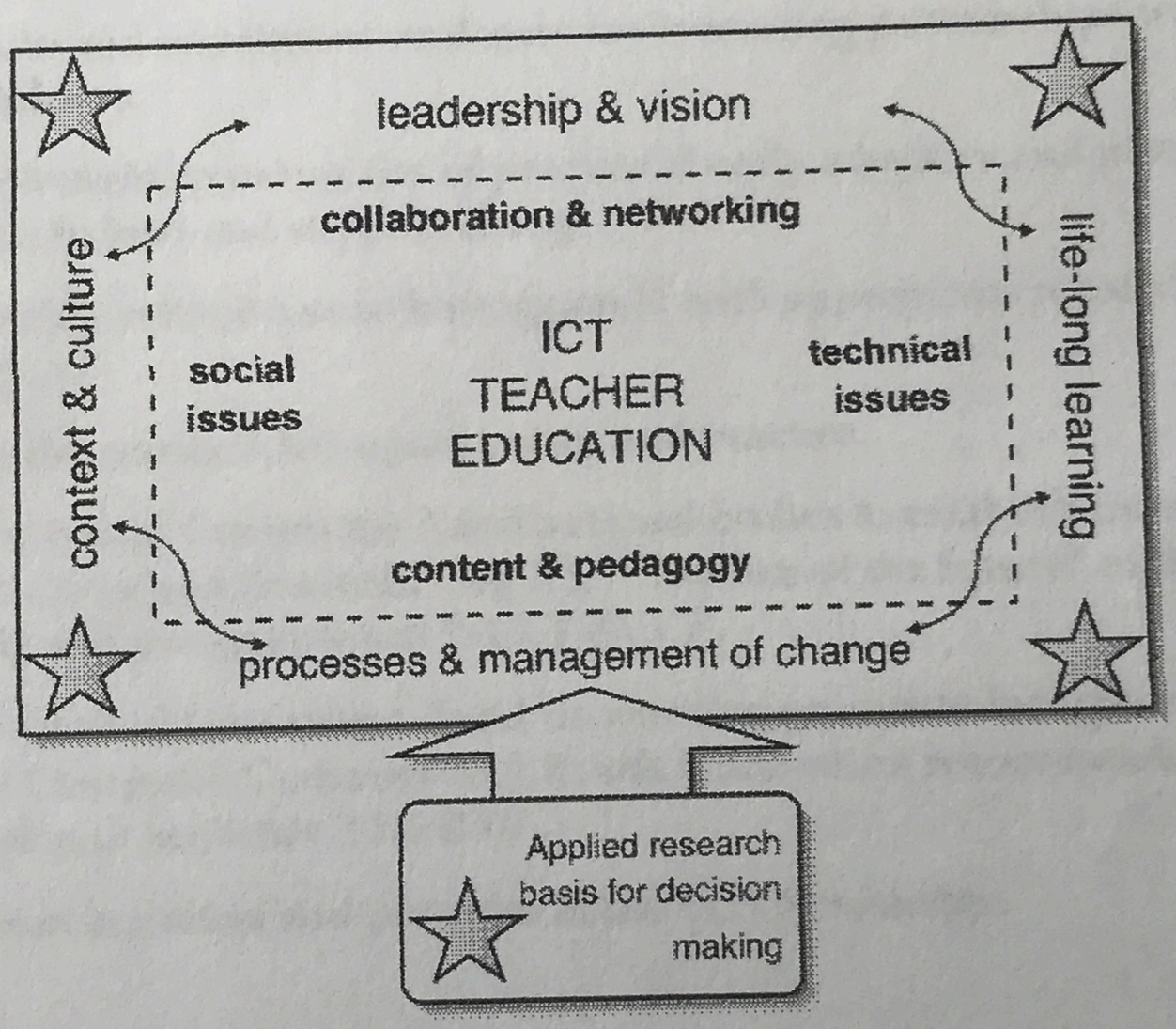

Figure 1. Elements of ICT teacher professional competencies (UNESCO 2003)

3 RECOMENDATIONS

We recommend that the following areas be given a high priority in developing support in programmes for increasing teacher professionalism because they underpin key areas of professional practice and behaviour:

- Develop leadership and vision with the profession, underpinned by research. This to include planning and management of change, lifelong learning and the accommodation of relevant contexts and cultures.
- Develop appropriate resources and support for ICT *in* teacher education, and for teachers *of* ICT, in the four areas of the UNESCO framework.
- To apply UNESCO/IFIP recommendations for youth from WCC2002.
- To promote and develop professional communities of practice.

4 ACTIONS TO BE TAKEN

To achieve the recommendations above, actions required by IFIP and other organizations are:

- To create professional associations and networks (to coordinate for coherence) to build and enforce international standards for its membership (cf. doctors).
- To create and implement strategies for increasing partnerships with stakeholders.
- To implement communities of practice of early adopters and pioneer teachers to lead and support change.
- To develop related research program(s) with appropriate research strategies.
- To use the research to impact policy and practice.
- IFIP Technical Committee 3 and national bodies to establish incentives for creativity and innovation eg IFIP "Teacher of the future" of the year awards and presentation at WCC/WCCE.
- IFIP Technical Committee 3 and its working groups to incorporate the World Computer Congress 2002 Youth Declaration recommendations in their plan of activities 2003-2007.
- To report activities and progress in the TC3 Newsletter.

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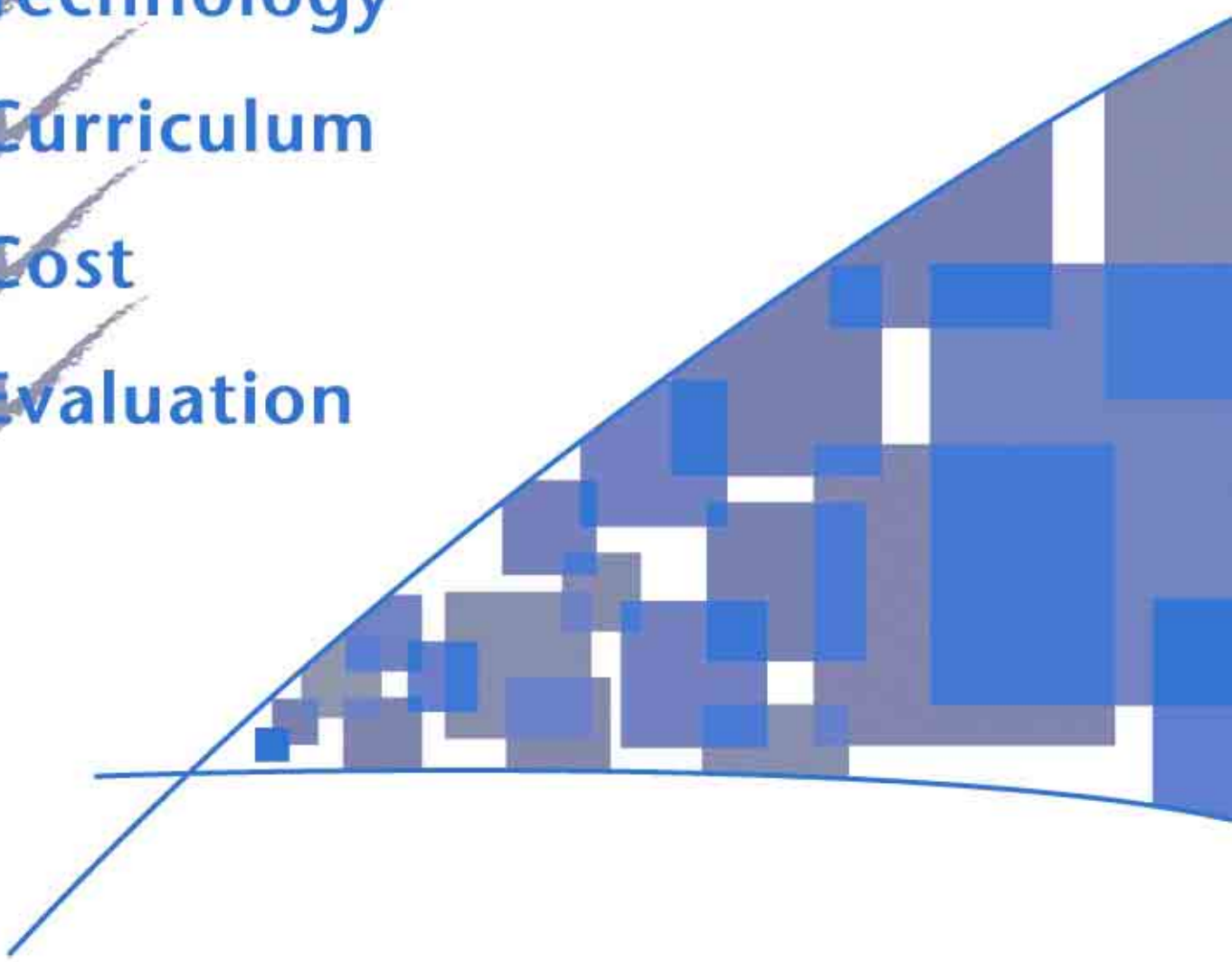
TEACHER EDUCATION GUIDELINES: USING OPEN AND DISTANCE LEARNING

- Technology
- Curriculum
- Cost
- Evaluation



United Nations Educational,
Scientific and Cultural Organization

TEACHER EDUCATION GUIDELINES:

USING OPEN AND DISTANCE LEARNING

Technology – Curriculum – Cost – Evaluation

UNESCO

Education Sector, Higher Education Division, Teacher Education Section
in cooperation with E-9 Initiative

UNESCO editorial co-ordination:
Ratimir Kvaternik

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PREFACE

The Guidelines set forth in this document are intended for use principally by senior and middle-management education officers in Education Ministries and teacher training institutions who are daily called upon to make hard choices in how to expand teacher education through open and distance learning.

The Guidelines represent a major activity in one of UNESCO's main lines of action for higher education, as summarized in the Organization's Approved Programmes and Budget for 2000-2001 (30 C/5), paragraph 01240. In that paragraph reference is made to the fact that "The General Conference authorizes the Director-General: (a) to implement an inter-sectoral project entitled 'The status of teachers and teacher education in the information society', in order to assist Member States in renewing teaching methods and the training of teachers at all levels, and, using open and distance education approaches, adapting them to the emerging information society, and…"

The guidelines also follow-up the recommendations concerning teacher education using distance learning that were made by the World Conference on Higher Education (WCHE, Paris, October 1998), the World Forum on Education (Dakar, April 2000), and the Seventh Session of the Joint ILO/UNESCO Committee on the Application of the Recommendations concerning the Status of Teachers (Geneva, September 2000).

Many of the national experiences upon which the authors of the Guidelines have drawn are described in a complementary document entitled 'Teacher Education through Distance Learning: Technology, Curriculum, Evaluation, and Cost (UNESCO, Paris, 2001), which summarizes case studies undertaken in Brazil, Burkina Faso, Chile, China, India, Mongolia, Nigeria, South Africa and United Kingdom. Those studies represented an interesting mix of applications of different modes of distance learning. Distance education still remains, at heart, a reflection of individual national infrastructures and a wide complex of educational, social, cultural and economic issues, including the willingness and capacities of teachers themselves to become engaged in these modes in their various learning institutions and communities.

Within UNESCO itself we are glad to have been able to use the studies in order to develop these guidelines on the application of distance learning in teacher education.

We thank the contributors to these studies, which we hope will find wide applicability in Member States.

John Daniel
Assistant Director-General for Education

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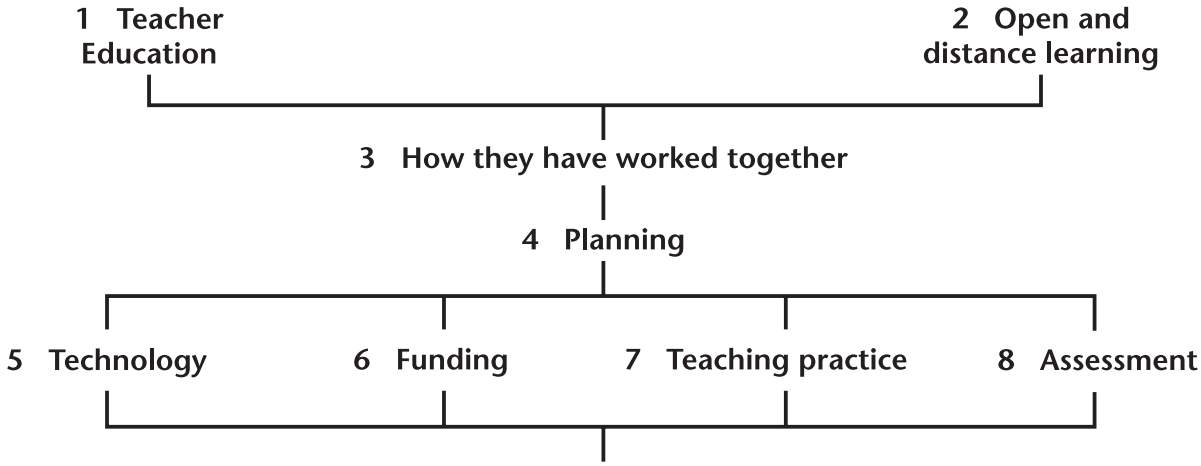
Introduction: how the guidelines work

These guidelines are designed to help anyone considering the use of open and distance learning for teachers. They try to answer eight major questions – and more minor ones – and in the light of answers to them to identify the options available to planners and strategies for choosing between the options.

We begin with three sets of broad questions for planners: about the problems of teacher education, about the nature of distance education or open and distance learning, and about how the two have been used together. Then we go on to look in detail at questions of planning and organisation, asking what needs to be put in place for an open and distance learning project or programme. This takes us on to four key areas: technology, funding, teaching practice, and assessment. The guidelines end with suggestions of other places to get information and help. Diagrammatically, one route through the guidelines looks like this.



The guidelines are based on recent experience and in particular on a set of eleven case studies, carried out on behalf of UNESCO, which are published separately. It is a pleasure to acknowledge our indebtedness to the authors of those case studies: João Batista Oliveira (Brazil), Jean-François Terret (Burkina Faso), Cristian Cerda (Chile), Miguel Ripoll (Chile), Miriam León (Chile), Wei Yuan Zhang (China), Niu Jian (China), Ghada Gholam (Egypt), Tarek G. Shawki (Egypt), Ram Narain Mehrotra (India), Bernadette Robinson (Mongolia), Rashid Aderinoye (Nigeria), Charles Potter (South Africa), William Fraser (South Africa), Corinne Meier (South Africa) and Rob Walker (United Kingdom).

The guidelines also draw from a map of world experience in the use of open and distance learning for teachers, drawn up for the British Department for International Development under a project that was funded as part of DFID's knowledge and research strategy, 'Researching the issues 2000'. They also reflect international experience reported by other agencies on the use of open and distance learning for teachers. All three activities – the drafting of the guidelines, the management of the case studies and the mapping exercise – were carried out together by the International Research Foundation for Open Learning; the foundation records its gratitude to both agencies for their support and their agreement to use material that appears in another form in those documents. The authors are also indebted to colleagues in UNESCO, at IRFOL and among its associates, and more widely, for comments on the draft. They have a major debt of thanks to Masako Saulière and Ratimir Kvaternik, both working at UNESCO as this work was planned and executed, for their consistently good advice and friendly help as it went forward.

1. What is wrong with teacher education?

Teachers are vital. Unless we can get more teachers, and better teachers, we will not reach the target of making quality education available for all by 2015. But there are still world shortages of teachers, still large numbers of underqualified teachers, and still many who need further professional education and training as they work. Conventional approaches to teacher education have not met all the demands upon the profession and this has led to an interest in open and distance learning alternatives.

In much of the south and especially in sub-Saharan Africa and south Asia, problems of teacher supply, of four kinds, threaten the attainment of the education targets. First, there are shortages of teachers. While school enrolments generally grew in the 1990s, teacher numbers only just kept pace with them; indeed, in six Commonwealth African countries pupil numbers were growing faster than teacher numbers. Meanwhile, AIDS is reducing the life expectancy of teachers and so increasing the numerical demands. With all the other pressures on educational budgets, it seems unlikely that teachers' colleges can be expanded at the rate necessary to meet these demands. Teacher shortages continue to dominate the educational landscape.

Second, in many but not all countries female teachers are in a minority in primary schools. Progress in getting more women into the profession is slow; in Africa the proportion of women rose from 39.4 percent to 43.3 per cent between 1990 and 1997, while in south Asia it rose only from 28.0 to 29.6 per cent.

Third, even where there are enough teachers, too many of them are untrained or undertrained, and the quality of training is often itself inadequate. A number of studies have found little difference between the effectiveness of trained and untrained teachers. 'About half of the teachers in developing countries are unqualified in terms of their own country's formal standards for teachers' education. Many teachers have little more than secondary education themselves. Teaching methods are often old fashioned, with too much focus on rote learning' (DFID 2001: 9).

Fourth, in many countries, there is a national desire not just to raise the quality of the teaching force to match the present demands on them but also to change teachers' jobs as their host societies are changing. New goals create new demands: gender parity by 2005 and universal basic education by 2015; inclusive education; education for democracy, peace and social cohesion; multi-grade teaching; increased accountability for achieving learning targets; the development of learners who are self-managing and independent, skilled in critical thinking and problem solving, equipped with life-skills; the preparation of learners who are competent for knowledge-based economies, capable in the use of information technology; and the expansion of teachers' roles to include social work in communities where child-headed households and orphans are common as a result of HIV-Aids. In transition countries, society is expecting teachers to change their approach as education itself is being reformed, within the context of social change. And these changes in role and changes in expectation are likely to affect both the initial education of teachers and programmes of continuing professional development.

All of this creates new challenges for teacher education and continuing professional development: the need to find ways of using existing resources differently, of expanding access to learning opportunities at affordable cost, of providing alternative pathways to initial teacher training, of drawing on new constituencies of the population to work as teachers, of using technologies appropriately to enrich teaching and support practice, of stimulating and supporting

teachers' active learning and of reconceptualising the traditional organisation of initial teacher education and continuing professional development.

In order to make good planning decisions about teacher education we need to ask in turn: what does it consist of? who are the teachers? and what is the curriculum?

1.1 What does it consist of?

Teacher education has to do a whole range of different jobs: to enable teachers to develop the potential of their pupils; to serve as role models; to help transform education and through it society; to encourage self confidence and creativity. At the same time, many educators often hope that student teachers will develop appropriate, and where necessary changed, attitudes to their job. In order to meet these hopes, teacher education is likely to include four elements: improving the general educational background of the trainee teachers; increasing their knowledge and understanding of the subjects they are to teach; pedagogy and understanding of children and learning; and the development of practical skills and competences.

The balance between these four elements varies in relation to the background education of student teachers, to the level at which they will teach, and to the stage they have reached in their career. Two distinctions are important here. The first is between the initial education and training of teachers and their continuing professional development. The second is between preservice and inservice activities. The two sets of distinctions do not overlap: many teachers begin work without teaching qualifications so that they may get initial training while they are working inservice. Then, inservice programmes may meet a variety of different needs, from initial training to updating or preparing teachers for new roles to helping reform the curriculum. Some of these purposes and distinctions are set out in table 1.1:

Table 1.1: Purposes of inservice programmes

Purposes	***subcategories***
Initial training of unqualified teachers	programmes leading to certification short induction courses
Upgrading of teachers who already have a qualification	for subqualified teachers for qualified teachers
Preparing teachers for new roles	as head teachers to work in teachers' colleges
Training related to content of the school curriculum	for planned curriculum change refresher courses

Source: based on Greenland 1983

The needs of primary education have dominated much discussion about teacher education and open and distance learning has been used more to prepare primary than secondary teachers. But this may be changing: earlier expansion of primary education is creating increased demands for secondary teachers, and in some cases to give primary teachers the skills to work at junior-secondary level. Basic education is increasingly seen as including both primary and at

least the first cycle of secondary education. Meanwhile teachers who move on to new roles, as head teachers or to work in teachers' colleges, often need and seldom get programmes of professional development to help them in their new job. A concern for their professional standing, long recognised by UNESCO as of major importance for the quality of education as well as for the condition of their lives, compels attention to programmes of this kind.

1.2 Who are the teachers?

Programmes of both initial teacher education and continuing professional development need to match the needs and circumstances of their audience. One size will not fit all. In particular, in designing a programme for teachers, we need to take account of:

- ***their educational background.*** This varies enormously between different countries and different levels of education. In some countries there are many teachers with little more than junior secondary education while in others all are graduates with a professional qualification as well. The balance between the different elements in teacher education is likely to affect the content of programmes for them.
- ***gender.*** It is difficult to recruit enough women teachers in many countries, enough men teachers in some. Programmes need to fit with the rest of teachers' lives and be sensitive to cultural norms and expectations that affect their jobs. In some countries there are restrictions on women teachers' mobility that affect their ability to attend initial or updating courses.
- ***their experience as teachers.*** Again, the content of a programme for – say – unqualified teachers who have just left school may be very different from one for teachers with limited formal education but long experience as untrained teachers.

The teaching force is scattered so that there are logistical problems to be overcome in providing inservice courses. If they have to travel to a central point, then there are actual costs involved for transport and possibly subsistence and opportunity costs for the time they are out of school. Family and other commitments may limit the ability of teachers to attend courses. There is obvious strength in any approach that can reach teachers without their leaving their schools for long journeys.

1.3 What is the curriculum?

The curriculum of teacher education is varied, and contested, is widely criticised, and in many countries is in a state of flux. In different countries emphasis has recently been placed on the importance of education to help countries compete in global markets, on social transformation, on technology, as well as on developing individual capacity. 'In different places we have got economics, social transformation, personal development, religion, technology, ethics, and a shift in the teacher's role, all among the aims of teacher education' (Perraton 2001: 2).

As a result, many education authorities are seeking fundamental changes in the curriculum. There is a widespread view that some emphasis, and resources, should shift from initial to continuing teacher education. At the same time, some authorities are beginning to revisit traditional and indigenous educational institutions in order to learn from their strengths and explore the possibility of integrating their work with a more modern curriculum. Demands on teachers continue to grow and become more diverse and their own education needs to reflect this.

Thus teacher education in many countries gives an impression of rethinking, and restructuring of the curriculum. But it is not clear how far the rhetoric of reform has led to superficial or substantial restructuring. The evidence here suggests the former. A recurrent picture is the coexistence of traditional and newer curriculum models within one programme. This takes the form of two competing strands of thinking that, for convenience, can be labelled as traditional and progressive tendencies. The traditional is teacher-centred, based on behaviourist assumptions, has a transmission view of knowledge and regards the teacher as a technician; the progressive strand includes more active and participatory learning methods, is less authoritarian, places more demands on teachers and contains elements of constructivist thinking. The progressive agenda encourages the development of reflective practice among teachers. As a result, the traditional model of master-apprenticeship, of theory preceding practice, has become increasingly challenged and the coherence between education theory and the actual practice of teaching became an even more critical issue. Key questions then arise for the curriculum planner about the extent to which this agenda is appropriate for teachers who have themselves had only a limited background education. In a classic analysis of the realities of educational reform, Beeby (1966) warned against seeking over-rapid transformation and of the dangers of unrealistic expectations of teachers who were themselves teaching at the limit of their knowledge.

All of these issues affect the curriculum planner, regardless of the methods, timing or location of teacher education. If, then, we are planning to use open and distance learning for teachers we need to ask not only about how it can work – the theme of the rest of these guidelines – but also about curriculum policy. Critical questions are about:

- the balance between the four elements of the curriculum for the particular audience, taking account of teachers' own background education;
- the balance between preservice and inservice education;
- the debates between traditional and progressive approaches and views about the appropriateness of defining teacher education in terms of a set of stated competencies;
- realistic expectations that will help the progress of curriculum reform but can be achieved with the support, interest and goodwill of teachers.

The planner then needs to consider methods that will fit both the aims of the curriculum and the circumstances of the learners. This in turn is likely to mean the use of a variety of different approaches – a theme we pick up in chapter 3.

In the next chapter we look at the nature of open and distance learning, in order to assess how far it can meet these needs for teachers and for the educational service within which they work

2. Is distance education relevant?

To establish whether distance education can help with the teachers' demands set out in chapter 1 we need to ask what it is, whether it is legitimate, whether it works, and how much it costs.

2.1 What is distance education?

The language is confusing. 'Distance education' is sometimes taken to mean the use of television and at others the use of the internet. The words imply that students are always remote and never meet each other or their teachers. 'Open learning' suggests that anyone can enrol and start and finish when they like. 'New information technologies' sounds good but vague. These guidelines are about the use of a range of technologies in education, using a set of definitions that have general currency. Distance education has been defined as an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. Open learning, in turn, is an organised educational activity, based on the use of teaching materials, in which constraints on study are minimised in terms either of access, or of time and place, pace, method of study, or any combination of these. The term 'open and distance learning' is used as an umbrella term to cover educational approaches of this kind that reach teachers in their schools, provide learning resources for them, or enable them to qualify without attending college in person, or open up new opportunities for keeping up to date no matter where or when they want to study.

Open and distance learning often makes use of several different media. Students may learn through print, broadcasts, the internet and through occasional meetings with tutors and with other students.

Three illustrations take us beyond definitions.

The University of the South Pacific serves scattered audiences over the huge area it serves. It teaches education, and other disciplines, by combining correspondence lessons with broadcasts and with regular sessions at regional centres within its region. The university was one of the earliest users of communication satellites and is able to run two-way seminars with its students by means of satellite links. The university's early adoption of distance education has made good quality teacher education available that would have been beyond the resources of the individual small states of the Pacific.

In order to expand the supply of teachers as it came out of a period of civil war, Uganda has set up a number of programmes deigned to equip untrained and unqualified teachers with professional skills. It has done this by combining teaching mainly through print with regular face-to-face sessions for student teachers and short periods of intensive study within conventional teachers' colleges.

The British Open University was set up in 1969 to widen access to education in Britain and has served as a model to many others. At the request of government it introduced a programme for a certificate in education for graduates who wanted to enter teaching but had no professional qualification. Teaching materials were distributed partly by mail and partly through the internet. Trainee teachers were based in schools where a mentor guided their teaching practice. Students used computer conferencing as an integral part of the course to interact with tutors and with each other.

Open and distance learning may use print, broadcasts, cassette recordings, computer-based materials, computer interaction, videoconferencing, and face-to-face learning. We look at the choice of technologies in chapter 5. The essence of it is that it enables students to learn without attending an institution. That has made it attractive for students who, for practical, economic, social and geographical reasons cannot get to college. It also makes it particularly appropriate for audiences that are scattered, and audiences that cannot leave their jobs to attend full-time courses. The world's sixty million teachers are like that.

2.2 Is it legitimate?

Open and distance learning is often seen as barely legitimate. Its history is marked by the work of institutions that accepted student fees, gave them poor service, and kept their costs down by encouraging students to drop out once they had paid all their money. Learning at a distance, particularly from printed materials, lends itself to rote learning. If teaching material gives all the answers then there is no room for an individual response while if it fails to do so the student may feel challenged but frustrated. Distance learning can be a soulless and isolated activity so that dropping out is more attractive than going on. Most parents and probably most educational planners would encourage their own children to study at a conventional university rather than an open university. Few would argue that open and distance learning matches the best of conventional education as sometimes practised in rich universities in industrialised countries or in a golden age we think our grandparents might have been able to remember.

But there is a threefold case to be made for its legitimacy. First, the evidence of public-sector open universities, and dual-mode universities that teach both conventionally and at a distance, is that students can achieve examination results that match those of conventional universities. A significant proportion of students give up along the way and do not complete their courses. But this is true of all students working part-time and not a distinguishing mark of students learning at a distance.

Second, distance education has been powerfully effective in reaching audiences who could not meet their educational needs from conventional institutions. In Colombia, a radio-based school was, in the 1970s, reaching over 100,000 rural peasant students every year. The National Technological University in the United States is using satellite and broadcasting technology to meet the needs of engineers for postgraduate study without their having to leave their jobs and attend a campus. In China, the combined use of television, classroom sessions, and printed materials is providing university education to about a third of all the students in higher education. A church-based nongovernment organisation, the American private sector, and the government authorities in China have all perceived distance education as legitimate because of its power to widen access to education.

Third, where open and distance learning provides opportunities for student interaction with tutors, it allows open-ended dialogue, often regarded as the touchstone of legitimate education. Thus, while open and distance learning may lend itself to rote learning - as does learning in large classrooms - this is not an essential or defining characteristic.

The arguments are linked: open and distance learning is legitimate because it has a record of success in terms of the measures applied to conventional education, but would be of little interest if it simply replicated for the same audience what could be done conventionally, and of little value if it got people through their examinations at the expense of more serious educational purposes.

2.3 Does it work?

The first part of that answer about legitimacy suggested that open and distance learning could work. But does it actually work for teachers? We can look at three kinds of answers - about student numbers, about outcomes in terms of examination results or learning gains, and about performance in the classroom.

The evidence on numbers enrolling on courses is solid and reassuring. Many programmes of teacher education, in all continents, have succeeded in enrolling students in significant numbers. We need, however, to go on to ask also about completion rates. Where teachers have been promised improved status or pay at the end of the course, completion numbers can be as impressive as enrolment numbers. In its programme to expand the teaching service in the 1970s, for example Tanzania succeeded in recruiting 45,000 potential teachers of whom 38,000 went on to get their qualifications (Chale 1993: 31). In the case studies recently completed by UNESCO, completion rates varied widely. (The case studies are outlined in chapter 3, below). In Burkina Faso, very few headteachers dropped out. In the case of Nigeria, drop-out rates varied from 27-39 per cent and the pass rates of those completing the programme varied from 55 per cent to 64 per cent. In the British Open University, completion rates appeared to be relatively high. In contrast, a programme in India had a completion rate of less than 20 per cent while about half the teachers learning about new communications technologies in Chile did not complete the course, partly because of difficulty in paying their fees. In both of these cases, in contrast with the Tanzanian example, students enrolled individually rather than being recruited in a national campaign and were not guaranteed promotion or a new status on completion.

There is evidence, too, that students on courses for teachers get reasonable examination results. A review of nine earlier case studies found that pass rates were between 50 and 90 per cent, figures that are probably in line with more recent data. It concluded that 'while examination success cannot be equated with teaching capacity, we can legitimately assume that a reasonable examination pass rate demonstrates that a programme was effective in teaching academic subjects' (Perraton 1993: 393). Rather than look at examination results, we might want to examine how well trainee teachers learned. Teacher education projects in Indonesia and Sri Lanka set out to measure learning gains and found reasonable evidence of effectiveness that is in line with the evidence on examination results (Nielsen and Tatto 1993).

It would also be interesting to ask whether the students of trained teachers performed better than those of untrained but unfortunately we have limited evidence, and hardly any of it from open and distance learning. A series of studies have yielded the disturbing results, from developing-country studies, that there was little difference in school outcomes with qualified or unqualified teachers (cf. Perraton 2000: 59-60, Avalos 1991, Torres 1996). One interpretation of this is that poorly qualified teachers are not much more effective than poor unqualified teachers and that there is therefore a case for improving - and spending more on - teacher education. Rich-country evidence bears this out. A recent study from the United States which compared student achievement and teacher policies within its states 'demonstrates that the states leading the nation in student achievement and those that have made the most significant gains in achievement are the states that have the most highly qualified teachers and that have made consistent investments in teachers' professional development' (Russell and McPherson 2001: 8). Better educated teachers probably teach better.

Only a handful of studies have followed trainee teachers into the classroom to see how well they are performing. This was, however, the subject of evaluations of distance-education programmes for teachers in Tanzania and Zimbabwe (Chale 1993, Chivore 1993, Mählck and Temu 1989). Evidence from these large-scale projects to expand teacher supply was reassuring: while direct comparison between students taught in

Table 2.1: Outcomes of some projects

Project, date, purpose	*Numbers*	*Outcomes*	*Costs*
Inservice upgrading of unqualified primary school teachers, Botswana, Swaziland, Uganda 1967-78	Each in range 600 to 1,000	Successful completion rate 88-93%. Anecdotal evidence of impact on classroom performance.	n/a
Kenya programme for unqualified primary school teachers, to improve general educational background and achieve secondary examination passes 1967-73	8,433 over 7 years; annual enrolment 850 to 2,000	91% passed examination and gained promotion. No firm evidence on classroom performance.	Cost per enrolment relatively high in comparison with alternatives
Tanzania programme to recruit and train on the job primary school teachers for introduction of Universal Primary Education 1976-84	45,534 in three annual cohorts	83% qualified. Positive evidence on classroom performance. Weaknesses in science teaching and self-confidence among female teachers	Cost per successful trainee about half cost of residential course
Zimbabwe Integrated Teacher Education (ZINTEC) for secondary school leavers, trained on the job for expansion of primary schooling 1981-8	7,353 over four years	80% pass rate. Positive evidence of classroom performance but difficult to draw comparative conclusions	n/a
Nigeria National Teachers' Institute training primary school teachers TCII course after 2 years secondary education 1984-90 NCE course after 5 years 1990-	186,713 over period Enrolment of 14,909 on 1st cycle and 26,657 on 2nd cycle	Success rate thought to be in range 25 to 30% of those entering; compares favourably with alternative; no evidence on classroom practice 21 000 students graduated 1994	Cost probably lower than conventional college
Pakistan Primary Teachers' Orientation Course (Allama Iqbal Open University) introducing new curriculum to primary school teachers 1976-86	83,658 total	56% completed course; 38% of original enrolment passed examination Positive self-report on usefulness. No direct evidence of classroom effects	AIOU graduate costs 45-70% of conventional university costs
Indonesia Universitas Terbuka upgrading course for lower secondary teachers	c 5,000	Positive effects on subject mastery and in theory and practice in skills; relatively poor results in mathematics; apparent decline in attitudes towards teaching	Cost about 60% of equivalent
Sri Lanka National Institute of Education training primary-school teachers with secondary level qualifications	c 5,000	Positive effects on subject matter and in theory and practice in skills; less successful than conventional college in mathematics	Cost one-sixth to one third of alternative
Uganda Northern Integrated Teacher Education Project for primary school teachers 1993-95	3,128 enrolled	88% completed and passed examination; some evidence of improved skills in teaching competencies	Cost per student about $2,000 compared with $2,500 in conventional college

Source: Perraton 2000: 80 – 1

different ways was problematic students' classroom practice stood up comparatively well (Perraton 1993: 394-5).

The available data are thin, partly for lack of good research, but for what they are worth are summarised in table 2.1.

2.4 What does it cost?

There are three kinds of answer to this question. First, we can look at broad-brush comparisons between the actual costs of training cohorts of teachers through contrasting approaches. Second, we can look at the costs of different technologies: we come back to this in chapter 5. Third, we can analyse the kinds of expenditure needed for teacher education in varying circumstances. We look at this below.

Using the first approach, a number of broad-based comparisons have been made between conventional and distance-education approaches in terms of the cost per student or cost per successful student. Of course these comparisons are crude, and lump together very different kinds of distance-education programme. But, for what it is worth, the evidence suggests that, above a threshold in numbers,

> with the relatively high completion rates often achieved in teacher education, costs per successful student tend to compare favourably with those of conventional education. This differential holds true both for projects with quite modest costs per student, reflecting limited student support, as in Pakistan [at the Allama Iqbal Open University Primary Teachers Orientation Course], and those with relatively high costs incurred for extensive student support and supervision of classroom practice, as in Tanzania [in its large teacher education programme of 1976-84].
>
> Perraton 2000: 128

The figures are summarised in table 2.2.

Interpretation of the figures takes us into the detail examined below in table 5.2 and 5.3 and to the third approach suggested above. We need to look at the differences in behaviour of the costs of conventional and distance approaches to teacher education. Open and distance learning is often characterised as having high fixed and low variable costs which therefore allow for economies of scale: with more students the unit costs go down. The large teacher-education programmes in China, or the early programme in Tanzania, demonstrate this. In considering teacher education, however, other factors are often as important in determining comparative costs. If trainee teachers study part-time, with reduced periods of residence at a college then there are likely to be savings in the cost of residence and governments are less likely to pay an allowance while they are studying. Furthermore, if trainees are teaching, either full or part-time, while they study, cost analysis needs to take account of the value of this work. (Total expenditure is lower if, say, untrained teachers study at a distance than if they are taken out of the schools to attend a full-time course and a new cohort of teachers is put into the schools.) Costing needs to take account of arrangements for student support and, often critical, of arrangements for classroom teaching and its supervision (see chapter 7). To examine the total set of differences between the two approaches we need therefore to examine:

Table 2.2: Costs and effects of some teacher education projects

Currency: constant 1998 US$

Country, project, date	*Student numbers*	*Average cost*	*Educational and cost impact*
Tanzania TTD 1979-84	15,000 p.a. 45,000 total	1863 per student p.a. 7316 per graduate	Effects comparable to conventional education. Cost about half conventional education
Brazil Logos II 1976-81	24,400	211 per student p.a. 741 per graduate	80% pass rate. Costs lower than alternative
Sri Lanka 1984-8	c5000	116 per student p.a.	Cost 1/6 – 1/3 of alternative. More effective than alternative for some subjects but less effective for others
Indonesia 1985-8	c5000	805 per student p.a.	Cost about 60% of equivalent. More effective than alternative in languages but less in maths
Nepal RETT Basic teacher course 1978-80	3000	196 per student p.a.	Cost slightly lower than alternative; completion rate 83%, pass rate 57%
Nigeria National Teachers Institute 1978-89	20,327	79 per student p.a.	Cost probably lower than regular colleges; completion rate estimated 42%, pass rate estimated 27%, both rates higher than at regular colleges
Pakistan Primary Teacher Orientation Course 1976-86	83,658 enrolled 31,674 completed	107-149 per successful completer	Cost per AIOU graduate 45-70% of conventional university
Kenya inservice teacher training 1968-77	790	806 per subject equivalent p.a.	Cost relatively high; favourable effect on access
Kenya University of Nairobi BEd 1986-90	515	1096 per student p.a.	Cost thought to be lower than cost of residential equivalent
Nigeria COSIT University of Lagos 1980-8	2000	345 per full-time student equivalent. 1304 per graduate	If opportunity costs are omitted then cost per graduate slightly lower than residential campus cost
Uganda NITEP project 1993-7	2750	2000 per successful student	Lower cost than equivalent

Source: Perraton and Creed 2000

- the scale of the programmes;
- the media or technologies used (see chapter 5);
- the costs of face-to-face or residential study;
- the cost of other student support;
- the costs of teaching practice and of supervising or examining it; (see chapter 7)
- policy on charging fees (see chapter 6);
- the opportunity costs of taking teachers out of school for their own education.

Some of the differences between the two approaches are set out in table 2.3.

Table 2.3: Comparison between the costs of conventional and distance education for teachers

	Conventional	*odl*
EXPENDITURE		
Residence	Likely to be a significant proportion of total costs	Cost likely to be reduced where students are in residence for smaller part of total study time
Grants, allowances	Often paid to full-time students	May be paid only for short periods of residence
Staffing	Staff time dominated by face-to-face teaching	Proportion of staff time required for materials development and for tutoring at a distance
Materials, media, communication		Costs likely to be higher and influenced by sophistication of media chosen; economies of scale are possible
Student support	Level of expenditure determined by amount of field supervision provided	Significant expenditure often needed for isolated students and to supervise classroom work
Annualised capital	Cost of teachers colleges and facilities likely to be a major capital item	Some capital required for distance education activities but these are counterbalanced by reductions in costs of college accommodation
OPPORTUNITY COSTS		
For students	Students may forgo notional income by attending college	Teachers may forgo income from private tuition while studying
For ministry of education		If students teach while they study ministries avoid costs of funding their replacements
INCOME		
Student fees	Rarely charged	Are sometimes charged, especially where students are voluntarily upgrading their qualifications

2.5 Conclusion

The evidence shows that distance education, in its various forms, can work and if well-designed can be educationally legitimate. It has been applied to the education of teachers and has been shown to be effective on a number of measures. In terms of cost per student, distance-education programmes have often shown advantages over conventional programmes. With this kind of reassurance we go on, in chapter 3, to look at the particular roles it has played in teacher education.

3. What has it been used for?

Distance education been used to teach, support and develop teachers for many years: UNESCO was a pioneer through its UNRWA/UNESCO Institute of Education which was training teachers for refugees forty years ago. Since then open and distance learning has been used in many countries of the world with a reasonable record of success. The use of new information and communication technologies has drawn new attention to open and distance learning and offers new possibilities. We begin by asking why it has been attractive to decision makers.

3.1 Why use distance education?

The reasons are varied. It has been used to reach trainees in geographically challenging areas such as the riverain regions in Guyana, mountainous areas in Nepal, the dispersed communities of the Indonesian archipelago and the small island states in the Caribbean and Pacific. In some high population countries such as China and Pakistan, distance programmes have played an essential role in providing teacher education on a huge scale. In many Latin America countries distance education has been used widely to support curriculum reform and teacher upgrading. Teacher education by distance is being used to redress inequalities in teaching qualifications in post-colonial Namibia and Zimbabwe and in South Africa, as a tool for reconstruction of the teaching service in Uganda. In other countries, it is being used to reach marginalised communities such as refugees in Sudan, itinerant communities in Mongolia, and minority-groups in northern Pakistan.

Using distance education for teacher training has various potential advantages. Large programmes have brought economies of scale. In contrast to college-based training, distance programmes can provide access to courses on a much larger scale and wider geographical reach. It can overcome regional differences in access to teacher education. It provides a means of side-stepping the slowness and dilution of the cascade approach. In continuing professional development, distance education can help avoid the cost of replacing a teacher who has gone to full-time education. It can open up access to teacher-training opportunities for teachers with family responsibilities who are earning an income and need to remain within their communities. The establishment of a decentralised distance-education structure can also be used to support training in the districts and serve as a basis for the development of a programme for the continuing development of teachers. In print-poor countries, self-study materials can become a permanent resource. It can also ‘put information about curricula and teaching approaches directly in to the hands of individual teachers’ (Robinson 1997: 125) and cut down the time between learning about new teaching practices and trying them out in the classroom. This is particularly important in curriculum reform and short professional development courses. Carefully balanced mixed-mode teaching can help to double and triple a college’s training output per year. Where the infrastructure for them is in place, new information and communication technologies have opened up a range of new opportunities for course- and resource-based learning in teacher education.

Three general points need to be stressed. First, distance education is of potential benefit to teachers because it can reach scattered populations and can offer them education and training without their having to leave their schools. Its has great logistical advantages. This means that it offers the chance of accelerating the supply, or the updating of teachers, beyond what could be done through conventional means.

Second, good programmes of open and distance learning have benefited from its strengths and avoided its weaknesses. Some aspects of teacher education need to be done face-to-face, or need close interaction with a tutor or with other students. Others do not. Programmes that combine conventional and distance methods are likely to be better than those that rely on a single approach.

Third, and for that reason, the more successful programmes have been carefully integrated into the structure of teacher education as a whole. They have not been designed as second-class alternatives to conventional education but as a part of a complementary system using a variety of different approaches, each chosen for its appropriateness to the curriculum and the audience.

3.2 Which parts of the curriculum is it good for?

We can go on to ask whether there are parts of the curriculum of teacher education for which open and distance learning is more or less appropriate. In chapter 1 we distinguished between four elements of the teacher's curriculum: general education, subject knowledge, pedagogy, and practical teaching. All of these elements have been addressed in different programmes of distance education, using a variety of technologies, which are examined in more detail in chapter 5. Distance education would seem to lend itself to the first element; there is wide experience of using open and distance learning methods for the traditional curriculum of secondary or tertiary education and a wealth of experience in offering an effective equivalent curriculum of this kind. In many countries there are teachers, or student teachers, with quite limited background education. Often these are the older and more remote teachers for whom open and distance learning may be a more convenient method of study than conventional education. Using open and distance learning to raise the level of their general education may be a simple and effective means of raising the quality of the teaching force.

Extending teachers' knowledge of the subjects they are to teach may be more demanding if it is asking teachers both to acquire new subject knowledge and at the same time to think about how they are to present it in the classroom. In Guyana, for example, a teacher training project dealt with this by running initial, pre-training programmes designed to increases the academic competence of unqualified primary and junior secondary teachers in English, mathematics and science in order to get them to the level needed for entry to a conventional teachers' college Educators have also used distance-education approaches to bring new thinking and teaching practice about specific subjects of the curriculum. In Latin America regional collaborative projects have been set up in environmental education, mathematics and science. Some aspects of pedagogy or of child development lend themselves well to open and distance learning. Video examples of real-life classroom teaching in a variety of contexts can give teachers a wider range of exemplary approaches than would be possible in conventional face-to-face learning. Similarly the A-Plus television series in Brazil gives teachers regular access to examples of classroom teaching together with the voices of teachers talking about their experience and concerns.

As we saw, many programmes - properly - include elements of teaching practice and here it is generally necessary to combine what is done at a distance with arrangements for the supervision of classroom practice, the theme of chapter 7 of the guidelines.

The general conclusion is that there are aspects of teacher education where the distant elements of open and distance learning are particularly appropriate, others that demand close contact with tutors or other students. We come back to the implications of this for planning and management in chapter 4.

3.3 How has open and distance learning been used?

In chapter one we drew distinctions between programmes of initial education or training and those of continuing professional development, and between programmes for experienced and for inexperienced teachers. Initial teacher education and training is the programme of studies which leads to qualified teacher status according to the official standards of a country. It is the basic or first level of qualification for a teacher. It may be taken as a pre-service programme (before a trainee teacher begins work as a teacher) or an in-service one (while an untrained teacher is working as a teacher). Continuing professional development enables teachers to extend existing knowledge and skills and develop new ones. Some of this takes the form of long structured courses leading to formal qualifications (diplomas or bachelor's or master's degrees). Other forms are shorter, concentrate on skills in managing children's learning or curriculum change and do not lead to additional qualifications. In some countries, qualified and unqualified teachers alike participate in continuing professional development. It may be provided as in-service activities (on-the-job learning) or out-of-school courses of varying length (off-the-job or in vacations).

In order to document recent international experience, UNESCO carried out a set of case studies on teacher education at a distance in 2001. The case studies fell into four groups which reflect differing uses of open and distance learning. They are summarised in table 3.1, which distinguishes programmes for initial teacher education, for continuing professional development, to reorient teachers for curriculum reform and to support career development. Their main features are then described in box 3.1 while a fuller account of them is available in the companion book to this one *Teacher education through distance learning: technology, curriculum, cost, evaluation* (Perraton, Robinson and Creed 2001).

Box 3.1 Case studies of teacher education at a distance

Initial qualifications

Nigeria: *The National Teachers' Institute.* The National Certificate in Education (NCE) is a print-based distance programme offered by the National Teachers Institute in Nigeria, a unique distance-teaching teacher's college. It provides an alternative but equivalent route to minimum national initial teaching qualifications for working primary teachers in a country very short of qualified teachers and where conventional college output cannot meet demand. It aims to provide large-scale training in a high population country at affordable costs.

United Kingdom: *Open University.* The Open University's PGCE programme uses ICT and distance education to support the school-based training of graduates in the United Kingdom. It reflects UK government policy to increase the role of school experience and the use of competency-based approaches in the initial preparation of teachers.

China: *The China Television Teachers College.* The China Television Teachers College (CTVTC), a part of the China Central Radio and Television University (CCRTVU) since 1994, provides large-scale teacher education through a national distance teaching institution, Distance education is included in China's strategic planning for teacher education and plays a significant role in initial teacher education and continuing professional development. Its aim is to provide large-scale teacher training at an affordable cost and to provide a unified system of teacher training.

Continuing professional development

Brazil: *TV-FUTURA.* A-Plus is a daily non-formal television series designed to stimulate interest in education, teaching and learning among teachers and other educators in the broader community. Taking a journalistic approach, it uses a private educational television channel to reach an audience of 13 million across Brazil. It also helps mobilise teachers into follow-up action through its Community Mobilisation Networks. These extension activities aim to help teachers extend teaching practices in ways that include community involvement, participation and development.

India: *Indira Gandhi National Open University.* The Certificate in Child Guidance is a print-based distance programme for primary teachers, parents and social workers, provided by the Indira Gandhi National Open University (IGNOU) in India. Using printed text, audio and video materials it provides a practically oriented, non-specialist programme which is not otherwise available. The numbers of students have been relatively small (less than a thousand per year).

Egypt: *Cairo University and Ministry of Education.* Egypt has set up a national network of 39 distance-training centres in all governorates and, by using interactive TV technology, has provided scheduled short in-service courses training for teachers and also for educational inspectors, directors and leaders. Trainees in the centres are able to watch subject-specialist presenters in real-time and have the opportunity of putting questions to them via centre coordinators.

South Africa: *University of South Africa (UNISA).* The BPrimEd and BSecEd are print-based degree programmes in teacher education provided by the University of South Africa (UNISA), one of the world's largest distance teaching universities. Distance education plays a prominent role in teacher education in South Africa – more than a third of its primary and secondary teachers were involved in distance education in 1995. These programmes began as in-service ones for working teachers wanting to upgrade to degree level but later diversified to include a pre-service target group too, in response to government policy change.

Re-orientation of teachers for curriculum reform and change

South Africa: *Open Learning Systems Educational Trust (OLSET).* English in Action is a South African interactive radio programme, run by an ngo, with two audiences: primary school children and their teachers. Through a well-structured curriculum and active learning approaches, the children learn English while the teachers improve both their English and their teaching of it. This non-formal programme asks teachers, many of whom have low levels of English or poor teaching methods, to lead language development activities, such as games or pairwork and to mediate content, if necessary in the mother tongue.

Mongolia: *UNICEF and the Ministry of Science, Education and Culture.* An inservice programme for primary teachers in a transitional country with reduced resources for education and to support changes in curriculum content and teaching methods. Though new to the country, distance education was chosen as an affordable means of reaching more teachers more quickly more often than traditional provision, to re-orient them to new teaching approaches and curricula.

Chile: *Universidad de La Frontera.* This in-service programme aims to teach teachers to learn to use information and communications technology (ICT) in their teaching. It uses ICT to teach teachers to use ICT. Distance education, though fairly new to Chile, was chosen in order to extend the geographical reach of the programme, otherwise available in a conventional face-to-face form, and to meet the teachers' needs for new skills and knowledge created by the recent widespread provision of computers to schools.

Career development

Burkina Faso: *Ministry of Basic Education and Literacy and RESAFAD (the African Network for Education at a Distance).* This was part of a multi-national programme for West African francophone countries aimed at increasing the management capacity of headteachers. The programme benefited from the use of new information and communication technologies to help the process of course development but used print, coupled with meetings of headteachers, to reach its scattered audience. The programme reached about a quarter of Burkina Faso's headteachers and there is some evidence from reports of school inspectors of more efficient school management as a consequence of the course.

These categories inevitably overlap: career development may, for example, be regarded as part of continuing professional development; some of the programmes have more than one audience, and may include qualified and unqualified teachers, teachers studying for initial qualifications and those using the same programmes to upgrade their qualifications. In general, distance-education programmes have been developed with varied intentions: of widening access to teaching qualifications; of disseminating good practice; of strengthening the education system as a whole by reaching not only teachers but the wider community; in enabling school-based training and professional development and as a means of strengthening the links between theory and practice, focusing on the school as a site of teachers' learning.

We look at each category of teacher education in turn.

Table 3.1: The case studies

Category	*Cases*	*Technologies*
Initial qualifications Programmes leading to qualified teacher status.	An alternative route to primary teacher qualifications, Nigeria	Print with face-to-face meetings.
	Using ICT to support school-based initial teacher education, United Kingdom	Print, computer communications, face-to-face meetings, video and audio, written feedback on assignments.
	Reaching teachers through television, China	Television and video copies, some print, audio-cassettes, face-to-face classes or meetings.
Continuing professional development Programmes and activities extending teachers' knowledge, skills and expertise throughout a teacher's working life.	Television-plus: journalism in the service of teacher development, Brazil	Television and video copies, magazines, newsletters, telephone 'call-in' centre, face-to-face meetings.
	New routes to teacher education degrees, South Africa	Print with some face-to-face meetings, audio- and video-cassettes and some small optional element of computer communications
	Developing primary teachers' knowledge and skills in child guidance, India	Print, face-to-face meetings and some audio- and video-cassettes.
Re-orientation of teachers for curriculum reform and change Supporting teachers in changing what they teach and how they teach it.	Interactive radio for supporting teachers of English a second language, South Africa	Radio programmes, audio-cassette copies, print and some face-to-face meetings.
	Re-orienting primary teachers to new teaching approaches, Mongolia	Print and audio (radio and audio-cassettes), some videos and face-to-face meetings.
	Teachers learning to use information technology, Chile	Computer communications for an online programme, for delivering materials, supporting interaction, providing access to databases and submitting coursework.
Teachers' career development Programmes to extend the careers of qualified teachers.	Professional development of headteachers in Burkina Faso	Print and face-to-face meetings.

3.4 How has it worked for initial qualifications?

First, some countries have used distance education to provide a route to initial qualifications for significant numbers of teachers, both new entrants to teaching and experienced unqualified teachers. The China Television Teachers College and the National Teachers' Institute in Nigeria

have long experience of this approach and both have become recognised and institutionalised parts of the regular education system in their countries. In a programme that reflects an official policy shift towards more school-based training, the Open University in Britain has run a school-based qualifying programme for graduates who want to enter teaching but have had no professional teacher training.

These three examples from very different countries illustrate differing roles for open and distance learning in initial teacher education. The programmes in China and Nigeria take in large numbers of entrants and make a substantial numerical contribution to increasing qualified teacher supply. The Open University programme makes an important contribution towards providing alternative opportunities for trainee teachers but, in comparison to the Nigerian and Chinese cases, its numerical impact on British teacher supply is modest. The 1998 figures reveal an intake of 1933 trainee teachers compared with a national annual intake of new teachers of some 30,000. However, there is some evidence that twice as many teachers who study at a distance through the Open University course stay in the profession as the national average where up to 40 per cent of newly trained teachers in England leave teaching within three years of qualifying (Personal communication). This finding is consistent with data from teachers working in very different circumstances in Zimbabwe where over 90 per cent of teachers trained through the ZINTEC distance-education programme were reported to be still working in the schools six years after the programme ended (Perraton 2000: 67).

The three programmes provide initial training for different levels of learners, from secondary-level entry qualifications in China and Nigeria to graduate entry in the United Kingdom. The programmes also handle the management of teaching practice in different ways, reflecting the regulations and norms of the different countries and the importance placed on it within different teacher education systems. While the whole programme from the Open University is designed round school experience, in China this is given little emphasis. In the British programme, contact with students on teaching practice in schools and a reduction of their isolation – a problem area in all initial teacher education programmes – is facilitated by the employment of information and communication technologies. The labour-intensive nature of the management of school practice, together with the use of new technologies and of several other media in combination, is likely to increase the quality of teacher preparation but also to increase costs.

3.5 What is its role in continuing professional development?

Initial teacher education is no longer seen as enough. Distance education is therefore also being used to raise the skills, deepen the understanding and extend the knowledge of teachers. Some programmes are broadly focused while others are targeted at specialist groups. Programmes are taken either by individuals or by groups of teachers who are encouraged to participate by their schools or their employers. For example, a non-profit television station is taking the lead on supporting school groups in Brazil. In other cases, programmes are available for individual teachers who want to improve their skills and their status, often enrolling on an individual basis, and at their own expense. Indira Gandhi National Open University in India has a number of programmes of this kind. The University of South Africa also offers programmes on this basis. Their BEd programmes are for experienced underqualified teachers and also new entrants to teaching, which serve to meet individual goals as well as contributing to the policy goal of a graduate teaching force. Some programmes are aimed at the upgrading of teachers' qualifications required by official policy on new national standards, as in China for example.

In these and other examples planners have chosen to use open and distance learning techniques to meet the needs of their scattered audiences. In doing so they have been able to take practical moves to provide long-term benefits, in terms of their capacity and status, to individual teachers as well as the education systems within which they work. In both England and Pakistan, for example, ministries of education have called on national open universities to distribute information and training on new curricula, rather than attempt to bring teachers together for this purpose. Some programmes using mass media have also sought to widen the audience beyond the core target of teachers to the broader community. The A-Plus television programme in Brazil uses mass media on a large scale to reach a wide community of viewers while at the same time using the series as a launching pad for further activities by groups of teachers.

3.6 How can it help curriculum reform?

Distance education can have a role in programmes of curriculum reform which aim to change either the content or the process of education. In South Africa, the Open Learning Systems Educational Trust is using radio to improve the teaching of English, and to support teachers in this work. In Mongolia, radio and print are used across large distances to re-orient teachers to official changes in curriculum and teaching methods within a country in transition. In response to policy initiatives aimed at establishing the use of information and communication technologies in schools, the Universidad de la Frontera in Chile is using the technologies to support teachers who are teaching these subjects.

The Universidad de la Frontera programme, supporting the teachers involved in the Enlaces project which introduced information and communication technologies to schools in Chile, provided an online programme for teachers, as an alternative option to face-to-face programmes and ensured that the course assignments were of an applied nature. Though the cost of the two alternatives (face-to-face and online) were about the same, the online programme appeared to achieve more change, in fostering more familiarity with the technologies and the development of a 'network communication culture' missing from the face-to-face version. The OLSET programme in South Africa has been effective in reaching large numbers of teachers not only with prescription and advice on how to teach English as a second language but with well-designed lessons, provision of models, guidance in using the radio or audio-cassette resources and support for changes in teaching methods. There is some evidence that not only has the programme reached large numbers at low cost, it has been effective in helping young pupils to improve their English and teachers improve their teaching as well as their English. Using radio in a different kind of way, as a topical magazine and involving teachers in topic identification and programme construction, primary teachers in Mongolia became familiar with new ideas about child-centred teaching and other new approaches and were able to apply them to their teaching.

3.7 Can it support teachers' career development?

Distance education has been used for teachers' career development. As they seek promotion, or aim for the next qualification level, or aspire to become a headteacher, or work in a teachers' college, or become an inspector, teachers need to acquire new skills. A multinational distance-education project in West Africa has developed a training programme in school management for headteachers and aspiring heads. In Burkina Faso, over a quarter of the country's

headteachers (whose professional development is increasingly seen as a key element in school effectiveness) developed new knowledge and skills within four years. This served at least three functions: it furthered their careers, built capacity in the headteacher cohort and provided professional development. This experience, and the demand for specific training and support for head teachers in many other countries, suggests that this as an area of work that merits investment and expansion. It is the kind of programme that will enhance and strengthen the status of teachers.

3.8 Conclusion

Open and distance learning has been widely applied to teacher education and there is some record of success in its use for all four regular elements of the curriculum - general education, subject-specific knowledge, pedagogy, and practical teaching. With differing emphases on different parts of the curriculum it has been deployed for teachers at different stages of their careers, and in support of national programmes of development and of curriculum reform. The record of achievement is solid enough both to have some confidence in its use and to draw some generalisations about how to plan and manage it, the theme of the following chapters.

4. How is it planned and managed?

To sum up the argument so far, open and distance learning has been applied to the problems of both the initial education of teachers and their continuing professional development, with some evidence of success. In this section we ask how programmes of this kind can be planned and managed before going on to ask about specific management decisions in the four key areas of technology, funding, classroom practice, and assessment.

The prime task of the planner or manager is to match educational purpose, administrative structure, and teaching methodology. This cannot be done in a vacuum. The history of distance education is littered with projects that looked good initially but could not be sustained as they were not built into national educational systems. Decisions about such issues as the allocation of government resources, the recognition of qualifications, or the use of teachers college facilities or staff are all likely to have implications for the educational service as a whole. Some of the planning choices within open and distance learning will affect people outside a ministry of education: teachers' associations and unions will be interested in the conditions of service for teachers working in a new role; broadcasting agencies, asked to transmit broadcasting materials, will certainly have a view about the timing of broadcasts and may want a measure of influence or even control over their content.

Identifying the educational purpose is all-important. If the purpose and audience lend themselves to open and distance learning, then it makes sense to explore the nonconventional options open to the manager alongside the conventional approaches of teacher education. The point of these guidelines is not to argue for the application of open and distance learning to every problem in teacher education but to suggest where and how it can be used. The most successful programmes are those where open and distance learning is closely integrated with other approaches to education and professional development.

4.1 What is the policy framework?

The planning of open and distance learning may involve policy issues at international, national and institutional level.

The international issues arise in part because the forces of globalisation are affecting the content and practices of education, in part because new policy issues arise when education is no longer confined within national frontiers. Programme planners are thus increasingly exposed to innovations in teacher education and need to make judgements about the desirability, feasibility and acceptability of these internationalised ideas within their country and programme. Changes to more practice-based teaching education, for example, have been encouraged internationally and become part of the common discourse about education. As we see in chapter 7, this has major implications for the local planning, implementation and management of programmes for teachers. International conventions on the role and status of teachers as agents of change naturally affect national policy. At the same time, educational cooperation across borders, and cross border enrolment, put on to the decision-maker's agenda jurisdictional questions about cross-cultural transference and language and about the control of cross-border enrolment and its accreditation or recognition.

At the national level, lines of responsibility for open and distance learning within government are likely to be complex and do not just lie with the education sector. Increasingly, the development of distance education raises questions that have to be answered within a national communication policy, part of which will be a policy for the educational use of communications. Political, economic, technical and regulatory issues may all need to be considered. Some of these issues concern the respective roles of the private and public sector; educational institutions are likely to seek access to telecommunications on favourable terms, possibly through the use of governments' regulatory powers in the telecommunications sector, or may want more freedom to use telecommunications than has traditionally been available. Other areas to be considered in a communications policy include:

- investment policy, in relation both to the public sector and to the encouragement of particular areas of private-sector investment;
- policy on tariffs and on any common carrier requirements;
- government purchasing policy, and policy for the use of communication technologies for government's internal communication;
- technical standards including frequency allocation, systems reliability;
- the national development of national capacity and expertise;
- scheduling, influence, control over content and intellectual property;
- issues of equity and access.

Within the education sector, decisions about such issues as the allocation of resources, fee policies, the recognition of qualifications, the regulating and monitoring systems needed or the use of teachers college facilities or staff are all likely to have implications for the educational service as a whole. Questions need to be addressed about the most appropriate contribution open and distance learning can make to different levels and types of education, including primary, secondary and tertiary education, and technical and vocational education and training, as well as to teacher education. Questions are also likely to arise about the national or regional location of responsibility for distance education. Many planning decisions will affect people outside a ministry of education: teachers' associations and unions will, for example, be interested in the conditions of service for teachers working in a new role.

For institutions changing to dual-mode status, a key issue will be the balancing of resources allocated to open and distance learning against those of conventional provision and the systematic planning of policies to manage institutional change effectively. This is likely to include new faculty policies (new contractual and workload agreements, training, renegotiation of union contracts, evaluation and support); student policy issues (materials delivery, library access, counselling, financial aid, registration and record-keeping, technical support) and legal policy development (intellectual property including ownership of materials, copyright, and faculty, student and institutional liability).

4.2 What different elements do you need to make it work?

As we saw in chapter 2, the use of open and distance learning forces us to distinguish between a number of different educational and administrative jobs that may be done by a single institution, even a single person, in conventional face-to-face education. In open and distance learning functions are divided between different sections of the same organisation, or between

different organisation. Where a project or programme is to enrol, advise, teach and examine students it needs structures for a set of different functions. (Programmes that simply provide resources for teachers, whether through print or broadcasting or on the internet, as opposed to courses on which learners enrol, will need appropriate structures for making and distributing the resources but not the whole range of functions set out below.) To make distance education work you need structures and facilities for:

- governance, planning, management and funding
- materials development and production
- materials reproduction and distribution
- student recruitment and advice
- student support including the supervision of classroom practice
- assessment and evaluation of learners
- feedback system/formative evaluation
- record systems.

Any organisation needs a governance structure that will make major policy decisions; arrangements of planning, management and funding are likely to be the responsibility partly of people working within a distance-teaching institution and partly of people outside. The development of teaching materials – or their acquisition from outside – is a basic function: distance education depends on such materials. They may be developed in-house, or by external course writers, and are likely to be in a variety of media. An institution will need not only writers but people who can edit materials, so that they work effectively at a distance, and people to brief and train writers and editors. Materials then need to be reproduced, if they are in the form of print or cassettes or cd-roms and distributed. Broadcasting or videoconferencing also demand a distribution function of a different kind. Structures and systems are needed to recruit students and advise them about the programme. Most students needs support, guidance, and feedback on their work. Where teacher-education programmes include a practical element, concerned with their competence or skills in the classroom, arrangements are also needed to supervise this. Then, in many programmes students need to be assessed and their work examined or evaluated. Finally, a feedback system on the work of the institution or programme as a whole is needed to provide checks on how well it is working while a record system, important for any form of education, is indispensable where students are dispersed, needs to be designed and maintained.

Each of these topics demands attention. There are many guides to them, some of them identified in the annex. We look in the following four chapters of the guidelines at the key areas for the purposes of teacher education of technology (which shapes decisions about materials development and support for students), funding, classroom practice and assessment. The identification of these elements makes it possible to go on and look at the choice of models for managing them.

4.3 What models are there for managing it?

A variety of different structures or models have been used for teacher education at a distance and are set out in table 4.1.

In some cases a ministry of education has set up a project directly, making ad-hoc arrangements for all the necessary functions. This was the case, for example, in both Tanzania and

Table 4.1: Some models for organising teacher education

Model	*Example*	*Comments*
Ad-hoc arrangements made by ministry of education	MITEP Uganda	While this makes it possible to deploy resources quickly it may not be a sustainable model
Single or dual mode teachers' college	NTI Nigeria Belize Teacher Training College	The Nigerian case is the only example of a specialised distance-teaching teachers' college
Single or dual-mode university	IGNOU UWI	Many universities with distance-teaching capacity have been asked by MOEs to run programmes for teachers
Multi-country programme	RESAFAD head teacher training University of the South Pacific	Can share international resources and be of particular value for small states
NGO single-purpose project	OLSET	Speed and vibrancy of ngo activity has to be balanced against problems of sustainability and of coherence with government activity
Consortia and partnerships	TV Futura Brazil	If problems of integration can be overcome, a partnership of this kind may, as in Brazil, bring together an ngo, a broadcasting station, schools and a private-sector publisher

Uganda, at different dates, in order to run an emergency programme to expand the number of teachers rapidly. While this had the merit of speed, and meeting immediate demands, it has not generally resulted in a sustainable system.

Then there are many examples in which prime responsibility rests with a teachers college. Most often this has meant that a college, which is already teaching conventionally, acquire new responsibilities for teaching at a distance. The Belize Teacher Training College developed a new, part-time distance version of their conventional initial teacher-education programme, drawing on existing faculty members to develop distance materials but also to train new classroom supervisors and assignment markers at a district-level. Staff had to acquire the skills needed for these new roles. In Nigeria, uniquely, the National Teachers' Institute exists just for teacher education and teaches entirely through open and distance learning. The advantage of these approaches is that the colleges should already be familiar with the needs of teachers and potential teachers and may have an infrastructure for supervising teachers in the classroom. At the outset, however, a teachers college which is beginning distance education needs to develop skills – in material development for example – that its staff do not already possess.

Universities have also been called on to play a role here. They may have two areas of expertise: in teacher education where they have a faculty of education and in open and distance learning. Using a university for teacher education makes it possible to take advantage of structures and systems that are already in place. There may, however, be problems of fit and adjustment if a university has no experience, in, say, the education of primary-school teachers which has generally been the responsibility of non-university teachers colleges. There have also often been practical difficulties within dual-mode universities in the almost indispensable job of developing materials. Staff tend to have competing pressures, too little time to write, and to

be working in an environment where there is only a shallow pool of writers. The introduction of distance education can also be met with considerable resistance by faculty members since it implies a change in cultural practices. It can bring changes to workload and job security, may involve changed job descriptions and even a threat to a traditional autonomy over content; it may demand an unfamiliar approach to team work.

We can distinguish here between universities with both conventional and distance-teaching capacities and open universities which teach only at a distance. Dual-mode universities themselves vary. Distinctions can be drawn in terms of organisational integration or the capacity of a distance education centre. In some cases, for example, only a handful of courses are available through distance learning and administrative arrangements for open and distance learning affect only a minority of university staff. In contrast some mixed-mode institutions have integrated distance education in such a way that there is a breaking down of distinctions between on- and off-campus teaching. In some institutions, the capacity of a central distance-education unit may be purely administrative. In others, it has overall responsibility for the pedagogical quality of distance education materials, and for staff training. All of these variations in university practice will have a bearing on the skills that can be deployed by a university in a teacher-education programme.

Universities have run programmes of two kinds which, over-simplifying, can be described as supply-led and demand-led. In some instances ministries of education have turned to a university to run a national programme because it has the infrastructure for materials development and distribution. In other cases, a university has developed courses, especially for continuing professional development, because it is itself aware of a demand from teachers that will help their professional development. Indira Gandhi National Open University in India, for example, runs programmes on which students enrol individually, paying their own fees, in order to raise the level of their qualifications.

Three other kinds of model can be identified. There are examples of nongovernment organisations working on one aspect of teacher education, setting up their own structures either in parallel with or linked with the public education service. With external, donor, funding the Open Learning Systems Education Trust (OLSET) in South Africa, for example, is offering training for teachers in the context of its radio programme for schools. Nongovernment organisations have played a particularly strong role in a region like Latin America where a pluralist tradition encourages them and assumes they can have a role in public education. There is also limited, but growing, experience of programmes that go across frontiers. The regional universities in the West Indies and the South Pacific have responsibilities in teacher education. The growth of telematics has promoted cross-country teacher education initiatives such as T3 in Europe and STAMP 2000+ in Southern Africa. The T3 project, a consortium of universities and other partners in seven European countries developed a European-wide agreement on the content and certification of information and communication technologies in schools. STAMP 2000+, initiated by the Commonwealth of Learning, is a co-operative programme designed to bring the benefits of distance education to the training and upgrading of unqualified upper primary and junior secondary teachers and administrators in eight southern African countries. In francophone Africa RESAFAD has been working on projects to develop resources that can be shared across frontiers. In most of these cases other than the regional universities, these projects have been concerned mainly with the development of materials rather than with the creation and management of a whole teaching system.

We look in the next section at the role of partnerships of various kinds.

In choosing between the models it makes sense to begin by seeing what is available in the environment. If there is an existing open university, or a university with a distance-teaching department, it may make sense to use their infrastructure rather than creating something new. But this will not always be the case: a ministry of education may have such different priorities from a university that it makes more sense to create a separate structure. Sometimes, there are also advantages to bypassing the traditional system in an attempt to be free from its political or pedagogical constraints, or its inertia. Both OLSET and TV-FUTURA found that, by operating outside the state educational system, they were able to offer practically orientated teacher-led content that was not readily available through the state system. This benefit needs to be set against the risks, in terms of acceptability and sustainability, of operating outside, if alongside, the system.

The choice between options – or the development of a new combination of them – is likely to be a function of five issues: governance, funding, timing, capacity and scale.

Questions of governance are about responsibility for and control of the various parts of the distance-teaching system. Who decides about which of the functions identified above? How are conflicts between any of the parties resolved?

The level and source of funding may be critical: donor funds, for example, may be available only to a government agency or, the reverse, only to an NGO.

If a project is for a limited purpose and for a short period then ad-hoc arrangements may have a positive advantage. Tanzania, for example, was able to set up a teacher-education programme to expand its teaching force in a short time, calling on a wide range of national resources, in order to train an urgently needed 40,000 teachers. But it is often difficult to turn short-term arrangements into a permanent system and a one-off emergency solution to a problem may jeopardise the development of a sustainable structure.

Where an institution – whether an open university or an international agency like the Commonwealth of Learning – has existing capacity to undertake some distance-education functions, this may be a powerful argument for using them and setting up a programme in cooperation with them. In contrast, if a college is launching a new programme of distance education, as was the case with MIITEP in Malawi, it will be necessary to set up the necessary infrastructure to develop materials and teach students.

The scale of a programme, or of a country, may determine the model to be chosen. Small states in particular may need to rely on a regional or international institution because of the limited facilities within country. Teacher education at a distance has, as already noted, been a major interest of the University of the South Pacific since its establishment.

In considering the balance of advantages for any one model, and developing proposals that take account of those issues, the most useful touchstone may be to consider the links between the programme and the rest of teacher education. Unless these links are in place then an unorthodox programme has little chance of effectiveness or even of survival. In developing the links it is necessary, too, to keep in mind relationships between the centre and the periphery: from the student-teachers' point of view the centre may be the school in which they are working and the distance-teaching institution the periphery; from the ministry of education, both may look remote. From the planner's point of view the links between them are of paramount importance.

4.4 Can you have partnerships and how do they work?

In many cases, it will not be possible for any one institution to carry out all the functions needed for open and distance learning and they will be shared between several partners. An open university, for example, may be contracted by a ministry of education for the development and central management of a programme but this is likely also to involve coordination or cooperation with any national accrediting agency, with curriculum bodies and possibly with public or private-sector broadcasting organisations. Cooperation with local colleges of education may be necessary for the supervision and management of the practical side of teacher education. The National Teachers' Institute in Nigeria depends on educators from local higher education institutions to supervise and assess their trainees' practical teaching at least three times annually during the four-year course. The China TV Teachers College provides core courses for its students but depends on Provincial Radio and Television Universities or other local educational institutions to supply learner support and local organisation, including the enrolment of students and management of the course. In practice, the whole organisation and balance of the course components is dependent on local conditions and can, therefore, vary considerably in quality. Mixed-mode delivery systems can involve a complex range of partners. The MIITEP programme run by the University of Malawi has a college-based and a distance-mode phase. During the college-based phase, teaching practice is assessed by teaching college tutors while in the distance phase, trainees are assessed by the host school's headmaster four times a week, regional supervisors (from local colleges) twice a term and college tutors five times during twenty months.

Partnerships tend to be fragile especially where different partners could, if they chose, replace each other. They are stronger if their functions are quite different, as, for example, where one partner has a mechanism for developing material and another for accreditation but with no overlap between them. The idea of partnerships has been driven by three forces: the shift towards greater decentralisation, an increase in school-based teacher education and decisions to integrate distance education and conventional approaches. While the benefits, and sometimes the necessity, of partnerships are obvious, they present management difficulties and

> as might be expected, have functioned with varying degrees of success. The complexity, time and cost of managing these crucial relationships with partners tend to be underestimated at the outset, especially when several colleges and regional or district authorities are involved. Furthermore, consistency of quality is not easy to achieve in large geographically dispersed programmes with decentralised field operations, which also need to be responsive to local conditions. Problems in managing the system revolve around issues of responsibility, role definition, accountability, location of decision-making, communication and the control and co-ordination of part-time support staff.
>
> Robinson, 1997: 126

Programmes which appear to have been most successful at achieving effective articulation and channels of communication are those that are very systematic in their planning and spend time, ahead of implementation, in identifying needs, on the basis of consultation and among a wide range of stakeholders. This seems to be symptomatic of distance-education programmes and initiatives which have been freed from a pressing imperative of going to scale; which, instead, have recognised the importance of building up a consolidated base as a prerequisite for effective delivery. Key elements seem to include strong programme direction

focused on strengthening co-ordination between partners, an internal research and feedback capacity and a concern to pay equal attention to the development of central and decentralised capacity. In India, for example, a district-based programme for the development of primary education has used open and distance learning alongside other methods of teacher education. It has combined strong decentralised decision-making and management with unequivocal support, if not direction, from the ministry. This support has opened up access to existing state teacher education structures, resources and channels of communication at different national, state and local levels.

In some cases partnerships have gone beyond frontiers. In West Africa, for example, the programme to train head teachers in Burkina Faso was able to draw on resources from educators throughout the region. Teacher education in the Caribbean draws on regional resources through the University of the West Indies, which is owned by the governments of the region. In a recent development, teacher education in Dominica and St Lucia has been supported by a collaborative project with Canadian universities. External support and exchange (beyond funding that we look at in chapter 6) may make it possible to:

- get information about similar activities elsewhere: international agencies including UNESCO and the World Bank publish information about open and distance learning while a number of information agencies have specialist interests in the area (see Annex);
- share teaching materials with other institutions or acquire material from elsewhere: both the Commonwealth of Learning, in the Commonwealth and CIFFAD in francophonie have policies and programmes to encourage such sharing;
- get professional advice or consultancy on particular specialisms in open and distance learning: consultants have often been used in planning and development phases;
- seek specialist education and training: programmes in the practice of distance education have been provided to learners internationally by, for example, Indira Gandhi National Open University, Deakin University in Australia and the University of London among others;
- enrol on courses internationally.

This last has got increasing international attention with the development of e-learning and the promise that internet-based teaching will share the world's educational resources and make distance education more widely available than ever before. Hype has reached beyond sensible hope. While there have been a handful of programmes that use the new technologies to deliver teaching across frontiers, as through the African Virtual University for example, little of this material has been designed for teachers and much of it has amounted to the delivery of lectures over a long distance rather than the creation of an educational programme. As chapter 5 explains there are serious limitations on the capacity of the internet to meet the needs of students internationally while the most demanding issues for the planner are often about student support and local classrooms, not about the development of impressive teaching materials or their delivery. Materials to support teachers are becoming available on the internet; both UNESCO and UNICEF, for example, have websites for this purpose.

In exploring the possibilities for international cooperation the planner will want to define the terms of the cooperation and is then likely to be guided by seeking a balance between the qual-

ity and economy that may be achieved by the use of external resources and the need for teacher education to match its national or local culture. In relation to teaching materials, for example, it may be possible to find high-quality materials developed elsewhere that promise good results in, say, mathematics. It is less likely that a course on classroom interactions, or relations between the home and the school, will easily travel across national or cultural boundaries. (Many educators lean towards the cautious here: while textbook publishers produce and distribute the same book to meet needs in half a continent, distance-education managers are more reluctant to use or adapt something produced even in a neighbouring territory.) Where whole teaching programmes are available across frontiers, these questions about cultural appropriateness are accompanied by issues about accreditation and recognition, and about local and national capacity building. As and when internet courses become more fully developed, educational planners will increasingly need to decide how far to recognise qualifications, obtained outside their jurisdiction, and how far their availability helps or constricts national development.

There are increasingly important regional developments in open and distance learning. The project in Burkina Faso is one example. Within the European Union, the European Commission has encouraged cooperation in all areas of education through open and distance learning and the use of the new technologies. In southern Africa there is a long history of cooperation, including the cooperative development of teaching materials for distance education. From the planner's point of view, regional possibilities may look more fruitful than wider international cooperation, especially if there is a history of educational cooperation within the region.

4.5 Who does what in each of the models or partnerships?

Whether a teacher-education project us run essentially by a single organisation, or through a partnership between several of them, decisions are needed about the allocation of functions to different members of the partnership. In table 4.2 we examine the location of the functions identified above in various different models and structures.

The seven programmes included in the table demonstrate the extent to which teacher education at a distance usually involves cooperation between partners. Perhaps the National Teachers' Institute in Nigeria has the greatest degree of autonomy in its work as a federal institution, with power to run its own examinations and award qualifications, and the capacity to work throughout Nigeria. But, not least because of the scale of the country, it needs to work with other institutions to provide the limited supervision it can undertake of teaching practice. Another institution with considerable autonomy, OLSET, has fewer links with other agencies than most in the table but a consequence of this is that it is not able to have the close contact with learners required for more formal courses. Nor is it involved in award of qualifications. At the opposite extreme, in terms of autonomy, is the District Primary Education Project in India which was designed both as a cooperation between a range of different institutions at federal, state and district level and as one in which open and distance leaning was integrated with conventional teacher education.

The effective management of open and distance learning demands some central management of planning so that materials development, production and distribution is often run from the centre; student recruitment and some student support may often rest there. Collaborative arrangements are most often needed for the supervision of classroom practice and for

Table 4.2: Distribution of major responsibilities within individual distance teacher education programmes

Location of responsibility	*Certificate with School Experience, Belize*	*MIITEP Programme, Malawi*	*PGCE, Open University, UK*	*DEP-DPEPII, IGNOU, India*	*English in Action, OLSET, South Africa*	*A-Plus, Brazil*	*National Teachers' Institute, Nigeria*
Governance, planning, management	Ministry of Education and Belize Teacher Training College (BTTC)	MoE	OU guided by Teacher Training Agency (TTA)	Collaboration of national, state and district agencies with management decentralised to districts	OLSET	Consortium of private-sector and ngo agencies	NTI
Funding	Government	Government	Government	Government	Donor	Private sponsors	Government, student fees
Materials development and production	BTTC	University of Malawi	OU with BBC for broadcasts	Indira Gandhi National Open University (IGNOU) in collaboration	OLSET	TV-Futura with Community Mobilisation Network (CMN)	NTI
Distribution: material reproduction and distribution	BTTC	6 Teacher Training Colleges	OU - BBC	IGNOU in collaboration	South African Broad-casting Corporation, community radio stations, OLSET	National educa-tional channel and local re-broadcasting	NTI regional offices in 36 states
Teacher trainee recruitment	BTTC	District Education Officers and TTCs	OU	Shared between IGNOU Delhi, IGNOU regional centres, District Institute of Education and Training (DIETs)	OLSET district coordinators	TV advertising and CMN	NTI regional offices
Tutoring and counselling student support	District Education Centres, BTTC, field supervisors	District tutors	School-based mentors and OU tutors.	Local and district coordinators	OLSET district coordinators	CMN and school coordinators	NTI
Teaching practice supervision	District classroom teacher-supervisors	College-based phase: college tutors. Distance-mode phase: head teachers, regional supervisors and college tutors	School-based mentors	School-based	Occasional by district programme supervisors	None	Limited, by staff of teachers' colleges
Assessment or accreditation assessment and evaluation of learners	Level 1: MoE Level 2: Joint Board of Teacher Education	Malawi National Examination Board	Certificate awarded by OU. Recognition as teaching qualification by TTA	IGNOU	None	None	Accreditation: National Commission for Colleges of Education. Teaching practice externally moderated by mainstream teacher education colleges

accreditation. The British Open University, for example, which has the capacity to undertake most of the functions, set up an extremely decentralised system for support of its certificate students, where mentoring became the responsibility of individual schools throughout the country. In both Belize and Malawi supervision of classroom practice was devolved from the centre to the staff of teachers' colleges. The two nongovernment programmes in Brazil and South Africa were not able to provide regular supervision. In these examples, responsibility for accreditation tends to rest partly or wholly away from the main distance-teaching agency. Even in the British example, where the university has the power to award degrees and certificates and does so in this case, the recognition of the certificate, as something that gives the holder the status of a qualified teacher, rests outside the university. In Belize issues of accreditation take the institution outside national frontiers: responsibility for level one of the certificate rests with the ministry but for level two with the Joint Board for Teacher Education, based at the University of the West Indies, and responsible for teacher education outside Belize as well as within.

Two lessons emerge for the planner. First, it is often possible to find an agency with capacity in some areas of teacher education at a distance within the educational system. You do not therefore have to do everything on your own and, at the planning stage, it is worth exploring where different responsibilities can best lie. Second, collaboration tends to be difficult and demands links at various levels within the organisations for smooth running and the resolution of conflicts. The links may be particularly difficult to articulate in large, federal, countries where resources may be needed at federal, provincial and district level. At the other extreme, open and distance learning may stretch the capacity of small states, with little experience in open and distance learning, and relatively few potential writers or tutors in any one institution.

There is, of course, no ideal or universal model for cooperation between agencies and the allocation of functions between them will be shaped by local needs and circumstances. What is common is the need to identify where the location of all the functions needed for effective distance education, to agree on shared or divided responsibilities where they fall to different parties, and to ensure that funding for the different elements is available and its distribution seen to be equitable. Transparency will buttress equity.

4.6 Who should do the planning?

The answer to this question depends on the organisational model chosen and the location of the initiative to use open and distance learning.

The main general principle is to involve all stakeholders. In most jurisdictions the support of a ministry of education is crucial for teacher education and it may also be necessary to consult with a teachers service commission, if it has a role in the employment of teachers, and any accrediting agency. Teachers associations and unions have a role to play both in planning and in considering the effects of teacher-education programmes on their members' conditions of service and opportunities for professional advancement.

Many programmes of distance education have made extensive use of external consultants. In some cases - though most often for the establishment of new open universities - international planning commissions have been established in order to bring together different national approaches. In others, consultants with a particular specialism have been brought in to advise on technical aspects of open and distance learning, often in materials production and in evaluation.

General advice is difficult other than to recommend using local resources, looking for a combination of people who each know about some aspect of what is to be done, and a strong degree of scepticism about advice form outsiders.

4.7 Planners' guidelines for choosing between the options

We can sum up the argument of this chapter briefly.

- Work within a policy framework that ensures your programme fits its national context and, where appropriate, its regional or international one. This may well involve looking at issues of communications policy as well as of educational policy.
- Identify the range of functions you need for your educational purpose and audience and make a dispassionate analysis of where these functions should be located and who should undertake them.
- Establish the strongest possible links between open and distance learning and conventional teacher education.
- Consult widely and ensure the support of stakeholders, establishing a system for continuing contact with them.
- Seek regional and international cooperation insofar as this fits with your aims.
- Consider what kind of partnership is necessary for your work and what strengths different agencies will bring to it.

5. What technologies can we use?

We stressed in chapter 2 that a range of technologies is available and that open and distance learning is not limited to correspondence lessons - old-fashioned and boring as they sound - or to the internet - exciting but often unrealistic especially in many developing-country contexts. To choose between technologies we need to look a their strengths and weaknesses, to ask whether the infrastructure is in place to use them, and to examine the costs.

There is no single answer to the question 'which technology is best?' Indeed, one starting point for choosing technologies is to recognise that media do not differ in their effectiveness. Of course a particular subject, or a particular kind of learning, may lend itself to a particular medium; print is not ideal for learning the pronunciation of an unfamiliar language and following a radio programme is not the easiest way to learn how to strip a carburettor. But a long line of research, and much practical experience, has shown that where you can compare different media for teaching the same subject matter, there are no significant differences in teaching effectiveness between different them (Clark 1983). Intuitive views about the superiority or inferiority of any one medium need to be treated with caution. There is experience of using radio for teaching mathematics, for example, while it has been seen as having advantages over television for some approaches to teaching art: you cannot see teacher's painting and copy it. The result is that we can choose our technologies on grounds such as their appropriateness, convenience and cost, reassured that many different combinations of technology are likely to be effective. There is some evidence to suggest that combinations of media are likely to be more effective than any single medium. Practicalities buttress this argument: if something is available both on the radio and in print then you have an alternative if you miss the radio programme or if the printed document does not arrive. A careful blend of media, drawing on their individual strengths and minimising their individual limitations, is likely to produce the best results.

5.1 What are the choices?

Within open and distance learning, technologies are used for two contrasting purposes: to distribute teaching material and to stimulate learning by means of one-way or two-way communication. An appropriate technology needs to be found to distribute material to students. In the case of physical teaching material, such as books or audio cassettes, material has to be carried direct to students or to a point from which they can collect it. It may be possible to use existing channels of communication with teachers for this purpose, or to rely on the post, or to set up a dedicated service. Broadcasting, by radio or television, videoconferencing and computer communication all offer means of delivering teaching material to learners without these physical arrangements.

Teaching involves more than distribution. Well-designed printed materials, cassettes, or broadcasts are usually designed to promote learning, often by stimulating an active response from the learner. In choosing technologies, therefore, the policy maker has to consider not just how materials will be distributed but how they can be designed to facilitate learning and to resolve tensions between these two aims. Television, for example, may look the best medium for showing a simulation in engineering but is inappropriate if the only available television hours are at an inconvenient time or on a channel which does not reach most of the learners.

If open and distance learning is to involve more than providing resources to teachers, it also demands two-way communication. This may be immediate, in the case of telephone tutoring or videoconferencing with a two-way audio circuit, or delayed, typically through the use of written assignments. New technologies are reducing the lengths of the delays here: it is sometimes possible for learners to send assignments to a tutor by fax or email. Two-way communication is also possible, of course, through face-to-face contact. In making decisions about technologies we need to consider not just those that are mediated but also the role of face-to-face contact if this is part of the distance-education system we are creating. Thus, the planner's decisions are usually about a set of technologies, chosen according to their appropriateness for the subject matter and the audience, and to their cost. The Open University certificate programme, for example, used printed material as the main means of presentation of the subject matter and distributed this partly through the mail and partly by internet. It was a specialist course, aiming at a much smaller audience than a foundation-degree course, and was not therefore able to use a large amount of television. It used a combination of face-to-face sessions and computer conferencing for dialogue.

A classroom teacher, writing on a blackboard, and getting questions from students does all three at once. In open and distance learning we may use print to present material, the mail to distribute it, and face-to-face tutorial sessions for feedback and dialogue.

Planners are likely to be able to choose between some or all of these technologies.

- Print remains the staple of much open and distance learning, providing a permanent document that is convenient to use. Distribution may be physical or electronic. Print allows two-way communication but only with a delay.
- Radio has been widely used for formal and informal teaching, helping to bring teaching alive, and overcoming the problems of physical distribution that may limit print.
- Television has obvious merits but tends to have costs ten times those of radio.
- Cassettes have been used for similar purposes to radio, overcoming the problems of timing that limit the use of broadcast radio.
- Videoconferencing allows specialists at a centre to reach scattered audiences provided they have the equipment to take part. Many videoconference systems allow for one-way video and two-way audio so that, for some of the audience, it becomes a two-way medium.
- A variety of computer-based technologies have been used including the distribution of sample lesson plans on cd-roms, setting up exchanges by computer conference between teachers' colleges, encouraging the interactive use of computer-based learning materials, encouraging the use of web-based materials, and using computer conferencing to encourage discussion among learners.

In making choices the planner is likely to be influenced above all by the convenience of the learner, the cost, and the need for a culture of maintenance. It will be necessary to maintain hardware and software: physical equipment needs maintenance and access to specialist staff and supplies. Software will need updating and improving on a regular basis. Unfortunately many programmes have neglected the importance of maintenance or of budgeting for it, referred to in chapter 6 below.

In table 5.1 we expand on this brief summary, identifying the strengths and weaknesses of a range of technologies for teacher education.

Table 5.1: Media and technology uses in teacher education

Function in teacher education and development	*Strengths*	*Limitations and requirements*
PRINT		
Provides information, concepts and examples in a structured way. Can teach academic subject content, education theory and knowledge about pedagogy. Can link subject knowledge to school curricula and teaching methods. Can combine expert input with teacher-produced materials. Can show teachers' lesson plans, extracts from teachers' diaries and accounts, diagrams of classroom or equipment layout and examples of pupils' work. Can provide transcripts of teacher-pupil interaction for analysis. Can provide guides to action for teachers (e.g. in implementing new curricula or doing action research).	A learning resource in a permanent form, permitting individual or group use. A portable and convenient resource. Copies can be used by more than one teacher. Good for explaining theory and concepts and providing detailed information. Can include a variety of source materials. Can be low cost but scale affects costs. Provides a common standardised resource. If well designed, can combine effectively with other media. Can play a variety of roles, from lead medium to supplementary resource.	Physical distribution of the materials can be slow or difficult in some contexts. Fixed content, not quickly responsive to sudden changes in school curricula or educational legislation or teacher education curricula. Requires relatively lengthy preparation time and team-working by those producing the materials. Cannot show teaching-learning interaction at work in real time in classrooms. As a standardised resource, it may not meet the needs of minority groups or languages, or regional variation. A one-way medium. Interaction is possible with the material, with the school environment applying ideas from the materials, with other teachers in local groups or with tutors.
RADIO		
Provides topical information and current news for teachers. Illustrates text content or addresses educational issues in a lively way, using authentic voices and varied sources (teachers, policy-makers, parents, curriculum developers, education experts). Can raise awareness about education in a wider community audience. Offers a forum for teacher exchanges (teachers' voices). Can reach all or most teachers at the same time to support faster and more widespread information dissemination.	Often widely accessible by teachers Can be responsive to teachers' needs within a short time-scale. Provides immediacy in the materials. Can be very low cost per teacher. Equipment for production can be simple, relatively inexpensive and durable. Use of local radio can increase the relevance of programmes and respond to local needs or languages. Programmes can take a variety of formats and fulfil different purposes: a flexible medium. Can integrate effectively with print.	Ephemeral or impermanent, content lost unless recorded. Scheduled transmission times may be inconvenient. Has a poor and unglamorous image. Needs teamwork and collaboration. when integrated with other media (can be difficult to achieve in practice). Often limited by regulatory framework for broadcasting or lack of enabling policy for educational use. Commercialisation of radio increasing costs for production or transmission. Weak in conveying detailed or conceptually dense material. One way medium.
INTERACTIVE RADIO		
Provides well-structured lessons for teachers and pupils alike in a range of subjects. Compensates for weak teacher-knowledge and can improve it at the same time.	Has proved effective in several contexts for teaching English as a second language, maths and other subjects. Can reach a mass audience at relatively low cost per learner. Can support teachers in subject knowledge and in demonstrating new teaching methods Structures active learning as part of the lesson Can provide models of lessons	Scheduling may be at inappropriate times. Depends on regular and reliable transmission facilities and broadcasting infrastructure. Cassette tapes can substitute but lose immediacy and need physical distribution. Needs skilled programme designers and structures for teacher support with training for them where interactive radio is new. A one-way medium. Interaction is with materials, with and between children in class and ideally with other teachers.

Table 5.1: Media and technology uses in teacher education

Function in teacher education and development	*Strengths*	*Limitations and requirements*
AUDIO-CASSETTE TAPES		
Provides illustrations through sound. Can give examples of concepts and theory. Can convey information. Can provide discussion in a more natural way than through text. Can provide detailed instructions (e.g. in using a computer or manipulating equipment). Can provide sequences of conversation for close analysis. Can be used as a teachers' 'talking newsletter'. Can provide models of pronunciation. Can act as a 'voice in the ear', to guide teachers through processes (e.g. learning to use a computer or observation tasks)	Offers a permanent resource for individuals or groups. Is relatively portable. Cassette players are often widely accessible by teachers Can be re-played, stopped and started at will by learner. Combines effectively with print, and can extend the use of radio programmes through recording for re-play. Is low cost to develop and duplicate. Can be a more intimate or motivating medium than print, if not presented as a single-voice long lecture. Provides good models in language learning and teaching, and sequences of natural conversation. Can demonstrate communicative approaches in language teaching. Teachers can contribute to tapes or make them. Can be used by tutors to give feedback to students.	Audio-cassettes can deteriorate over time. Sound quality can be poor if a chain of recordings are made or if the equipment is poor. Cassettes need good management (e.g. accurate labelling, storing, mechanisms for circulating among teachers). Can fail to stimulate active learning if used just to deliver lectures. Tape-editing time often underestimated. Needs skilled integration with print or other media. Content often needs designing differently from radio programmes. A one-way medium.
CD-ROM (COMPACT DISK-READ ONLY MEMORY)		
Provides access to information for teachers in text, graphics, audio and video form. Can provide information on curricula content and teaching methods.	Can store large amounts of information on one disk. Relatively cheap and simple to copy and distribute. Provides random access to content, so a particular segment can be located without having to rewind as in audio-cassettes. Can substitute for lack of access to databases where computers lack connection to Internet.	Requires a computer with CD-ROM drive and software to access the disk. Stores less audio material than audio-cassette tapes. More expensive than audio-tapes. Making CD-ROM interactive increases development costs.
TELEVISION		
Can reach a mass audience of teachers and the community. Can raise awareness in the community at large about educational issues and teaching. Shows processes in real-time or slowed down or in close-up (e.g. classroom interaction, language development, mathematical operations). Shows a variety of school and classroom contexts and teachers in action which teachers would not otherwise see, given the isolated nature of teachers' work. Gives teachers comparisons and benchmarks. Can show specialists or experts at work. Provides material as the basis of group discussion.	Can demonstrate real contexts and provide rich visual content. Can capture classroom realities. Can combine a variety of content (e.g. site visits to schools; interviews, dynamic simulations, and examples of teachers' work). Can be combined with other media. Can provide topical content.	High programme development costs and may be high transmission costs. But modest cost per viewer possible on large enough scale. Not always accessible to all teachers. Inadequate technical support at local level sometimes leaves non-functioning equipment. Often inappropriate transmission times for teachers. Sometimes replicates traditional lecture formats which fail to make effective use of the medium's capabilities. One-way medium. May foster passive viewing. Filming in schools requires considerable specialist skills and resources. Filming in studio classrooms is often easier but can lack authenticity.

Table 5.1: Media and technology uses in teacher education

Function in teacher education and development	*Strengths*	*Limitations and requirements*
VIDEO-CASSETTES		
Shows processes in real-time or slowed down. Shows a variety of school and classroom contexts and teachers at work which the viewing teachers would not otherwise see. Can provide separate segments for close analysis relating to different parts of the course materials, not only long sequences. Commercially-produced video-cassettes, for example, on child development or other educational topics, can be 're-purposed' for particular educational uses (segments selected and printed guides produced in relation to them).	Can be relatively low cost, depending on development costs and scale of use. Has some of the strengths of television but can be used in different ways for learning (under the control of the learner who can stop, start and re-play sequences). Can provide material for close observation and analysis, if teacher is guided either on the cassette or in print. Can be used by individual teachers or groups. Can be combined with print. Is a permanent resource. It can: support active learning with good instructional design; demonstrate teachers' beliefs and practices; stimulate discussion; show the realities of teaching in different schools and compensate for teachers' lack of access to other schools; show simulations and role play (e.g. in headteacher training) or children's work.	Requires physical distribution of video-cassettes and access to playback facilities convenient for teachers. Quality (picture and sound) can deteriorate if copies of copies are made, rather than from the master tape. The cassettes need good management (accurate labelling, storing, mechanisms for circulation). Their role needs to be carefully designed to embed them in the course materials or in relation to active learning, if they are not to be a marginal resource. Video may be poor technical quality (poor lighting and sound, one camera recording only the teacher (not the children) and poor educational quality (e.g. presentation of whole 45 minute lesson). Editing time is often underestimated. Needs professional makers to achieve good quality.
VIDEO USE IN MICRO-TEACHING		
Provides a means for student-teachers to observe themselves on recorded video in a teaching situation or simulation, and to get feedback on their performance through viewing the video and discussion with tutor and peers. Provides student-teachers with an opportunity for observing, interpreting and discussing the video material. Provides opportunities for observing and comparing the performance of self with others.	Is effective up to a point, in assisting student-teachers to appraise their own and others' performance and assist the initiation of reflective practice. Provides opportunities for practice and experiment followed by feedback; helps the student-teacher develop specific skills (such as questioning, explaining, managing time-on-task, setting up group-work, using a particular teaching method). A short amount of recording can generate a large amount of discussion and analysis (5-10 minutes of recording can generate at least an hour of analysis and feedback) with a skilled tutor. Gives attention to the individual student-teacher.	Is labour-intensive and small scale, therefore relatively high cost as a form of face-to-face teaching. Effectiveness depends on the quality of the tutor or facilitator, the preparation by tutor and student-teacher, the tutor's skill in facilitation and timing of feedback. Has been criticised as concentrating on isolated, decontextualised and specific teaching skills or competences rather than deep understanding. Requires a room to be set up appropriately as a classroom, with adequate lighting and equipment but can be relatively low-cost to set up. More difficult to do over a distance.
AUDIO TELE-CONFERENCING		
Enables real-time interaction among teachers and educators in different locations. Can bring together teachers, curriculum developers, specialists and policy makers in one event. Can be used for presentations and teaching sessions, discussions, course delivery (in combination with other media) and student support.	Can support development of teachers across large distances, enabling contact between groups. Is relatively easy to use (no large amount of technical know-how to master). Can be cost effective but depends on context and comparisons with alternatives. Can provide topical content at short notice more easily than print (has the immediacy (or more) of radio). Can be combined with video-conferencing (one-way video, two-way audio) to reduce video-conferencing costs and to provide interactivity where the infrastructure or budget does not support two-way video-conferencing.	Facilitating group discussion across a number of sites needs high levels of skills and preparation. Requires advance organisation, scheduling and coordination to make the event successful. Special equipment needed so that learners usually have to travel to venue. Costs vary in different countries, but can be cost effective when compared with alternatives. Requires adequate telecommunications infrastructure to function and ensure adequate sound quality. Requires additional materials or two-way graphics for some topics and subjects.

Table 5.1: Media and technology uses in teacher education

Function in teacher education and development	*Strengths*	*Limitations and requirements*
VIDEO-CONFERENCING		
Enables real-time interaction among teachers and educators in different locations. Can bring together teachers, curriculum developers, specialists and policy makers in one event. Can be used for presentations and teaching sessions, discussions, course delivery (in combination with other media) and student support. Can show a variety of visual materials to participants.	Can support development of teachers across large distances, enabling contact between groups. Can provide topical content at short notice more easily than print (has the immediacy (or more) of radio). Can make scarce expertise available widely.	Has high start-up costs; usage levels need to be high enough to recover them. Requires technical support, including at remote sites. Requires students to travel to venue; given the cost of equipping sites, these are likely to be less local than options using different technologies. Where teacher interaction is possible at the local or district level, video-conferencing is likely to be a more expensive option. Where teachers travel long distances to in-service events, the video-conferencing option may be more cost-effective. The added costs of the visual dimension may not provide matching benefits over audio-alone.
COMPUTERS		
Provides access to information on CD-rom and local databases. A means of preparing materials for teaching if consumables are available (e.g. cartridges, paper). Provides computer-based learning materials for teachers and pupils.	Can provide access to large amounts of resources for teachers to select from and use as appropriate in their own contexts or for their own development. Its use helps teachers to develop their own personal computer skills.	The quality of software or learning programmes is sometimes poor. Technical support is needed and may be scarce in rural areas. Access is sometimes restricted for teachers. Training for teachers may be too little, and too narrowly focused on using the computer rather than using it for teaching and learning across the curriculum.
COMPUTER COMMUNICATION		
Enables teachers to participate in larger professional communities, beyond their local ones. Provides access to databases, either on a local area network provided by the education authorities, or the Internet. Enables teachers to follow professional development programmes provided by remote institutions.	Can provide a wide range of multimedia materials, if the infrastructure (and bandwidth) permit. Supports a range of interaction, from formal to informal of varying group size. Can archive discussions for later use by other teachers. Allows teachers to participate widely and to exchange experience and materials in peer groups. Provides access to more sources of information and assistance, on topics from the specific ('How do I teach the new curriculum on environmental studies to Grade 3 children?) to more general educational topics.	Problems of access and cost in some countries. Requires an adequate infrastructure (electricity, telecommunications), affordable prices, supportive policy framework and investment of resources. Requires a change in perceptions and practices in teaching and learning (in contrast to common perception that having computer communications will of itself improving the quality of teaching and learning). If lengthy print materials are produced through downloading, this may increase costs per copy over those of centralised print production and shift costs to the teacher, school or district. Requires training for effective use (often neglected). Requires considerable technical support.

5.2 What about the new information and communication technologies?

While open and distance learning does not demand that we use the new, computer-based, technologies, they present enough opportunities for us to consider them separately. The development of computer links is beginning to blur the distinction drawn above between distribution and teaching. It is possible, through an internet connection, both to distribute material to learners electronically rather than physically and to teach them, by means of a computer program, or engage in dialogue with them by email or computer conferencing.

New communication technologies are being used with four different functions in teacher education, over and above their use as tools for the writing and production of teaching material. The first is simply to distribute teaching materials; from the educator's point of view it may make little difference if materials are distributed by post or by the internet, though the implications in terms of cost and convenience for the user may be very different. Second, in some cases electronic communications allow simulated two-way communication. This is the case where a trainee teacher interacts with a computer program instead of with a tutor; much early computer-based learning followed this model but it has been relatively unimportant for teacher education. Third, where computers are networked, or students have access to the internet, then computer-based technologies can be used for two-way or multi-way communication. Fourth, there is increasing diversification into resource-based, self-access teacher education in a variety of media. A range of dedicated websites have been created for the professional development of teachers. Wherever teachers have access to the internet, these sites can increase the exchange of materials and interaction between teachers and direct them to other teacher education resources, experts and professional associations.

Within teacher education, the new technologies have been used for two different purposes. One is training teachers to learn about information and communication technologies and their use in teaching as computers are introduced to schools. In many countries this is being done through face-to-face training programmes, often as part of initial teacher education. Some countries (such as the United Kingdom and Singapore) have developed policies which require all initial teacher education programmes to include compulsory courses in the technologies as a strategy for building capacity in relation to them. In other countries, no policy yet exists and teaching teachers about information and communication technologies is at best an option within teacher-education programmes.

The other role of information and communication technologies is as a means of providing teacher education, either as a core or main component of a programme or playing a supplementary role within it. In Costa Rica, for example, the ministry of education developed the use of the Logo computer program within schools as part of a programme of curriculum reform. Teachers colleges are beginning to experiment with the use of computer-based material to strengthen and broaden their curriculum. Both UNICEF and UNESCO are developing work of this kind.

While there is limited documented experience on the effectiveness of the new technologies for teacher education, the available evidence suggests that we can propose three lessons for planners, mainly about capacity building.

- First, the development of teachers' capacity in using the technologies cannot happen in isolation. Plans need to take account of the use of the technologies elsewhere in the

education system and in the wider environment. The technologies necessitate an appropriate technical infrastructure and funding to support it.

- Second, if the use of the technologies is seen as a function of teachers generally, this needs to be reflected in national policies and strategies and in the curriculum for both initial teacher education and continuing professional development.
- Third, while teacher educators are a key element in establishing the use of information and communication technologies in education, many teacher educators themselves lack skills and training in the use of the technologies or opportunities to apply and develop their knowledge and skills.

5.3 What are the prerequisites for each of them?

In choosing technologies we need to think both about their educational strengths and weaknesses, summarised in table 5.2 above, and about the prerequisites for their production, reproduction, distribution and use. If, for example, we want to consider using radio we need to ask who will produce the programmes, how they will be broadcast (by a local or national broadcaster, on what frequency and at what time, and at whose cost), and about their reception, exploring whether learners have access to radio and either mains electricity or an affordable supply of batteries. It is important to ask questions about prerequisites both at the centre and at the periphery: it is not enough to produce good materials if they cannot be distributed or, for lack of access or shortage of particular technical equipment, learners cannot use them. In Burkina Faso, for example, as one of the least developed countries with a scattered population, the infrastructure in place meant that it would be unrealistic to use any medium other than print for teacher education.

The scale, and organisational location, of the project or programme is likely to shape the answers to these questions. OLSET in South Africa has used radio for schools, at a modest cost per learner, because it is a relatively large country, using broadcasts in a single country, and with a national infrastructure that means many schools can use radio. In contrast, computer-based learning would not be realistic for its many rural schools. In Brazil and China the scale of teacher education is so big that it is possible for educators to have access to television through a non-government-private sector consortium in one case and a state-backed university in the other.

5.4 What do they cost?

In examining costs, we need to distinguish between total cost and cost per student or cost per successful student: as noted above, it is possible to justify the relatively high costs of a medium like television where student numbers are high enough to bring down the unit cost. Then, in examining each medium or technology, it is useful to ask three sets of questions. First, we need to distinguish between the cost of setting up or initiating work in a particular medium from its running costs. Next, we need to consider how far the running costs are fixed or vary, usually with the number of students. And, third, it is useful to distinguish between the costs of producing teaching material, the costs of reproduction, of distribution and of reception. At each stage the planner is likely to have another practical question: who pays. For some of the costs may fall on the institution, some on national, regional or local government, and some on the individual student. In table 5.2 we summarise the nature and location of costs for various media, looking at the same time at their possible use for one-way or for two-way communication.

Table 5.2: Nature and location of some costs

Medium	*Features*	*Location of expenditure*		
		Reproduction	***Distribution***	***Reception***
Print	Initiation costs can be modest Origination costs fixed; reproduction costs vary with number of copies Level of costs differ widely according to quality of print Can be two-way if assignments included	Institution	Institution	None
Television	Initial installation cost high Production costs fixed Distribution costs fixed for given transmitter coverage Unit cost is likely to be high below 200,000 students then to rise again above 1 million One-way	n/a	Institution but may be shared with broad-casting agency	Local institution for group study or student if individual to provide set
Radio Audio/video cassettes	Installation cost relatively high Production costs fixed Distribution costs fixed for given transmitter coverage Cost generally one tenth that of tv One-way	n/a	Institution but may be shared with broad-casting agency	Student (e.g. batteries)
Videoconferencing	Significant installation costs at centre and at each location Production costs may be low and are fixed Distribution costs depend on means of trans-mission May be two-way if audio feedback link is included	n/a	Institution	Institution
Production of computer-based teaching material	Some initiation costs Production cost likely to be very much higher than for print Distribution costs dependent on choice between cd-rom and internet distribution	Institution if cd-rom	Institution if cd-rom	Learner
Computer conferencing	No production cost. Distribution costs dependent on cost of access to telephone network Running costs for institution vary with num-ber of students Multi-way	n/a	Institution/ Student	Learner

The actual costs of a particular technology will depend on local circumstances and it is not possible to set out an international set of standard prices. Even within a single medium or technology costs can vary widely: sophisticated television documentaries have far higher production costs than teaching programmes which consist of a talking head and the equivalent of a blackboard. But comparative costs show a fairly steady pattern. Research carried out within European higher education suggested the ratios set out in table 5.3. This analysis took as its starting point the fact that teaching material almost always started with a written text so that one could look at the comparative cost of producing material in a variety of formats as compared with the cost of preparing print. These figures are just for production: they do not take account of the reception costs that fall on the learner and leave aside the question of scale already identified.

Table 5.3: Comparative production costs of some technologies

Medium	*Cost per student learning hour in 1998 US$*	*Ratio to print cost*
Print	825	1:1
Radio	24,750 to 44,550	1: 50
Television	148,500 to 206,250	1: 180 to 250
Audio	280,050	1:35
Video	29,700 to 138,600	1:35 to 1: 170
CD-rom	33,000	1:40

Source: *Hülsmann 2000*

Costs for the new information technologies are only beginning to become available. Here we need to distinguish between the costs for preparing teaching material and for tutoring students on line. American research has indicated a very wide range of costs for preparing material that is presented by computer, with the lowest where this is simply using the computer to present print and the highest where designers move into simulations or virtual reality. The figures, shown in table 5.4, vary from $6,000 for a simple outline or $12,000 for a text up to $1,000,000 for a three-unit course. The beginning experience of online tutoring suggests that the costs of this may put strains either on budgets or on tutors' workloads, mainly because there is no ready way of controlling the time tutors spend responding to their students or the demands that students put on their tutors. If there is a computer conference, tutors may feel a responsibility to monitor its contents, regardless of the length of material placed there by students. Where students can contact their tutor by email, they tend to demand more of their tutors' time than when they are submitting a conventional assignment. In the absence of good cost studies of online teaching the only advice for the planner is to welcome the pedagogic advantage of being able to have ready contact with distant students while seeking a way of containing the costs.

Table 5.4: Cost of developing a three-unit internet course 1998

Type of teaching material	*Cost in US$*
Course outlines and assignments	6,000
Text	12,000
Text with reference materials	18,000
Text with reference materials and images	37,500
Audio and video	120,000
Simulations	250,000
Virtual reality	1,000,000

Source: *Arizona Learning Systems 1998*

5.5 Planners' guidelines for choosing between the options

International experience suggests that the choice of technologies should be guided by five factors:

- Convenience and availability for learners are all important: we need to ensure that the technology does fit with learners' needs and realities.
- Technology needs to be appropriate for the curriculum and for teaching effectiveness. While arguments based on minimising cost, and keeping technology as simple as possible, might often lead us to print, this is not ideal for all purposes and has limitations in terms of motivating students.
- Technical backup and support needs to be in place: it is no good relying on a technology if it cannot be used by students; many videocassettes sitting on shelves in remote villages bear witness to this. Maintenance needs to be planned for.
- The costs need to be affordable for the institution and for the learner.
- There are particular difficulties in achieving a balance here within small states where the use of sophisticated technology may force educators into dependence on external sources with the danger of cultural hegemony by large countries and large international companies.

In general the challenge is to find an appropriate trade-off between quality and cost, justifying any move away from the simplest and cheapest technologies but resisting untested arguments that they are the only ones to be considered.

6. How can you fund it?

Much education, at primary, secondary and tertiary levels has conventionally been funded by government and government funding has been the norm for many programmes of initial teacher education and training. But pressure on government funds has led many countries to explore alternative sources of funding so that education is also funded from four other sources: from student fees, community support, the private and nongovernment sector, and from donors and funding agencies. Programmes often receive funding from a combination of sources: teacher education at a distance in both China and Nigeria, for example, is funded partly by government, partly by student fees. In Brazil, as described in chapter 3, a programme of teacher education has been funded by a combination of private-sector and nongovernment funding so that the heavy capital costs of television are met by the private sector.

Many governments have been willing to fund not only initial teacher education but some programmes of continuing professional development, especially for curriculum reform or for some upgrading programmes in countries trying to raise the minimum standard of teacher qualification. Teachers are, however, often expected to pay fees where they enrol on a course of continuing professional development which will benefit them in terms of career advancement or salary increment.

Some parts of a programme may be funded by government but not through a ministry of education. If education can get access to state broadcasting time and facilities, at a nominal charge or free of cost, then broadcasting transmission costs do not fall on the ministry of education budget.

6.1 What are the consequences of each choice?

There are trade-offs between each of the options. In some jurisdictions there may be an expectation that government should meet the full costs of teacher education because of its importance for the quality of the education service as a whole. Total funding from a ministry of education may hold down available funds and will give the ministry - and its finance section - strong direct control over the programme. There may therefore be pressure on the part of the institutions concerned to seek funds outside the ministry or to pass on some of the costs to the learners. On the other hand, the imposition of student fees may hold down enrolment, discourage students, and is likely to be socially regressive. There is little reported experience of the use of community resources in teacher education of this kind. The nature of private-sector and nongovernment involvement is culturally determined: this sector is involved in the projects in Brazil and at OLSET in South Africa but there are significant differences between the two. The provision in Brazil is through funds generated within the country by an established consortium, while OLSET is dependent on external, donor funding and despite its successes, seems unable to attract government funding. The freedom of action and non-bureaucratic structure that marks effective nongovernment organisations has to be balanced against difficulties they may face in integrating their work with regular state activity and ensuring its sustainability.

External finance from funding agencies may also present problems of sustainability. Many funding agencies have been willing to meet capital costs, and to fund pilot projects, but expect governments to meet recurrent and continuing costs. Course development has sometimes, but not always, been treated as capital expenditure even though its major cost element is likely to

be for staff time. The trade-off here is often between initial freedom of action, bought with external funds, and long-term integration and sustainability. In seeking that trade-off, it is unwise to brush aside questions about how to maintain a programme or project.

The best advice may be to be open-minded about the options and consider the possibilities of funding different elements of the programme from different sources. Box 6.1 shows how this was done in Malawi.

Box 6.1 The Malawi integrated in service teacher education programme

This project in Malawi brought together funding from a variety of sources including the ministry of education, the World Bank, and the German aid agency GTZ. While some costs undoubtedly fell on the learners, they were not charged fees so that there is no contribution from them shown in this table.

Area of work	*Funding Source*
Planning and initiation	MoE (including 6 professionals from the Teacher Development Unit, experts from Malawi Institute of Education, the University and Colleges of Education). GTZ - long-term expert in logistics.
Materials development	World Bank loan - curriculum review, 5 handbooks and other learning materials. GTZ- expert in training and materials development, office support costs.
Materials reproduction and distribution Reception costs Student support and classroom practice	World Bank - printing of training material. GTZ - office support costs and computer equipment. n/a GTZ finances activities for pedagogic support (zonal meeting and school-based supervision) plus vehicles for transport. Colleges (college-based training by tutors, visiting college practical teaching supervisors) conventionally funded by MoE (central MoE for tutor salaries, Regional MoE for accommodating students during college-based phase). MSSSP - transport for PEAs visiting schools.
Training and capacity building	World Bank loan to Malawi (training trainers, PEA's, headteachers). Malawi School Support System Programme (MSSSP) - Training Development unit.
Maintenance	GTZ - long-term expert in monitoring and evaluation.

6.2 What sort of funds do you need?

Funding is likely to be needed for costs of several different kinds and at different stages in the development of a project or programme. While open and distance learning does not require the building of colleges and halls of residence, it does require some capital investment, for the development of systems and materials, well in advance of student recruitment. This is a critical point which is not necessarily understood in new projects and which can create political and presentational difficulties: once a project has been approved and expectations aroused, it is difficult for planners to insist on a development period of one or two years when, to the outsider or the potential learners, there is little sign of action.

Different activities may be funded from different sources. Costs are likely to be incurred for initial planning, the development of materials, their reproduction and distribution, their reception, student support, training and capacity building, and maintenance.

There are costs associated with initial planning and initiation of teacher education at a distance, even if these amount only to the use of existing capacity within the educational system. These costs have often been found from regular government budgets. Where programmes are developed with external advice, external funding may be available for planning and initiation. The Asian Development Bank, for example, has funded explorations of the use of open and distance learning for teachers and for initial planning. Agencies like the Commonwealth of Learning have often been involved in the development of plans, sometimes with external funding,

The development of teaching materials, as already noted, requires expenditure before students are enrolled. A variety of strategies have been used for funding this, depending on the organisational structure chosen for the programme (see chapter 4). Difficulties can arise where teachers or trainers are already in government employment, working in education, but asked to develop materials as an extra or different job. In some cases regulations do not allow them to be paid extra; in others sanctions are impossible if they do not deliver the material. Strategies need to be put in place that allow for the effective development and editing of material that is fair to staff and ensures materials are delivered on time (see Perraton and Creed 1999). Funds for writers are not enough: editing of materials, to ensure their educational effectiveness and get them to camera-ready state or undertake desktop publishing, is likely to cost as much as their initial writing.

The costs for reproducing and distributing teaching materials may fall in various places. If material is broadcast, transmission costs may be met by the broadcasting agency. If learners have to collect materials, some of the costs of distribution fall on them. Where materials are distributed electronically then, once the capital investment has been made, costs to the initiating institution may be negligible.

Costs for reception of materials for an individual learner often fall on the learner, who may be expected to have a radio or, in an industrialised country, to obtain a computer. Where the distance-teaching system brings learners together there may be costs for the development or supply of specialist centres or equipment or negotiations for their use by learners (e.g. the supply of radios, development of videoconference facilities, the use of telecentres).

There will always be costs for the continuing support of students and arrangement for supervision of their classroom practice (where it is likely to be possible to use existing resources within the educational system, providing that the costs, including the opportunity costs, of this are acceptable). In the case of courses undertaken by individuals, in the interest of their own career development, these costs may be covered by a student fee. This element is perhaps the most significant in calculating the recurrent budget and identifying funds for it: it is both a recurrent cost and one that does not allow for economies of scale.

Funds will be needed for training and capacity building, especially as an unfamiliar project is being set up. As with initiation costs, this is an area where funds have often been obtained both from government and from external agencies. These are not, however, once-for-all costs: just as we argued for continuing professional development as an aim of teacher education so it will be necessary for those working in a specialist open and distance learning institution.

Finally, funding is not a once-off activity: maintenance of the whole system, of any equipment, and of teaching materials all incur costs. The costs of maintaining teaching materials, in particular, are often under-estimated at the outset: the effort needed to get them created the first time diverts attention from setting up a programme of continuing revision, improvement and updating.

Table 6.1 shows where resources have most often been located for these activities.

Table 6.1: Activities and resources

Activity to be funded	*Type of funding required*	*Comments on possible sources*
Planning and initiation	One-off	May be from MOE funds but often also from funding and international agencies
Materials development	Funding mainly for staff time but can be treated as capital where materials are used over several years	Upfront funding usually from MOE, ngo or funding agency grants. Funds for revision and updating also required
Materials reproduction and distribution	Recurrent	Regular expenditure that may be recovered from operating grant or from student fees. Where distribution is through public broadcasting, government mail, or by internet, costs may be borne on other budgets.
Reception costs	May be some capital (e.g. supply of radios, development of videoconference facilities) but recurrent costs then arise	Initial funding may be from one-off grant (e.g. funding agency) Individual recurrent costs (e.g. maintenance of radios, computers) likely to fall on individual learner/centre
Student support and classroom practice	Recurrent	Regular expenditure that may be recovered from operating grant or from student fees. It may be possible for some costs (e.g. for deployment of school or college staff to support students) to be met from other institutional budgets
Training and capacity building	Recurrent	Heavy initial expenditure needed, especially where project is unfamiliar to those working in it, but continuing expenditure then required
Maintenance	Recurrent	Continuing expenditure that is often neglected (especially for materials updating) and needs to be built into budgets for previous areas

6.3 Planners' guidelines for choosing between the options

Distance education for teachers has a patchy record, with many programmes started but abandoned, often because short-term funding arrangements could not be sustained. The record suggests several guidelines.

- The development of open and distance learning for teachers needs to take place within the framework of policy for teacher education generally so that questions about long-term funding are addressed at the outset.
- Even if it is assumed that the bulk of funds will come from government, it is worth considering the options of using alternative sources of funding, examining the trade-offs between them.
- In considering what, if anything, students should pay towards a course or programme, it is necessary to balance questions of equity and access (which suggest holding down student fees), questions of motivation (where learners may have medium-term rewards in terms of promotion), and questions of quality (which may demand expenditure above all on student support).
- Remember the maintenance issue.

7. How do teachers learn practical skills?

In chapter one we distinguished between four functions of teacher education. In one sense, all teacher education needs to be oriented towards the ways in which teachers support children's learning and so to the fourth of those functions, of strengthening teachers' practice in the classroom. But there are differences in the emphasis that has been laid on this function between different programmes. Where these are concerned simply to raise teachers' background education, or where they are designed to help experienced teachers learn about new subject-matter, classroom activities may be downplayed.

In asking about practical skills it is therefore legitimate to ask how far this is part of the role of a distance-education programme. The question is critically important for the planner for economic, logistical and educational reasons. The economic ones follow from the fact that the supervision of classroom practice is likely to be labour-intensive and will not show economies of scale. Indeed, if supervisors are to travel and visit teachers in their schools, then the costs of travel may be a significant part of the budget. The logistics are inevitably complicated and likely to involve a partnership of the kind discussed in chapter 4.4; a distance-teaching organisation will seldom itself have the staff to undertake this work so that it is likely to involve other partners who in turn need management, support and often training. From the educational point of view, changed activities within the teacher's own classroom are, as we have argued, of the essence of teacher education. This has implications not only for any teaching-practice component within a course but for its structure and content as a whole. Even theoretical elements of a course, including materials presented in print or on radio, can be designed so that they relate to classroom practice. Open and distance learning has a potential advantage in terms of integrating theory and practice where it enables practising teachers to raise their skills by study at a distance and it is worth seeking strategies that will maximise that advantage.

Conventional as well as distance-education programmes have, with varying success, confronted this need to turn what teachers know and believe into what they do to support children's learning. Many conventional programmes fail to attend to this and some produce teachers who are formally qualified but have had only a token or minimal supervised school experience. In some countries, practical teaching forms no part of the final assessment of teachers. The issues for a distance-education provider are about managing the supervision and assessment of students in distant locations and how to design materials and activities in ways which integrate knowledge or theory with practice. In the cases set out in chapter 3 we have examples of different strategies: a support structure for local action-groups of teachers (Brazil), delegation of supervision and assessment to school staff, with varying degrees of prescription and support (Nigeria, Britain, and UNISA in South Africa), the provision of teaching content, models and sequenced structure in the lessons provided for children (OLSET in South Africa), the design of course-work to require a practical application (Britain and Chile), the exchange of practical experience in workshops and newsletters (Mongolia and Brazil) or through websites (Britain and Chile), the demonstration of model lessons through television or video (China), the use of applied projects rather than examinations on theory and the inclusion of the assessment of performance in the final grade on formal programmes (Britain and Nigeria). Some of the projects place the practice of teaching at the centre of programme design and organisation, others assign it a relatively minor, or even marginal place, not because of the logistical difficulties involved for a distance education provider but because of the traditions and perceptions of teacher education in the different countries, and its role in conventional teacher-education programmes.

In general, strategies to integrate theory with practice fall into the three categories identified by Robinson (1997):

- knowledge about practice (a teacher is able explain what multi-grade teaching is and produce an essay or examination answer on it);
- knowledge applied to practice (a teacher can plan the organisation of multi-grade teaching or materials for it and show how these might be used in the situation or report and reflect on work done);
- demonstration of knowledge and understanding through performance (a teacher shows the use of multi-grade teaching through the conduct of teaching and learning activities, observed by others).

The different categories have different logistical and cost implications for distance education. One danger here is that activities in the first category are (wrongly) assumed by programme providers to result in the outcomes found in the third (competence in performance) as a matter of course. The challenge for the planner is to design a programme so that knowledge is carried through from the first of these to the third and to build in a system of assessment and feedback that tests how successful the programme is in doing so. In many cases this involves more than, say, the integration of work based on classroom activity in assignments or videoconferencing sessions that look at classrooms and requires arrangements for a supervisor to see how teachers are working within their classrooms.

7.1 How can it be done?

We can identify five main approaches to the management and supervision of the practicum which are set out in table 7.1.

Table 7.1: Models of organising the practicum in teacher training by distance programmes

Model	***Examples***
1. No practicum offered at all	Certificate in Guidance, IGNOU (India)
2. College-based micro-teaching	Belize Teacher Training College
3. Classroom-based practicum as a separate block in a course, usually placed after academic blocks.	Diploma in Education, IGNOU (India),
4. Classroom-based practicum supervised by visiting staff from college or ministry	Zimbabwe ZINTEC project
5. Classroom-based practicum under the guidance of a mentor within the school	Open University (Britain) Postgraduate Certificate of Education

For some programmes, an overt or tacit decision has been taken against any formal supervision or assessment of the practicum. This has often been the case, for example, where a programme is mainly concerned to raise learners' background education. In other cases, where programmes are aimed at experienced teachers, there is no formal practical element and therefore no need for a structure to supervise or assess it. The Certificate in Guidance by IGNOU, for example, inserts into the theoretical work suggestions about how to extend the ideas presented in the units into classroom practice but this is purely voluntary and not formally assessed.

In the second model, within programmes such as that of the Belize teachers' college referred to above (para. 4.3) the only practical work consists of college-based microteaching. This cuts down substantially on the organisational headaches of a school-based practicum but severely limits supervision and guidance of trainees' actual teaching.

The third model offers the practicum as a separate block of classroom-based teaching. The Indira Gandhi National Open University offers a Diploma in Education, for example, which has a one-off block of practical teaching after all the theoretical units. The government of Ghana has explored a model of teacher education in which students spend blocks of time working in a conventional college and blocks studying at a distance while they are working in school. This approach has the benefit of logistical simplicity, and allows cohorts of students to move from one mode of study to another. It does, however, run the risk that theory, done in one block of time, is unrelated to practice, done in another and that the guidance offered by tutors in college is seen as irrelevant by student teachers once they are working in schools. Close integration between the theoretical units and their practical pedagogical application becomes more difficult.

In the fourth model, trainee teachers follow a course while they are teaching and are visited, from time to time, by a supervisor from the college or from some other part of the teaching service. School inspectors, for example, have often been given this role. In principle this should make it possible both to integrate learning at a distance with practical classroom applications. In practice, logistical difficulties have often been overwhelming; in Zimbabwe, where this model was used, evaluation showed that supervision of this kind was the weakest part of the programme so that nearly all the students participating in one evaluation thought that field supervision was inadequate. Where inspectors were deployed to supervise, they had to change their role, sometimes with difficulty. Even college lecturers were reported to 'spend more time checking schemes of work and lessons plans rather than assisting students in the reinforcement of concepts, skills and linking theory with practice' (Chivore 1993: 59).

In the fifth model, school-based teaching is an integral part of the course, interspersed and often closely integrated with the theoretical units, and is supervised by a school-based monitor. In the case of the British Open University, outlined in chapter 3, the university decided to decentralise the supervision of classroom practice to individual schools. This was seen as a necessary strategy to enable students to enrol on the course regardless of where they were living but it also fitted with current national policy of moving towards school-based teacher education. The university undertook the job of briefing and training mentors, who were regular members of the staff of schools throughout the country, and paid them a fee which was a substantial proportion of the total expenditure on the course. The work of mentors themselves was supervised by the staff of the university's education faculty, working from its regional offices.

7.2 Where can it be done?

These five models locate teaching practice in different places. Management difficulties are minimised where it is centralised, as in the Belize example, which also made it possible to use relatively advanced – and expensive – television techniques for microteaching. If teachers are supervised in their own schools, by someone from the distance-teaching institution or one of its partners, it should in principle easier to ensure an integration between theory and practice. While in many instances there have been logistical difficulties in supervising classroom practice in this way either the third or fourth model is one that has most often been seen as appropriate and realistic.

The fifth model, of employing school-based mentors has attracted widespread interest. It depends on the availability of teachers within the system who have themselves sufficient experience and understanding of education to act as mentors, and a structure to brief and train them and to monitor their work. Many ministries of education, in considering this option, have rejected it as unrealistic as these conditions cannot be met. It has also been criticised as a system which serves to replicate the existing culture and values of the schools where the mentors and their trainee teachers are working. On the other hand, in discussing their experience, the Open University argued that their school-based approach meant that it was possible to ensure:

> that all the open and distance course text and resources should be directly related to school practice. No activity, reading or observation could be set that did not directly relate to experience in schools: the link had to be explicit. The course therefore also prescribes a *curriculum of school activities…* This school activities framework is directly related to the course structure and assessment model and allows for increasingly demanding activities, covering all aspects of the teaching role, as the programme progresses.
>
> Moon and Leach 1997: 5

7.3 Planners' guidelines for choosing between the options

This chapter has argued consistently the importance of asking how teachers will apply what they themselves learn in their own classroom, leading to the following proposals.

- Examine critically how far teachers will demonstrate and understand through their own performance the material they have been working on in their course.
- Plan appropriate arrangements for supervision of classroom practice in the light of that examination. Take account of the logistics and budget needed for this element.
- Explore where there are people or institutions who can help in managing and supervising classroom practice which will often necessitate a partnership with other institutions.
- Consider the balance of advantages of the options for the practice of teaching skills, their location, and the issues of who should supervise them and how those people should be supervised and trained.

8. How can you assess it?

There are three separate issues here: how we can make an assessment of open and distance learning as a whole; how we can build in a system of assessment or formative evaluation of quality control within the institution; how we can assess distance education for teachers. In the context of teacher education we look in particular detail at the last of these.

8.1 How do we assess open and distance learning?

In trying to assess the distance-education experience we are limited by the shortage of good evaluation. One can speculate as to why. Sometimes critical evaluations exist but are difficult to access because they are internal and confidential reports. Sometimes excellent evaluations that are in the public domain are buried within rabbit-warren generalist websites. But the overriding impression here is that distance and teacher education, both together and separately, are under-researched and under-theorised areas and particularly so in developing countries (Robinson, 1997). The dearth of evaluative literature seems partly to do with the difficulties of assessing a complex and interrelated range of factors related to effectiveness. The way that distance education disperses responsibility for a programme among a range of partners, sometimes on a large scale over distance–for student support, administration, tutoring, course production, delivery and assessment–presents a number of logistical and methodological challenges for researchers. In many countries it is hampered by limited research capacity and expertise, limited research culture, and limited funding. In programmes with a wide geographical reach, data from the centre often cannot tell us how well it is working at more local levels. Often the means for gathering data is problematic: researchers on the project in Chile (see chapter 3) commented that: 'The main constraint for researching the programme is the lack of an organised database with information about it. Even though the staff was open and willing to help, they did not have an easy way of getting some information and in some cases their memory was the only source available' (Cerda, Leon & Ripoll forthcoming).

In many countries it is hampered by limited research capacity and expertise, limited research culture, and limited funding. Funding may be the key: education spends less on research and evaluation than many other areas of human enterprise. The result is that policy makers have very little critical information on which to make informed decisions about teacher education by distance and providers have limited feedback from within their institutions to improve their practice.

Many evaluations have been narrowly focused, too. Studies of a necessary breadth 'demand intensive work on the ground and a greater commitment to evaluation than many authorities have felt able to give. For the most part, therefore, we have to rely on much more partial evidence' (Robinson 1997:133). We know that distance-education methods can be used on a scale that make a difference to national numbers in teacher supply but we do not know enough in terms of its effectiveness, curriculum and cost.

We have suggested, in chapter 2, the need to look at student numbers and completion rates, about evidence on learning gain or examination success, and about the effect of programmes on classroom practice and then, in order to make comparisons with conventional approaches, about costs. In all these areas we are short of data and evidence-based decisions about appropriate methodologies suffer as a result. More research and better research will make for better practice.

8.2 How do we provide for quality control and formative evaluation?

Formative evaluation is likely to strengthen any educational institution. It has a particular significance for open and distance learning partly because its methods are complex and likely to involve many partners and partly because its students are distant, unseen, and often unheard. It is therefore necessary to build measures for quality assessment into all the processes of a distance-teaching institution. Many general guides on open and distance learning give advice on this which is not significantly different for teacher education from education for other purposes. In introducing a set of guidelines developed for higher education in Britain, for example, the Quality Assurance Agency has argued that:

> System design, programme design and delivery, student development and support, student communication and representation, and student assessment all raise particular questions for institutions about the ways in which they 'manage' teaching and learning to ensure that the quality of provision and security of academic standards are as they need to be…
>
> Distance learning must rely on a sound and effective logistical and administrative infrastructure to ensure that all participants' activities are co-ordinated and engage with the programme as designed by the provider. There is likely to be a distinct division of labour both in teaching and administration. An integral part of the teaching and administrative system is the timing of action and the lead times needed to meet deadlines. The guidelines place particular emphasis on these points.
>
> Higher Education Quality Council 1999

It goes on to propose that quality assurance should be examined under six headings: system design; programme design, approval and review; management of programme delivery; student development and support; student communication and representation; and student assessment. We examine the last of these below as it present particular difficulties in teacher education. Of the other areas, distance-teaching institutions have been particularly concerned to create appropriate systems to monitor system design, the development of teaching materials, and student support.

In assessing alternative proposals for system design it is necessary to examine how open and distance learning articulates with the rest of the educational system so that it provides a quality of education that matches the needs of students which is recognised as being on a par with conventional education. Furthermore, it demands a structure that monitors the processes of distance education to ensure that they are working effectively and efficiently for learners. Academic quality of the work at the centre is not enough: institutions also need to know how well their systems are working for communicating with students, for sending and responding to their work, and for maintaining student records.

There is now an extensive literature on the development of effective teaching materials for open and distance learning, in a range of different media, and a measure of agreement on the principles that underlie good instructional design. In designing an assessment system it is therefore appropriate to build in checks on the development and presentation of materials to ensure that they are pedagogically effective.

We have touched on some of the issues involved in ensuring effective student support in chapter 7 on classroom practice. Where teachers, studying at a distance, have themselves little experience as adult learners, or of learning outside a conventional classroom, they are likely to need

considerable support, offered through written comments on assignments, or electronically, or through face-to-face contact with tutors. Measures to monitor the quality and timeliness of this work need to be built into the system.

8.3 How do we assess distance education for teachers?

In chapter 7, in relation to teaching practice, we distinguished between three levels of teachers' knowledge and practice. In a valuable review of the problems, Robinson, has proposed the nature of assessment appropriate to each and its implications for distance education (Robinson 1997:130-3). She points out that the difficulties of assessing students working through distance education parallel the difficulties in using it for teaching. Distinguishing three levels of assessment, as in table 8.1, she points out that

> Knowledge and understanding are easier for a distance education provider to assess than practice and performance. Assessment of a student's pedagogical skills, the outcomes, is difficult for distance educators to do alone since it needs first-hand observation and authentication. As the model in table [8.1] shows it becomes more complex organisationally for a distance education provider and the costs rise, as assessment moves from Level 1 (knowledge and understanding) to Level 3 (practice and performance), that is from standard patterns of assessment of knowledge for large groups to assessment of individual performance and difference. One strength of distance education is its capacity to deal with large numbers, one limitation is its inability to deal easily with the individual.
>
> Robinson 1997

If we want to assess teachers' knowledge and understanding, which may be the main aim of a programme that concentrates on improving teachers' general education or their knowledge in one particular area, then there are no particular difficulties in assessing them through conventional tests and at a distance. Assessment can be built into written work relatively easily. Several of the projects discussed in section 3 arranged for assessment of this kind. It becomes more difficult if we move up one level and ask how far teachers are applying their knowledge to practice. It is, however, still possible to design learning materials, in a variety of media, that ask teachers to undertake activities in the classroom and report on them. This kind of student assignment makes it possible for the tutor both to guide the student and to assess how far knowledge has in fact been applied to practice. The third level, in which we ask how far teachers are in fact applying what they have learned in the classroom, is both the most difficult to manage and, as argued in the previous chapter, often the most important. Just as managing and supervising classroom practice present particular difficulties for open and distance learning so does its assessment. Again, if this centrally important kind of assessment is to be undertaken, a distance-teaching institution needs to work with partners on the ground, who will themselves need guidance and possibly training in their work. Efforts have been made, using a variety of approaches, to arrange this. The National Teachers' Institute in Nigeria produced a standard grid for assessment of classroom practice by external supervisors. At the British Open University, assessment of teaching practice, throughout the course, was a responsibility of the mentor and school co-ordinator. Students were required to keep a 'professional development portfolio' which included school practice assessments made by the mentor, which was

Table 8.1: Assessing teachers' knowledge and practice at a distance

Teachers' knowledge and practice	*Nature of assessment*	*Implications for distance education*
Level 1: ***Knowledge and understanding*** Of academic subjects to be taught Of pedagogical concepts, ideas and theory	Written work (assignments), essays, course tests, final examinations	Can assess learning and give feedback to students on a large scale (hundreds or thousands). Can achieve economies of scale (standard assignments). Can provide well-designed assignments because of the resource put into course design; may also retreat into over-use of multiple-choice questions for administrative convenience. Assignments may remain too theoretical or unrelated to the realities of classroom life, or lack regional relevance.
Level 2: ***Knowledge applied to practice*** Application of knowledge to teacher's own context; testing out and interpreting ideas about pedagogy; evaluating practical activities and experiments, and reflecting on them	Written reports and accounts of things done (description and analysis of activities such as teaching a mathematical topic a new way; collecting evidence in a child observation study; organising a classroom differently; or developing new language and reading activities).	Good learning materials can structure this process for the teacher (distance not a barrier). Can support linkage between theory and practice. Not possible for a distance education provider to tell from the student's reports how authentic an account is given, for example, that classroom practice matches what is described. Can be more time-consuming and expensive for a distance education provider to assess (non-standard assignments, greater individual differences).
Level 3: ***Practice and performance*** Enactment of knowledge and ideas Demonstration of competences and skills	Direct observation and authentication of individual teacher performance	Much more complex to organise and manage than Level 1. More labour-intensive and expensive than Level 1; approximates more closely to costs of conventional training. Requires more support staff in a variety of roles than Level 1; needs more staff training provision; more support materials; more monitoring and management. Needs local partners. Cannot be done at a distance (without sophisticated interactive technologies).

Source: *Robinson 1997*

submitted to the university at the end of the course for marking.

Like reconnaissance, time spent on the assessment of individual teacher assessment is never wasted.

8.4 Guidelines for planners

Assessment tends to be neglected. This chapter argues:

- Formative evaluation needs to provide information about the quality of open and distance learning generally, about the quality of the processes of a distance-teaching institution, and about the assessment of individual teachers.
- More good research is to be encouraged in order to guide practice.
- Systems of quality control need to address themselves to: system design, programme design and delivery, student development and support, student communication and representation, and student assessment.

- There are particular needs to look at the monitoring of day-to-day practice within the institutional system, at teaching materials, and at student support as well as at the assessment of individual teachers.
- This needs to look at the problems, in increasing organisational complexity, of assessing knowledge and understanding, knowledge applied to practice, and practice and performance.

Annex: Sources of information and references

Sources of information

For further information it may be helpful to look at manuals on different aspects of open and distance learning, at its descriptive and analytical literature, and at a number of websites.

Manuals

A very useful, short, practical handbook in the IIEP Educational fundamentals series is:

Rumble, G. 1992 *The management of distance learning systems*, Paris: UNESCO/IIEP

A general guide to open and distance learning, from a mainly north American perspective, is:

Moore, M. G. and Kearsley, G. 1996 *Distance education: a systems view* Belmont: Wadsworth

There is an extensive literature about how to undertake and manage open and distance learning. One relevant series, concentrating on practical advice to people working in distance education, is the Kogan Page 'Open and distance learning series' with titles that include:

Freeman, R. 1997 *Managing open systems*, London: Kogan Page

Rowntree, D. 1994 *Preparing materials for open, distance and flexible learning*, London: Kogan Page

The Commonwealth of Learning (1285 West Broadway, Suite 600, Vancouver, BC, V6H 3X8, Canada; Phone +1 604 775 8200; Fax +1 604 775 8210; email info@col.org) has produced both a series of guidelines on topics that include the remote delivery of courses and training manuals for use in training distance educators, most of which include a set of case studies:

An Overview of Open and Distance Learning (278 pages)

Designing Materials for Open and Distance Learning (360 pages)

Planning & Management of Open and Distance Learning (408 pages)

Use and Integration of Media in Open and Distance Learning (396 pages)

Quality Assurance in Open and Distance Learning (290 pages)

Copyright & Distance Education: A trainer's toolkit (79 pages)

Among the demanding problems are those of training and rewarding writers of materials. International practice is analysed, leading to practical guidance for managers in:

Perraton, H. and Creed, C. 1999 *Distance Education Practice: Training and Rewarding Authors*, London: DFID Education Research Series, No.33

The manual on quality assurance in university distance education, referred to in chapter 8, consists of a set of six guidelines and 23 precepts together with a set of questions for the institution to ask about its arrangements for quality assurance. It is available on the Higher Education Quality Council's website.

Quality Assurance Agency for Higher Education 1999 *Distance learning guidelines,* Gloucester (http://www.qaa.ac.uk/public/dlg/contents.htm)

Other books and reports

There is only a handful of books on the broad problems of teacher education especially in the developing world. They include:

Avalos, B. 1991 *Approaches to teacher education: Initial teacher training*, London: Commonwealth Secretariat

Dove, L. 1986 *Teachers and teacher education in developing countries* London: Croom Helm

Farrell, J. and Oliveira, J. 1993 *Teachers in developing countries: improving effectiveness and managing costs*, Washington D.C.: World Bank EDI seminar series

Greenland, J. 1983 (ed.) *The in-service training of primary school teachers in English-speaking Africa: a report*, Basingstoke: Macmillan

Hawes, H. and Stephens, D. 1990 *Questions of quality: primary education and development* Harlow: Longman

Rust, V. D. and Dalin, P. 1990 *Teachers and teaching in the developing world*, New York: Garland

Thomas, E. (ed.) 2002 *World Yearbook of Education 2002: Teacher education: dilemmas and prospects*, London: Kogan Page

UNESCO, 1998 *Teachers and teaching in a changing world*, Paris

UNESCO, 1998 *Training teachers to work in schools considered difficult*, Paris

UNESCO, 1995 *National languages and teacher training in Africa*, Paris

UNESCO, 1995 *Information technologies in teacher education: issues and experiences for countries in transition*, Paris

There is important and recent material, specifically about open and distance learning for teachers, in two recent books:

Perraton, H. 2000 *Open and distance learning in the developing world*, London: Routledge

Lynch, J et al. 1997 (ed.) *Innovations in delivering primary education vol. III of Education and development: tradition and innovation London*: Cassell (chapter by Bernadette Robinson)

There is some recent material on teacher education in:

Creed, C. 2001 *Distance Education in the E-9 countries*, Paris

UNESCO, through its Institute for Information Technologies in Education has produced an analytic survey on distance education:

N.C. Farnes 2000 (ed.) *Distance Education for the Information Society: policies, pedagogy and professional development*, Moscow: UNESCO-IITE

On open and distance learning for teachers there is a set of case studies, with comparative information on costs and outcomes in:

Perraton, H. 1993 (ed.) *Distance education for teacher training* London: Routledge

There is also a useful set of papers, focused on Asia but of broader relevance, based on a conference organised by the Asian Development Bank and the Commonwealth of Learning:

> Asian Development Bank 1997 *Distance education for primary school teachers*, Manila

A volume in the Commonwealth of Learning's World review of distance education and open learning is in press for publication in 2002 and will provide a comprehensive and up to date survey of the area:

> C. Latchem and B. Robinson (ed.) *Open and distance learning for teacher education*, London: Routledge

A short version of the case studies on which these guidelines are based is available from UNESCO:

> Robinson, B., Creed, C. and Perraton, H. 2001 *Teacher education through distance learning: technology, curriculum, cost, evaluation*, Paris: UNESCO

It is anticipated that the full version of the case studies will also be published by UNESCO in 2002. A model case study of the use of distance education in Tanzania is published by the International Institute for Educational Planning:

> Mählck, L and Temu, E B 1989 *Distance versus college trained primary school teachers: a case study from Tanzania* Paris: International Institute for Educational Planning

Websites

UNESCO's education website contains a variety of downloadable material relevant to teacher education and the use of distance education: http://www.unesco.org/education/portal/e_learning/index.shtml. On the E9 initiative, addressing the needs of the nine high-population countries, see: http://www.unesco.org/education/e9/publications

There is a training package to assist primary school teachers to improve their multi-grade teaching skills at: http://www.unesco.org/education/primary/teachers.shtml

The International Bureau of Education, also has a databank of innovative educational programmes including teacher education and distance education projects. The website is at:
www.ibe.unesco.org/international/datablanks/innodata/inno.htm

There is a website devoted to the needs of teachers run by UNICEF, containing articles opinions and research likely to be of interest to teachers at: http://www.unicef.org/teachers/build.htm

The World Bank has set up a Global Distance Education Net which contains papers on teaching and learning, technology, management, and policy and programmes. The website is at:
http://www1.worldbank.org/_vti_bin/shtml.dll/DistEd/index.html/map2

The World Bank has also set up a Global Development Learning Network, an activity based at its training arm the World Bank Institute. Its activities are described at: http://www.gdln.org/

Information on its own research programmes in open and distance learning is available from the International Research Foundation for Open Learning at: http://www.col.org/irfol

The multi-site teacher education research project (MUSTER) run by the Centre of International Education, University of Sussex has a website with downloadable research papers on teacher education in a group of which embraced the use of distance education in Malawi:
http://www.sussex.ac.uk/usie/muster

A free bimonthly newsletter on the use of information and communication technologies in education is produced by an American agency, Knowledge Enterprise Inc. The November/December 2000 issue focuses on the use of technology for teacher education. It is distributed electronically and is available at: http:///wwwTechKnowLogia.org

The British Department of International Development has set up a project concerned with the deployment of information technologies to support education in Africa. Its website has a resource bank of information which is at: http://www.imfundo.org

A major source of information about open and distance learning is the International Centre for Distance Learning, housed at the British Open University. It has a conventional library and a website which gives access to information about literature, courses, and institutions. The address is: http://icdl.open.ac.uk

Agencies

Much of the material above derives from the work of the main international agencies concerned with education and in particular from UNESCO, which has primary responsibility for education, UNICEF, whose interests in education follow from its broad concern for children, and from the World Bank. There are two specialist, international, agencies whose function is to support the international development of open and distance learning and the sharing of resources internationally. They are the Commonwealth of Learning (1285 West Broadway, Suite 600, Vancouver, BC, V6H 3X8, Canada; Phone +1 604 775 8200; Fax +1 604 775 8210; email info@col.org) which works throughout the Commonwealth and the Consortium International Francophone de Formation à Distance (INTIF, 15 Quai Louis XVIII, 33000 Bordeaux, France, Phone +33 5 56 01 59 00, Fax +33 5 56 51 78 20) which works within francophonie. The International Research Foundation for Open Learning (Michael Young Centre, Purbeck Road, Cambridge CB2 2PG, England), which has produced this report, is a nonprofit research agency concerned with research to inform policy in open and distance learning.

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Greenland, J 1983 (ed.) The in-service training of primary school teachers in English-speaking Africa: a report, Basingstoke: Macmillan

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Perraton, H. 2000 *Open and distance learning in the developing world*, London: Routledge

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Perraton, H. and Creed, C. 1999 *Distance Education Practice: Training and Rewarding Authors*, London: DFID Education Research Series, No.33

Perraton, H. and Creed, C. 2000 *Applying new technologies and cost-effective delivery systems in basic education* (Thematic study for Education for all 2000 Assessment). Paris: UNESCO

Quality Assurance Agency for Higher Education 1999 Distance learning guidelines, Gloucester (http://www.qaa.ac.uk/public/dlg/contents.htm, accessed 3 December 2001)

Robinson, B 1997 'Distance education for primary teacher training in developing countries' in ed. Lynch, J et al. *Innovations in delivering primary education vol. III of Education and development: tradition and innovation* London: Cassell

Robinson, B., Creed, C. and Perraton, H. 2001 *Teacher education through distance learning: technology, curriculum, cost, evaluation*, Paris: UNESCO

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Using portable computer technologies to support learning environments.

Dr. C. Paul Newhouse

Edith Cowan University

p.newhouse@cowan.edu.au

My Mission

- To provide opportunities for children to develop as decision-making, empowered, responsible, relational individual citizens.

  [I have always had a constructivist view of learning.]

- This has not typified schooling in the past, largely due to economic and bureaucratic constraints BUT could do so much more with appropriate technological support.

  [I have taught in a school trying to do this.]

- Computer technologies provide flexible tools that can be used to address many educational problems BUT also they are pervasive in our society requiring rising levels of technological literacy.

My Experience

- 9 years secondary teaching
- 13 years teacher education
- 17 years educational research
- 10 years research on portable computing

- Classroom based research
- Curriculum development
- Teacher development
  - pre-service
  - in-service

My 2002 Experiences

- Teacher Development
  - Grass-roots: primary school staff + geography teacher
  - System: Frameworks for Department of Education
    - *Teacher ICT Attributes - Progression*
    - *Impact of ICT on Learning and Schools*
- Curriculum Development
  - Conceptual: progress maps
  - Concrete: post-compulsory course
- School Development
  - Primary school - ICT and collaborative learning
  - Secondary school - portable computers and project based learning

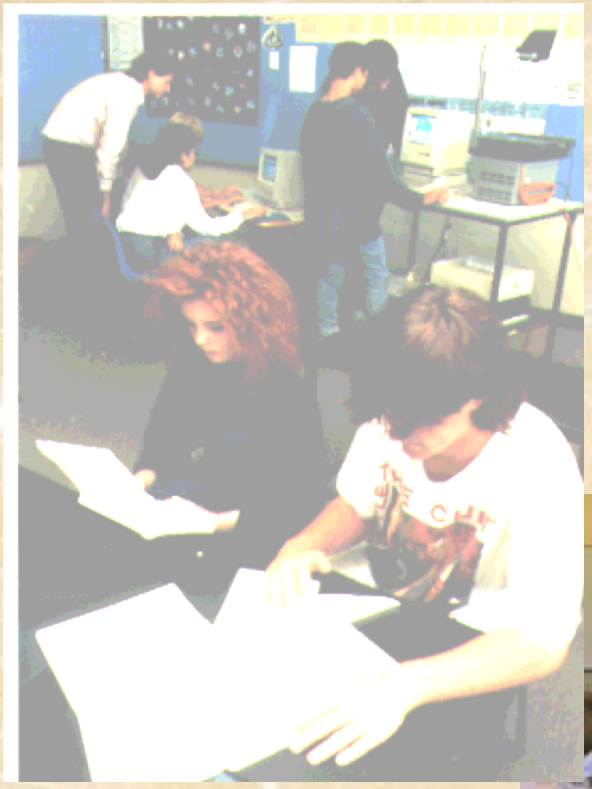
My 2002 Research Experiences

- All teachers in one primary school
  - working in teams based on phases of schooling
  - focus on developing collaborative/ cooperative skills
  - students working on at least one major project
- One teacher in a secondary school
  - long-term, open-ended group project
  - access to notebook computers
- Further developed my model addressing the use of computers in schools and teachers' responses.

My interest in portables?

- Fits my philosophy of education that puts the student's needs central.
- Fits my view of schooling that is non-controlling and empowering.
- Fits my experience as a teacher wanting flexible, minimally intrusive technology support for learning.

- Since the advent of the first 'luggable' computer in 1986 I have conducted research in schools … the most recent last year.



Luggable

Laptop

Wireless

2002 Research
School of the Future Project

Year 8 Society and Environment

Design a School for 2050

- Project for Year 8 in Society & Environment.
- Most of two term's work for 4 sessions a week.
- The aim was to develop mapping skills and an understanding of the relationship between the physical, socio-economic and built environments.
- Outcomes-based with group-work
- Introductory activities
- Main Project to re-design current school campus and design a new campus.

Physical Environment

Included a Field Trip

Computer Use

- Class set of notebook computers.
- Often used one-to-one.
- Sometimes used one per group of 4.
- Teacher also used projector for whole-class presentation a few times.
- Computers available when needed.
- Tutorial CDROM, project process document, concept maps, questionnaires, data analysis, viewing site maps, creating & editing maps, library research & access to project documents.

Some of the Output

- The following screens show parts of the students' work.
- Some editing has been done to protect the anonymity.

Survey Questions

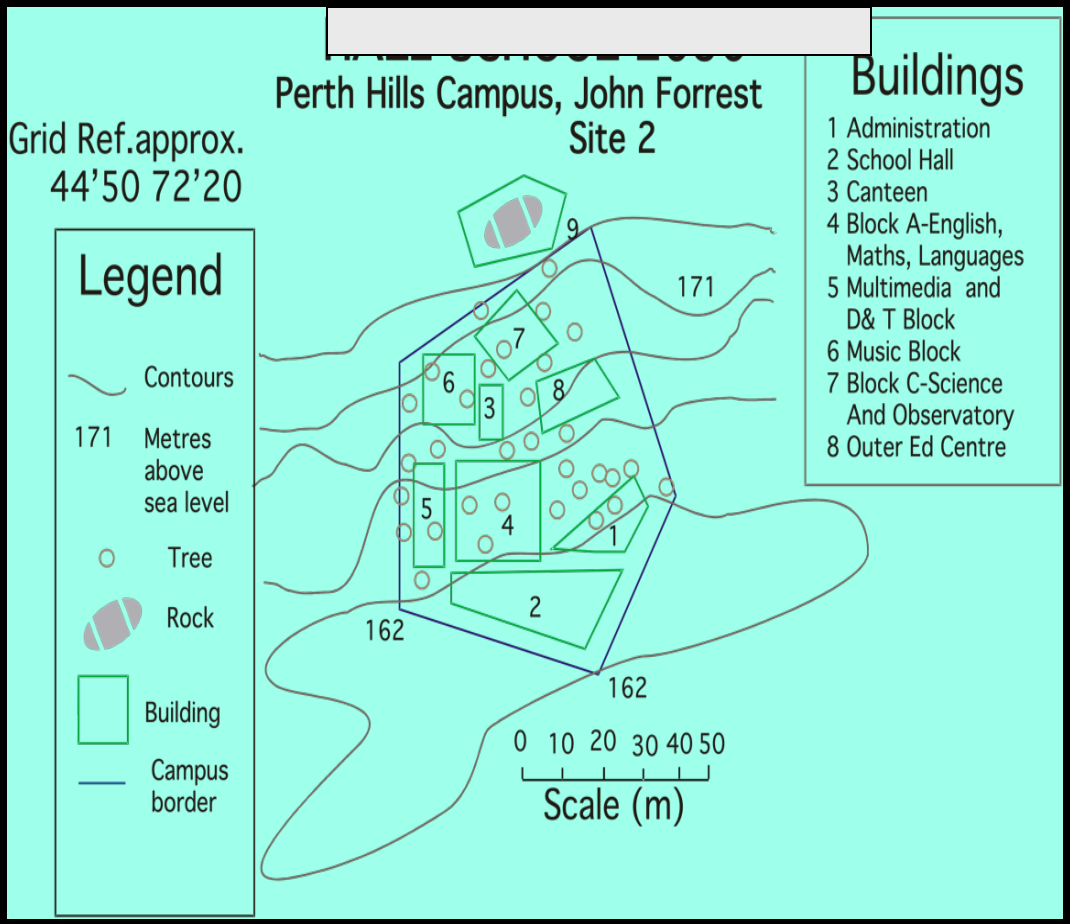
Yr 12 Questions

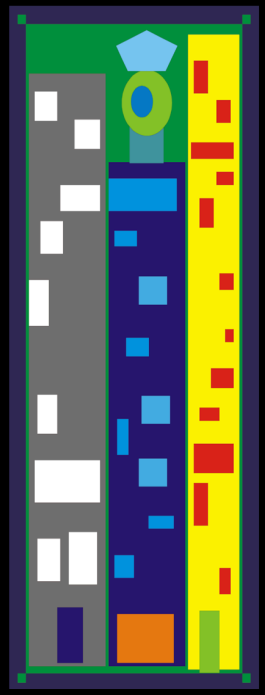
- ✓What should be improved at the school? Library (2), canteen (3), sport (1)
- ✓What is good about the school? Music and Drama (2), sport (4)
- ✓Do you think the school should increase it's size? yes(4), no (2)
- ✓Does there need to be more music and drama? more (2), less(4)



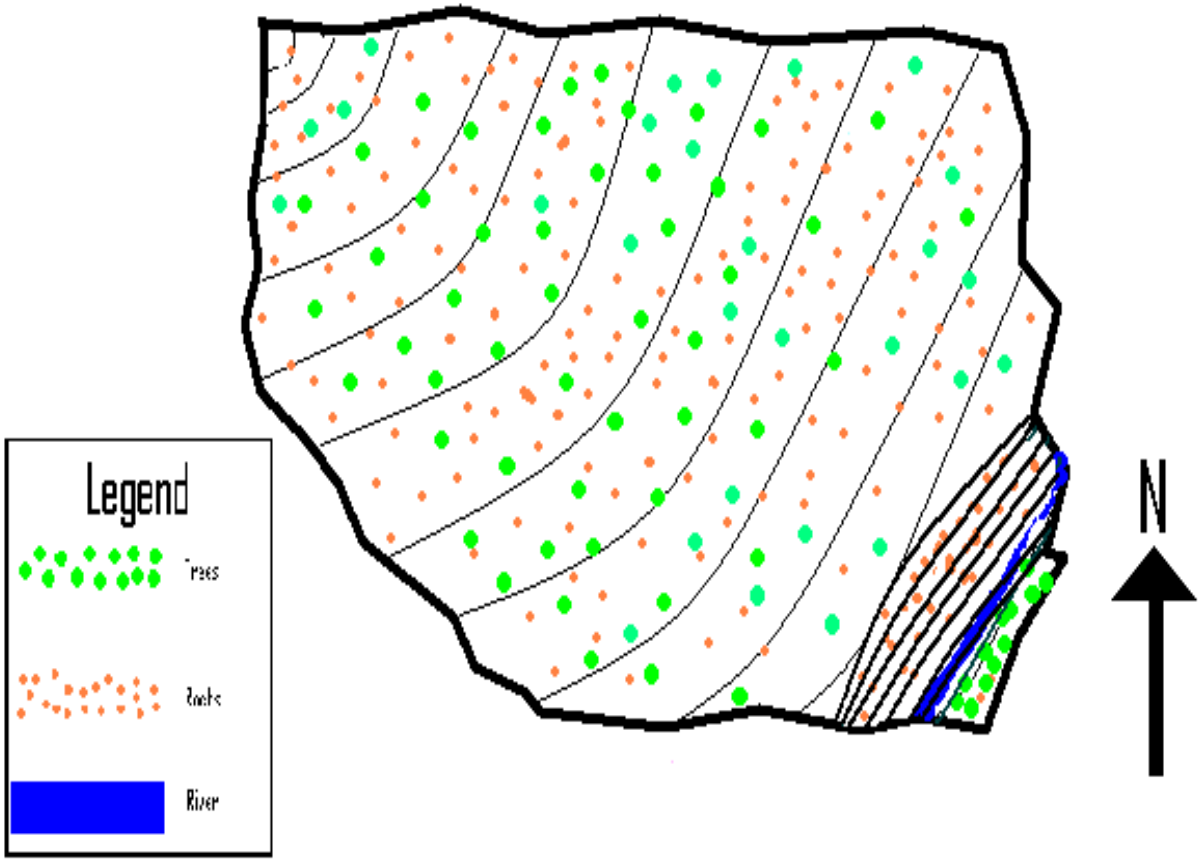
Topographic Map

VAMT BUILDING CONSTRUCTION

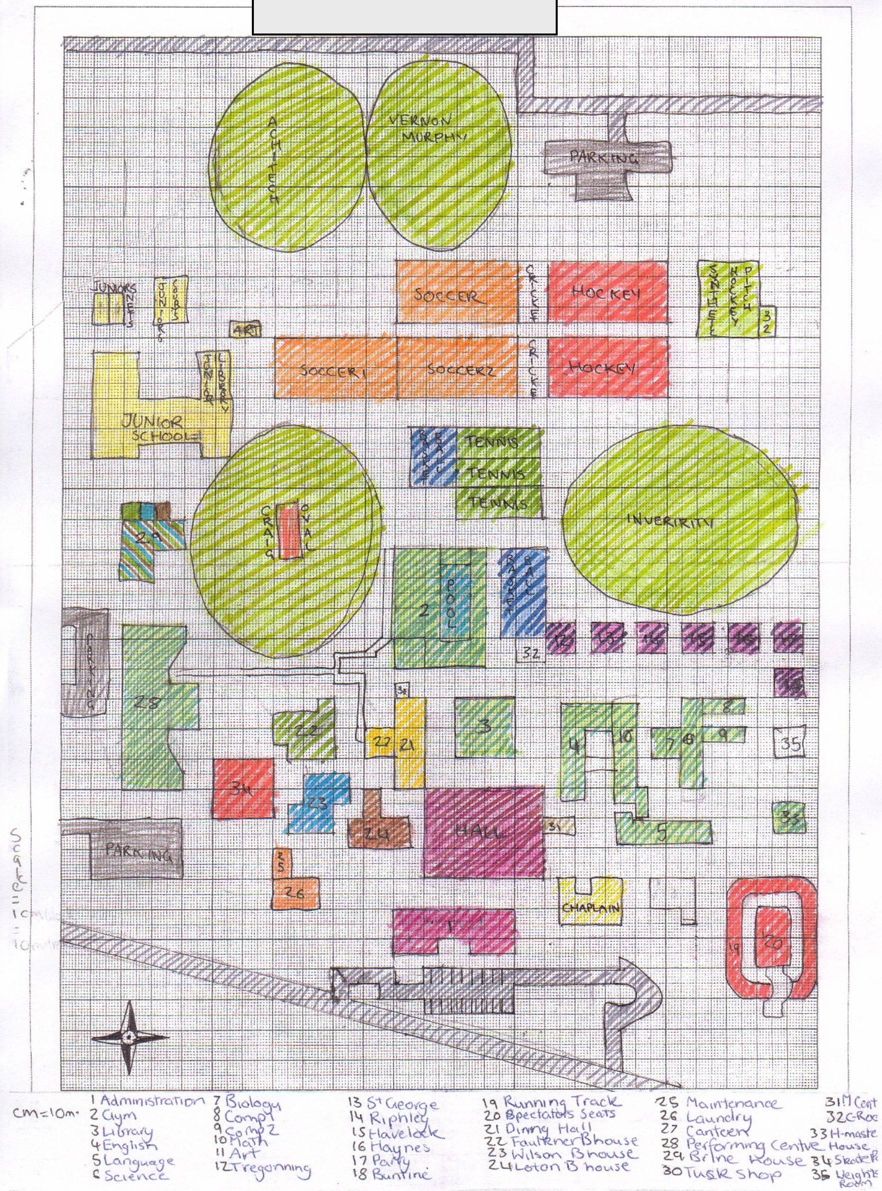




Map of Perth Hills Campus



•The Perth Hills are a hard to build on place, but M.A.C.W © has chosen the best spot available, a small valley in the heart of the hills, the perfect place for a school.


VERNON MURPHY
PARKING
SOCCER
CRICKET
HOCKEY
SYNTHETIC HOCKEY PITCH
32
JUNIORS
ART
SOCCER1
SOCCER2
CRICKET
HOCKEY
JUNIOR LIBRARY
JUNIOR SCHOOL
TENNIS
TENNIS
TENNIS
CRAIG OVAL
INVERIRITY
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POOL
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PARKING
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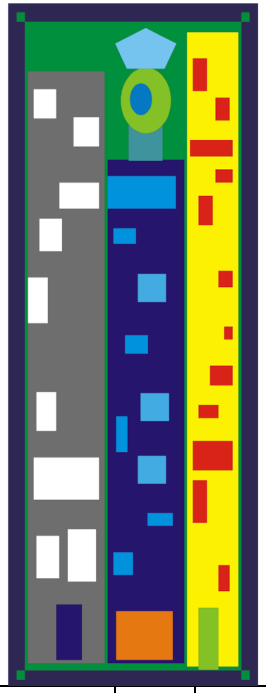
CHAPLAIN
1
19
20
Scale = 1cm = 10m
1 Administration
2 Gym
3 Library
4 English
5 Language
6 Science
7 Biology
8 Comp1
9 Comp 2
10 Math
11 Art
12 Tregonning
13 St George
14 Riphley
15 Havelock
16 Haynes
17 Parry
18 Buntine
19 Running Track
20 Spectators Seats
21 Dining Hall
22 Faulkner B house
23 Wilson B house
24 Loton B house
25 Maintenance
26 Laundry
27 Canteen
28 Performing Centre
29 Brine House
30 Tusk Shop
31 M Cent
32 C-Roo
33 H-master House
34 Skate P
35 Weights Room
cm=10m.

VAMT BUILDING CONSTRUCTION

Transports & Parking



Parking will be as normal-pick up lane for picking up quick and parking spots for interviews,to see teachers,concerts and other socials as well as private spaces for teachers.Buses will be provided to students.

Teachers Parking

Pick Up Area

Parking

Bus Bay

School in the Hills

- 4 story Building with swimming pool 1st floor. the three others stories are for education, with eight class rooms in each

- Other features are bush trails, an out door education class and all the sports fields

Perth Hills Campus

•The terrain in the Perth Hills is very inhospitable, but M.A.C.W © has taken nature into account when building our new school, and has taken care to destroy as few natural features as possible.


Student Car Park


Victor Goh's group

Outcomes

- First time this teacher and students had attempted such a project.
- Teacher was happy that the students were learning within an authentic context.
- About half the students preferred to rely on the teacher and work individually.
- Short sessions made it difficult to maintain momentum and monitor progress.
- Computers used most sessions.

Change in Learning Environment

- Previously dominated by the teacher, textbook and acquisition of content by individual students.
- Now dominated by interactions between students, the problem and associated tasks.
- More student decision-making and choice.
- A greater variety of media used and types of tasks required.
- Focus on an authentic context.

Learning Environment Framework

Committee on Developments in the Science of Learning (Ed.). (2000). *How People Learn: Brain, Mind, Experience, and School*. Washington, D.C.: National Academy Press.

Learner Centred	•Roles in groups •Provided resources and introductory activities
Knowledge Centred	•Planning from outcomes •Resources and introductory activities
Assessment Centred	•Formal assessment developed from the tasks •Evaluation and feedback from teacher and others throughout
Community Centred	•Variety of group work •Use of USA example materials

Ways of Using ICT

Real-world problem	•Electronic maps from DOLA •Handheld GPS
Scaffolding	•Inspiration for concept maps •SchoolKit modules •Intranet site
Feedback, reflection and guidance	•Email questionnaires to teacher to display and provide feedback
Communities	•Intranet & internet •Downloaded movies
Teacher learning	•Connection with USA teacher

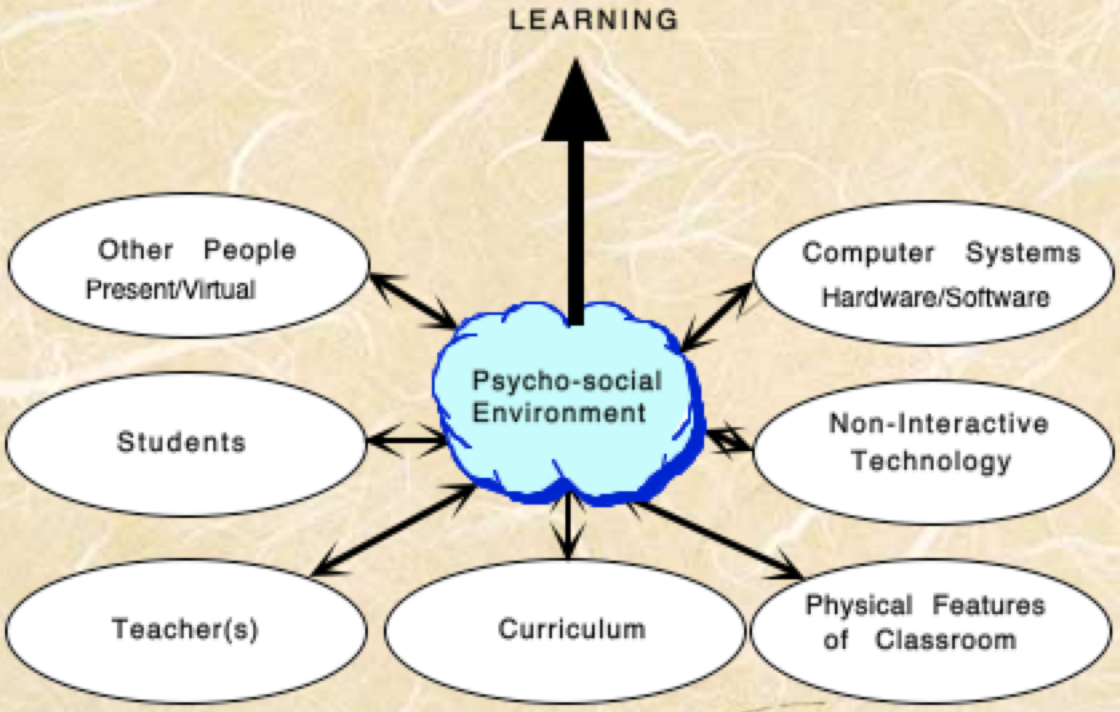
Laptops for Everyone?

- In Australia major laptop programmes began in the early 1990s - I was involved in one.
- The tendency has been to ask whether portables are better than desktops and whether children should own their own.
- Rather the place of portable computing should be considered within a broader framework of improving the learning opportunities for children in schools.
- Non-technocentric thinking!
- Use ICT to provide better learning environments - relevance, range, effectiveness etc.

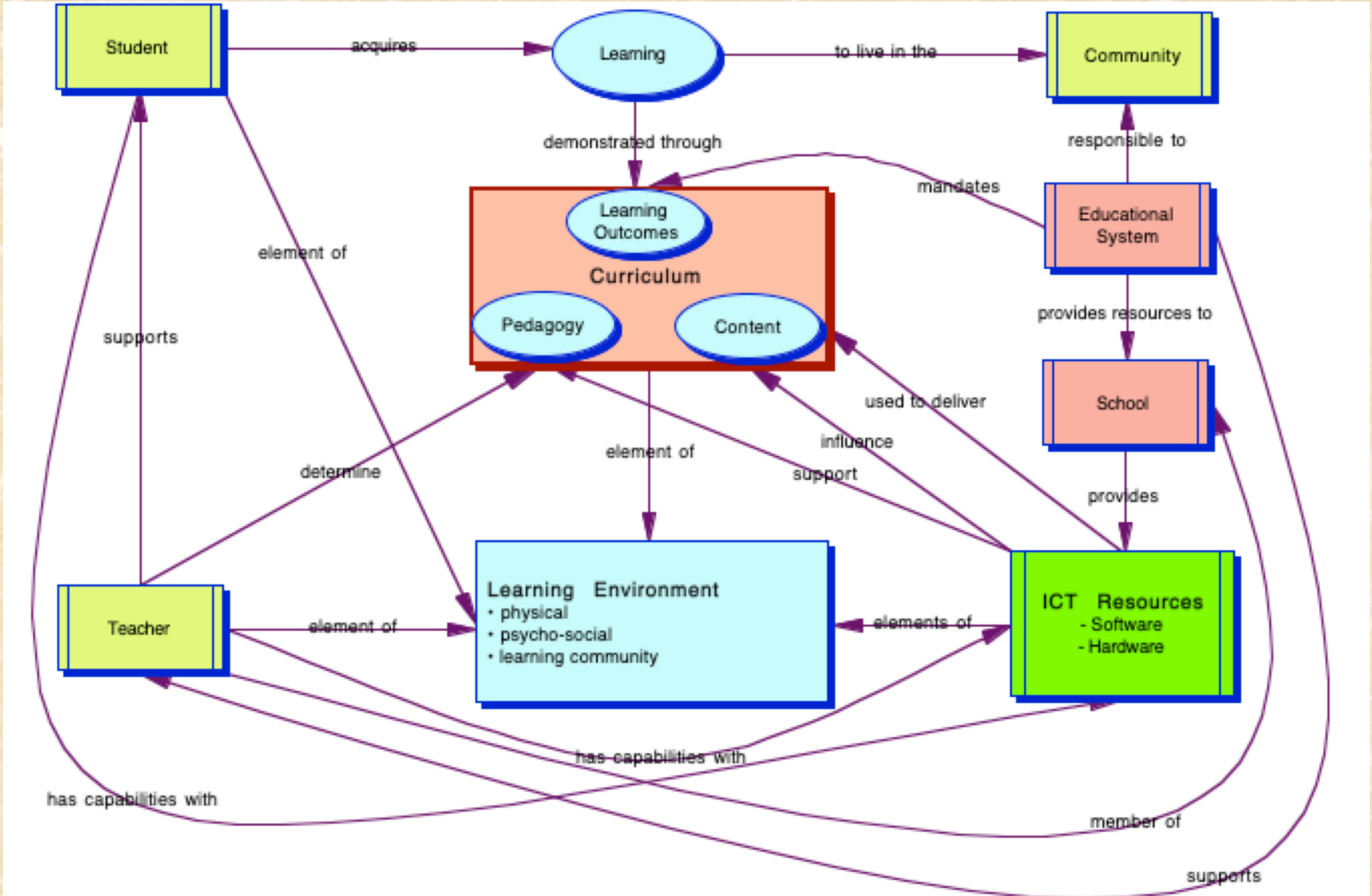
Computer Supported Learning Environments

Learning Environments are:

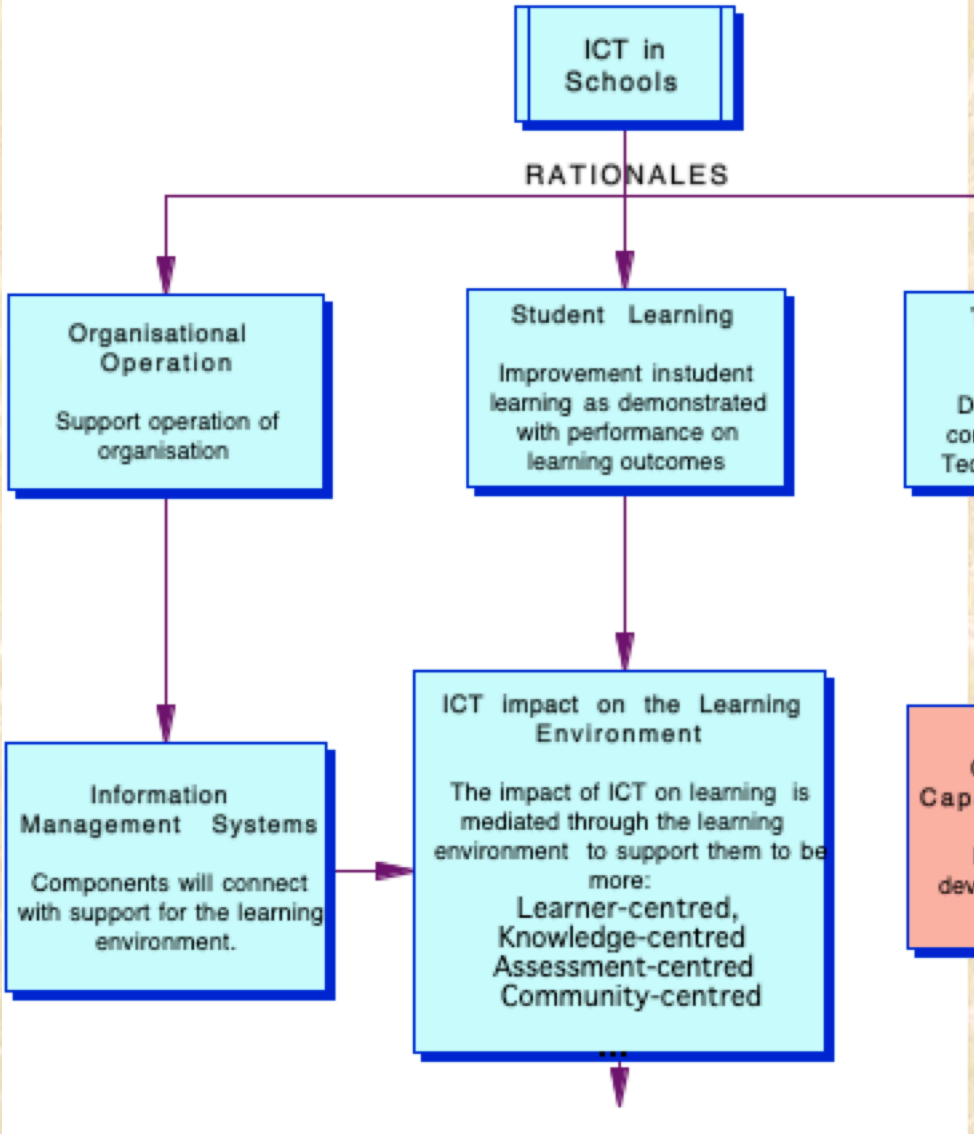
(a) Complex (b) Full of Interactions

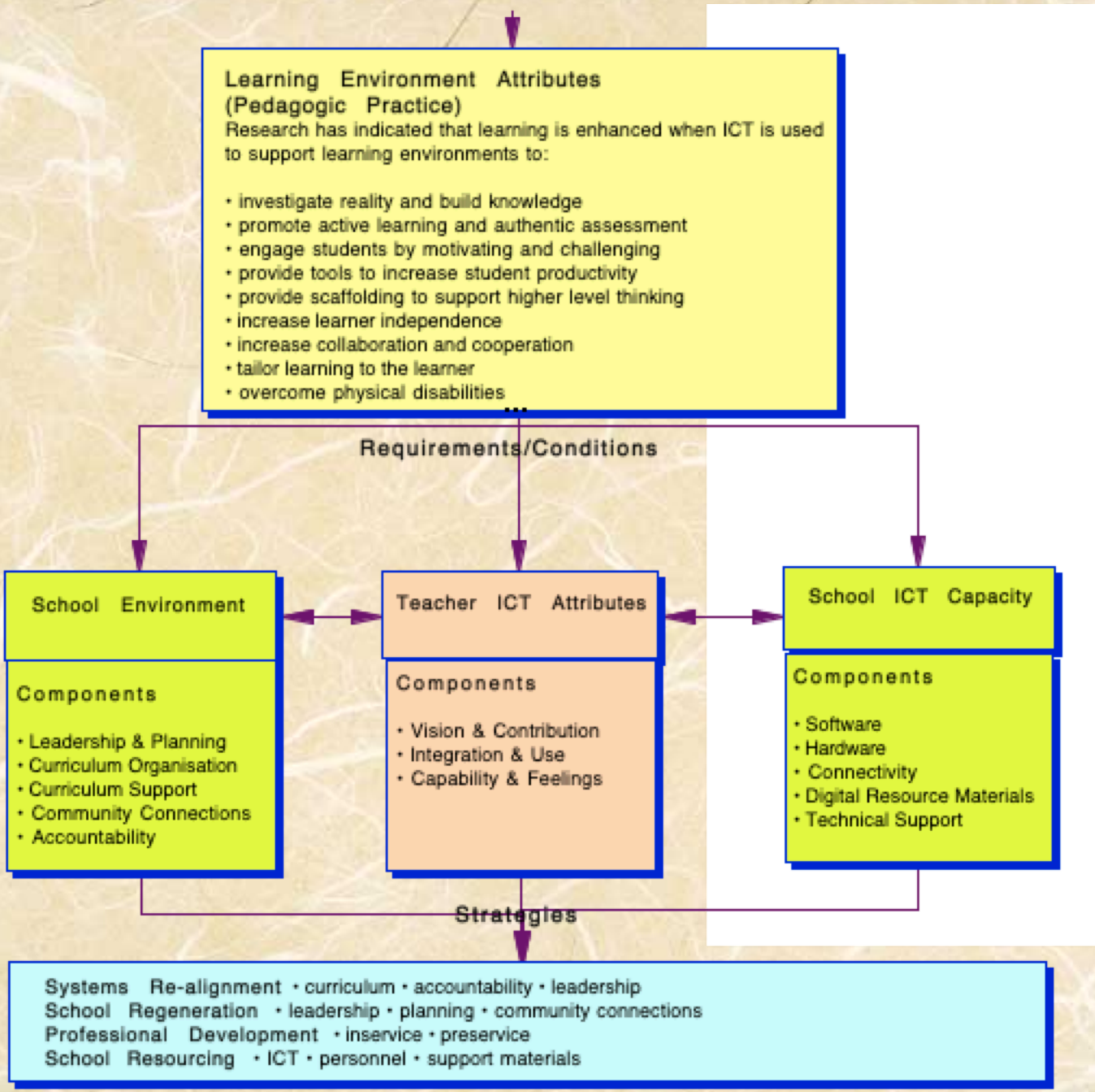


The network?


Student
acquires
Learning
to live in the
Community
demonstrated through
responsible to
mandates
Learning Outcomes
Curriculum
Pedagogy
Content
Educational System
element of
supports
provides resources to
School
used to deliver
influence
element of
support
determine
provides
Learning Environment
• physical
• psycho-social
• learning community
Teacher
element of
elements of
ICT Resources
- Software
- Hardware
has capabilities with
has capabilities with
member of
supports

Developing a Framework




Learning Environment Attributes
(Pedagogic Practice)
Research has indicated that learning is enhanced when ICT is used to support learning environments to:
• investigate reality and build knowledge
• promote active learning and authentic assessment
• engage students by motivating and challenging
• provide tools to increase student productivity
• provide scaffolding to support higher level thinking
• increase learner independence
• increase collaboration and cooperation
• tailor learning to the learner
• overcome physical disabilities
Requirements/Conditions
School Environment
Components
• Leadership & Planning
• Curriculum Organisation
• Curriculum Support
• Community Connections
• Accountability
Teacher ICT Attributes
Components
• Vision & Contribution
• Integration & Use
• Capability & Feelings
School ICT Capacity
Components
• Software
• Hardware
• Connectivity
• Digital Resource Materials
• Technical Support
Strategies
Systems Re-alignment • curriculum • accountability • leadership
School Regeneration • leadership • planning • community connections
Professional Development • inservice • preservice
School Resourcing • ICT • personnel • support materials

The 'Teacher' Variable

[Developed with Sue Trinidad & Barney Clarkson]

- **Outcome**

  The teacher exploits the characteristics of ICT to support the learning of students by, effectively integrating the use of ICT, wherever appropriate, into constructivist learning environments, and contributing to relevant learning communities.

- **Layers**

  Components – Vision & Contribut^{n}, Integra^{n} & Use, Capabilities & Feelings.

  Elements – each component has a number of elements.

  Pointers - each element has a number of pointers.

- **Stages**

  Inaction, Investigation, Application, Integration, and Transformation.

- **Instruments & Processes**

STAGE	Description of Key Difference(s)
Inaction	At this stage there is a general lack of action and/or interest.
Investigation	At this stage the teacher has developed an interest in using ICT with students and is beginning to act on this interest.
Application	At this stage the teacher is regularly using ICT with students and knows how to do so competently and confidently.
	Critical Use Border
Integration	At this stage the use of ICT becomes critical to the support of the learning environment and the opportunity for students to achieve learning outcomes through the learning experiences provided.
Transformation	At this stage the teacher is able to take on leadership roles (formal or informal) in the use of ICT and be knowledgably reflective on its integration by themselves and others.

Components & Elements

Capabilities & Feelings	Investigation	Application	Integration	Transformation
Understanding of potential uses				
Roles of teacher & students				
Source of direction				
ICT skills				
Affective response				
Concerns				

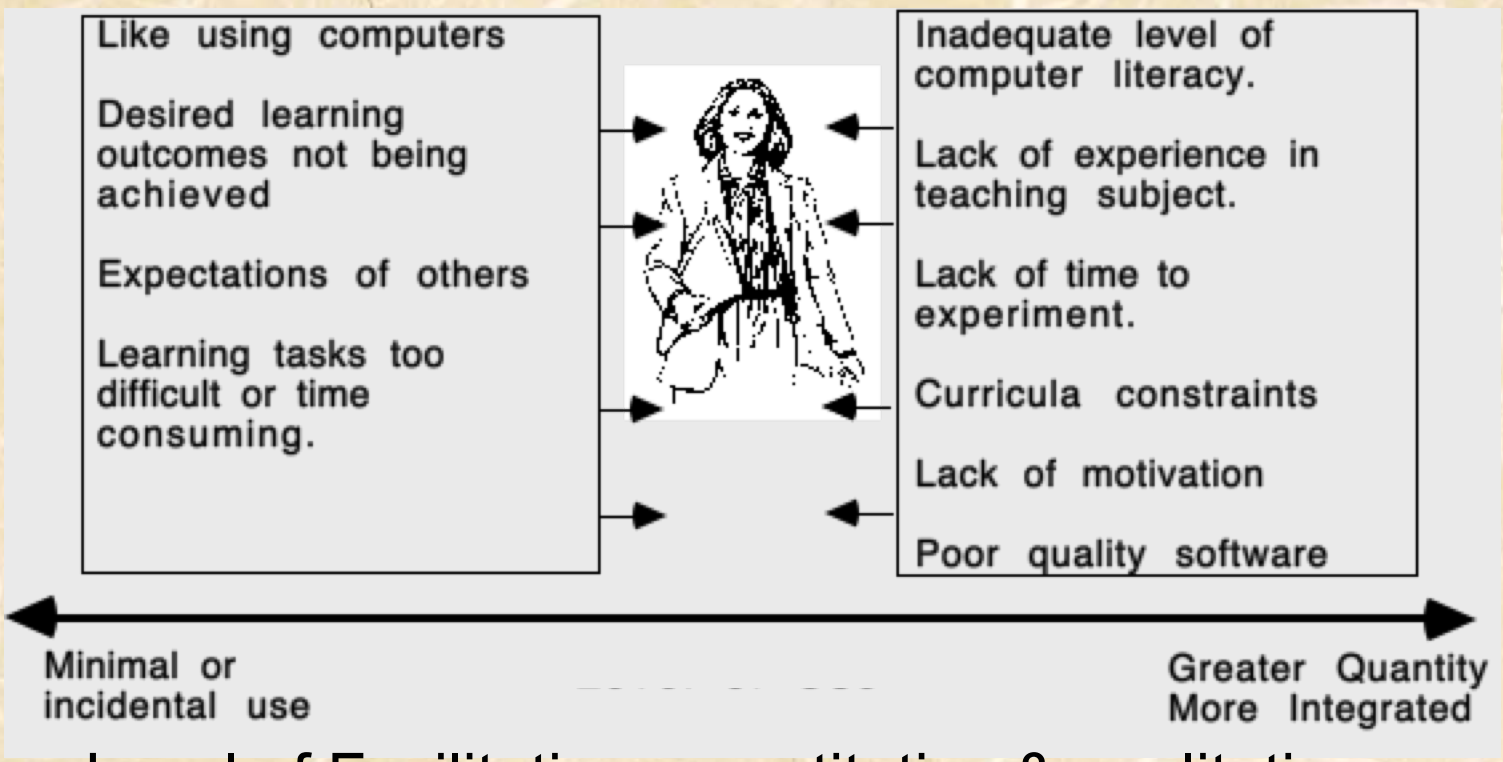
- Integration & Use
- Vision & Contribution

Supporting Progression

- Depends on internal and external factors
- External …
  - School ICT Capacity
  - School/System Environment
  - Student ICT attributes

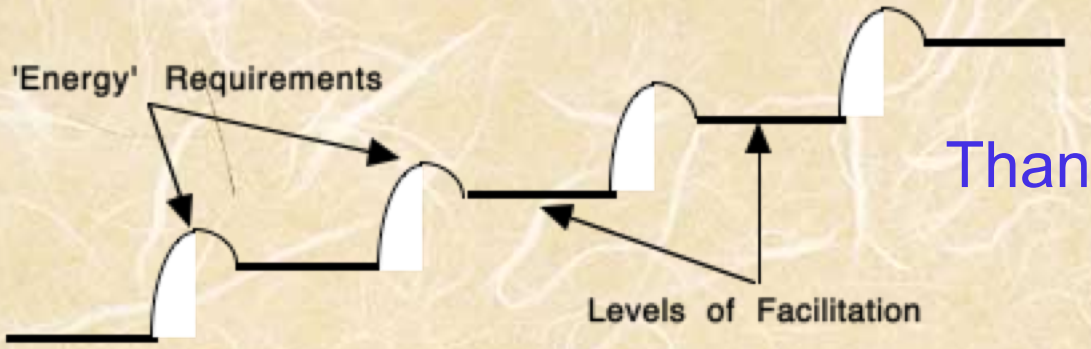
  … these may provide OBSTACLES
- Internal …
  - Teacher ICT attributes particularly **perceptions** … FORCES/pressures

Forces on Teachers



Level of Facilitation: quantitative & qualitative (Integration & Use)

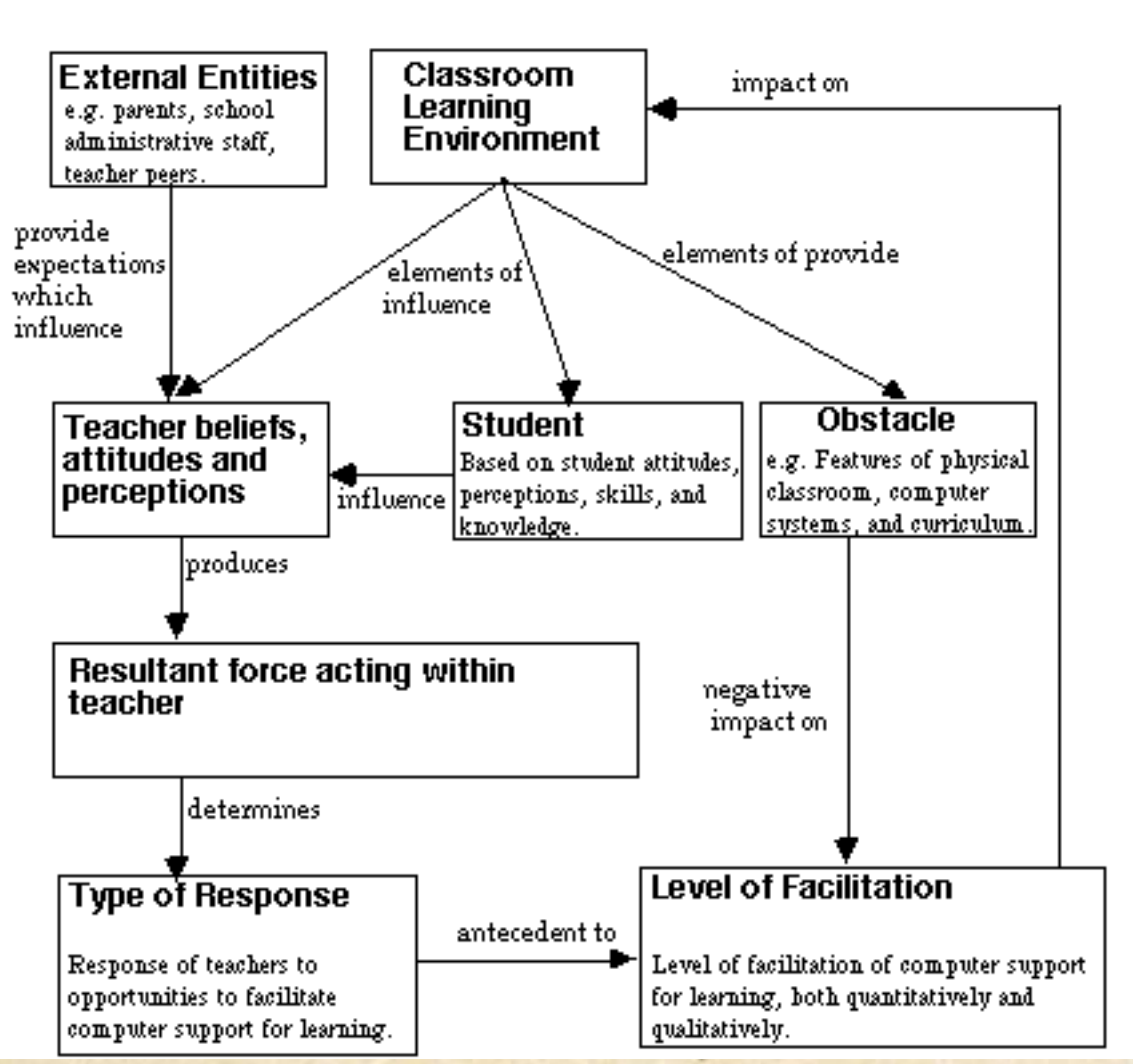
Overcoming Obstacles



Thanks Netherlands!

- Obstacles can be removed without teacher change!
- Most technical obstacles are being removed.
- Other obstacles
  - School constraints - organisational, environmental etc.
  - Lack of time, experience and support.
  - Assessment strategies ....
- BARRIERS may be obstacles or negative forces.

Completing the loop …



How may portable computing help?

- Unlikely to influence balance of FORCES immediately
  - My research has shown that many teachers do not facilitate the use of ICT even when all students have a computer.
  - Small positive influence due to perceptions of student capabilities, school/parent expectations etc.
- Likely to remove some obstacles through
  - Ubiquity
  - Invisibility
  - Flexibility
- BUT may add others …

The research?

- Ubiquitous access is readily afforded.
- The most flexible access to computer systems.
- Greater level of invisibility in the classroom.
- Reduction of the techno-centric focus typical of computer laboratory use.
- Better support for constructivist environments through a range of scaffolding tools.

- if owned by the students
  - Personal customization of computers is more likely
  - Students increase responsibility for the management of data.
  - Assume access to the computer at home.

Portable Computing?

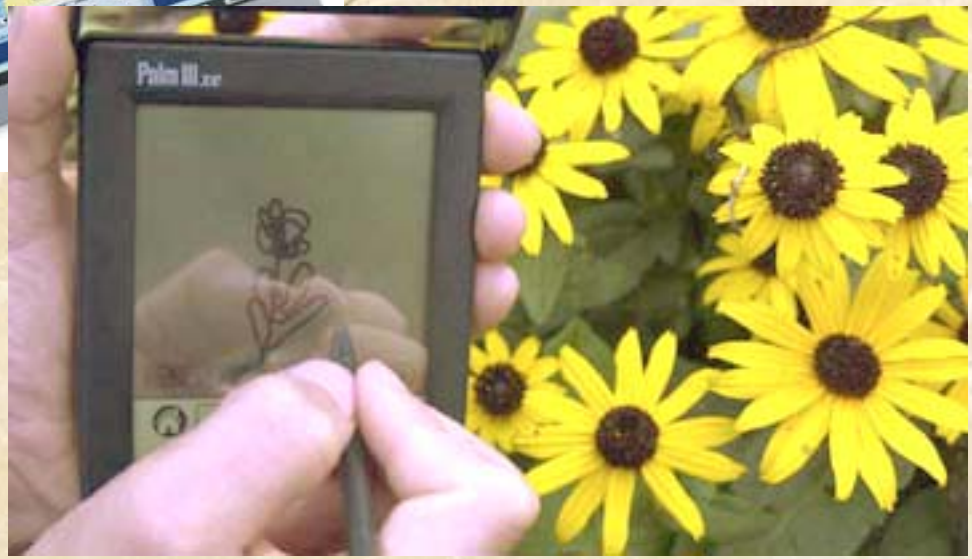
- *Ubiquitous access* to computer processing
- Access to personal data files where and when needed with appropriate software and hardware.
- Choices to provide ubiquitous access:
  - carry some of the hardware (including a processor), software and data files (e.g. notebook computer, PDA).
  - carry only data files (e.g. disk) and use them on software and hardware available in all the locations likely to need them.
  - carry nothing and access personal data files and software configurations held on a server with access through networked devices in all locations required.

Portable Computer Devices

- Readily support ubiquitous access
- Increasingly powerful and reducing cost
- Questions
  - Reliability and durability?
  - Security?
  - Ergonomics (I/O devices)?
  - Capacity and physical size requirements?
  - Level of standardisation or personalisation?

All shapes, sizes and capabilities!

- PDAs? Pen Tablets? OQO? Mira? Mobile phone?



Some Research

e.g. Anytime Anywhere Learning Program (Microsoft)

- comprehensive comparison study - laptop schools
- used to support an increasing range of activities for increasing amounts of time at school and home
- 'laptop teachers' showed a shift toward the use of more constructivist pedagogical practices.
- students using laptops had improved writing skills and confidence in computer use

Walker, L., Rockman, S., & Chessler, M. (2000). A More Complex Picture: Laptop Use and Impact in the Context of Changing Home and School Access. San Francisco, CA: Rockman ET AL

Palmtops & PDAs

"teachers indicated that handheld technology confers a range of benefits on instruction, including improving the quality of instructional activities, promoting students' autonomous learning, enhancing students' communication and collaboration, improving students' organizational skills, and enhancing students' motivation."

Crawford, V., & Vahey, P. (2002). *Palm Education Pioneers Program March 2002 Evaluation Report*: SRI International.

In Australia

- Rowe, H. A. H. (1993). Learning with personal computers. Hawthorn: Australian Council for Educational Research.
- Ainley, M., Bourke, V., Chatfield, R., Hillman, K., & Watkins, I. (2000). Computers, Laptops and Tools. Melbourne: Australian Council for Educational Research.
- Newhouse, C. P. (2001). Wireless portable technology unlocks the potential for computers to support learning in primary schools. Australian Educational Computing, 16(2), 6-13.
- … and many others.

The Questions?

- Cost & Ergonomics?
- Reliability and durability?
- Security?
- Level of standardisation or personalisation?
- Capacity and physical size requirements?

Cost & Ergonomics?

- Becker (2000) shows how the cost of the portable option is comparable with classroom desktop computer options.
- Specific to portable computers are the weight and awkwardness of carrying the computers, and the tendency for them to be used in a variety of environments leading to poor body posture.
- “many of the consequences of their [laptop] use do have solutions” (Harris & Straker, 2000)

Reliability and durability?

- Most research has found some problems associated with durability.
- Delicately constructed portable computer systems are likely to be easily damaged.
  - *Athens Academy project reported "challenges of wear and tear" and abuse of hardware.*
  - *A three year study by Kessell reported a number of reliability concerns with girls being required to carry laptops between classrooms and to their homes.*
- Portables built for school use such as the iBook fair better.
- Requires good management and selection of appropriately constructed devices (not the cheapest).

Security?

- Both the physical and logical security - balance between central and user control.
- In terms of physical security personally owned portable computers become the responsibility of the user but this then has implications for the logical security of the school's network.
- Most of the research conducted has not found this to be a major problem with the slight increase in cost of school network maintenance easily offset by the reduced corporate responsibility for physical security .
- Kessell did report some difficulties caused by the incompatibility of students installing their own software and the school being responsible for laptop maintenance.
- Most schools requiring students to have their own laptops have reported little or no physical security problems.

Level of standardisation or personalisation?

- Pitches IT maintenance convenience against the link to learning
  - IT support personnel want total control over identical systems
  - educators want environments within which the learner has maximum control with a variety of systems to match the variety of learners and learning tasks
- What is critical is whether each student has his/her own computer, not who paid for it.
- The sense of personal identity is an important issue for learners - portables more readily facilitate personalisation.
- Anything that is portable eventually is owned by the individual!

Capacity and physical size requirements?

- Expanding range of choices - experimenting...
- A report by SRI International suggested that “Handheld computers are probably best not viewed as a replacement for desktop computers but as a supplement to them.“
- Depends on the age and capabilities of the student. For example,
  - For younger children technologies such as Microsoft’s MIRA offer an interesting prospect of combining thin-client with ubiquitous access.
  - Early years (up to age 7 or 8) each student could have access to a Tablet PC kept at school and graduate to a notebook about the age of 12 years.
  - Early teenage years own a notebook or smaller device carried to and from school perhaps graduating to a PDA in the later years of schooling.

Still some barriers!

- Very few technical barriers

- Curriculum constraints
- School organisation constraints
- Teacher skill and experience
- Pedagogical beliefs and preferences

Athens Academy

- unreliability of the brand of hardware
- problems with lack of desk space and the general 'visibility' of laptops in a classroom
- even with laptops, the use of the technology support was still "outside the curriculum"
- apart from increased access to online information and an increase in presentations - little impact on teaching practices and the learning environment

Hill, J., Reeves, T. C., Grant, M., & Wang, S. (2001). *The impact of portable technologies on teaching and learning: year two report*. (Report 2). University of Georgia: Athens Academy.

… concluding

- While it is relatively safe to contend that most students in the future will have some form of portable computer system, given the historically robust nature of schools it is difficult to predict in practice what impact this will have on schooling .
- If we decide that our children do need better schooling and that computer support will assist in providing this, then portable computing technologies implemented with the appropriate support will realise the potential so long envisaged.

New Visions for Teaching & Learning in the 21st Century

By Ian Jukes and Ted McCain

What are the mandates of public education?

Essentially, we have two mandates. The first is the acculturation of the individual. It's the passing on of the accumulated wisdom of nation to the next generation. We want to develop students who have an appreciation of the aesthetic, the esoteric, the philosophical, the ethical & moral. All that they learn will not necessarily be practical but hopefully it will provide them with experiences that will lead to good citizenry...

Our second mandate

Is equally as important as the first. Our mandate is to prepare them for life, preparing them for the workplace, for a lifetime of learning, of not just earning a living but learning a living. We want to help them to relatively seamlessly become productive members of society who are able to contribute economically to the nation while also ensuring their own financial success.

Let's talk about schools

Let's first consider the present educational reality in light of our mandates, and then consider alternative possibilities that will allow us to make the transition from where we are to where we need to be. Once we've done that, let's project what this might look like for education.

How do we do this?

First, let's look at traditional teaching. Both Ted and Ian were "older" when we became teachers. How did we teach? Both of us followed our role models. Listen closely and consider what skills are being valued?

The full frontal lecture – a one act play

Okay guys, let's go. Let's get moving along here. Where were you yesterday Tom? We have a lot to get through. I only have 5 periods to get through all this stuff on Japan. Come on guys - 7 minutes have already gone by. Hand in your homework please. Where's your homework Patty? Did you forget it again?

Tony, please get your hands out of your pockets & take your feet off the desk. Mary, please get your stuff out. You'll need to take notes Where's your notebook? No you can't borrow my pencil.

Beverly, tell me what we were talking about last class. What do you mean you don't remember? Look – come on folks - let's go. I need you to take notes on the major towns, population, transport, industries, lifestyle & history of the Konsai region of Japan. You better write this down because you'll need to remember it for the test.

The Konsai regions of Japan has three major cities, Osaka, Kyoto & Kobe Osaka is the hub city. It has a population of 2,146,000. It's a port & financial center and also heavy manufacturing.

Kobe has a population of 1,875,000 people. It has copper smelters & is a major textile producer. Bill, did you write that down? We need to get through all this material for the test next Tuesday. Kobe is also port city - it's the center for ship building in Japan.

Kyoto has a population of 1,352,000. It's a center of heavy industry. It's known for its cultural heritage. In fact, during WW II, it was considered to be so rich in cultural heritage that the Allies made a conscious decision not to bomb it. A high-speed railway connects the 3 cities together
P
Pardon me James? No you don't have to write this all down if you don't want, it's entirely up to you. Yes, of course it counts. Yes you will have to know some of this for the test. Yes some of the information is in the book but not all the stuff I'm telling you. Jason please settle down - this isn't going to take that long. What do you mean Gail? Yes, of course this is relevant. Now don't argue with me. What do you mean why? Because I said so - that's why. Yes, there's a written assignment - read Chapter 3 and do questions 1 - 7 from the end of the chapter. Yes, I will be marking it ... yes of course it's graded & it could be on the final.

Do you recognize this approach?
The full frontal lecture model. What's being valued here? Does this approach occur in your school? Do you know anyone who is teaching this way? Is its use more common than acknowledged? Are there differences between the frequency with which it's taught at lower and higher grades?

Why does this happen?
It happens because it's our native language. It's the way we were taught. Many teachers have invested lives in developing this style of teaching to the point where it has become their comfort zone. So, when push comes to shove, they tend to revert to

this approach and invoke TTWWADI (That's the Way We've Always Done It) when challenged.

What else drives this?
Parental expectations - the curriculum guide. The sense that we've just gotta cover it. It's all about getting kids to the next class, the next grade, the next level of education. It's particularly built into the evaluative tools of system and the multiple levels of testing that students face - the test on Monday; the end of unit, end of term, end of year tests; the state and national exams.

What's <u>really</u> taught?
The major focus is on content - on the explicit curriculum - much of it, when we look at it honestly, is instruction in vacuum, with little relevance to the real world. How do students respond? By asking questions such as "Why do we need to learn this?" or "Will this be on the test?" or "Does this count?" They don't have to say anything. You can tell what they're thinking from their body language. All of these behaviors are indicators that instruction is happening in a vacuum – that what they are being taught has little relevance to their world.

Why do students tolerate this?
Primarily because they have to! We're in control. What is taught and how it's taught mainly define the learning environment. This tends to create a sense of absolutes. It also rewards rote, memorization and the regurgitation of the 'right' answers needed to pass the test. However, much more than content is learned. Students learn a fundamental approach to life with the teacher as their role model who sends powerful explicit and implicit messages about how and what students will learn.

So what's the message?
Read the book take the notes, answer the questions, take the test then forget it (teach, test, turf.) The teacher speaks and the student listens. The teacher initiates, the student reacts. The teacher is proactive and the student passive. Basically, the message is to follow orders, don't think, just do it - and your opinions don't really matter.

Where did this model come from?
This culture of dependency is a perfect fit with the Industrial Age workplace and mindset. Dependence on manager, following instructions in order to solve problems and once again, don't think, just do the job. Passively accept the way things are.

So what's wrong with that?
Don't get us wrong – this model worked well for almost a 100 years. It was part of an educational system that was specifically designed to ensure that students would drop

out. Why? It was because only the top 20% needed to move on. And there were lots of good paying, union protected jobs available. School was simply part of a bigger societal process.

Not anymore

Today, we live in a fundamentally different world than the world that the previous model was developed for. There has been a technologically driven transformation of the workplace along with a proliferation of automation, robotics and information technologies, but many schools haven't changed. Many are still trying to uphold the fundamental tenets of the Industrial Age workplace that largely no longer exists.

So what happens?

What happens when students are taught this way for 12 months, 13 years and when this becomes the norm? Does it affect the way they think and view the world? And if this is the only way they are taught, what's in a student's skills toolbox at graduation? What happens when he or she tries to use the toolbox?

The new workplace reality

A look at the modern workplace is an opportunity to look through a window that many people haven't seen. In the community where Ian lives is a large manufacturing company called Western Star. Western Star builds 16 wheel trucks and all terrain vehicles. They employ more than 5000 people in 5 production facilities. Several years ago, in response to changing times, they abandoned the old ways and adopted the Toyota Manufacturing System model. Using this model, the production line is actually five parallel lines.

On the production line, orders reach & "pull" materials through the plant. If your customer doesn't need a product, the company doesn't produce it. Using the principles of zero-inventory and just in time delivery, the orders pull supplies into the production line. Suppliers deliver materials, typically within a 2-hour window. Trucks literally back up to the production line and off-load the necessary metal, plastic, hoses and other parts.

In the plant, every worker has a customer. The welder's customer is the framer; the framer's customer is the painter. All of the workers work to keep their customers happy. To do this, they only produce materials when they are needed. That's because wide area networks and computer systems keep Western Star in close contact with both their suppliers and customers. Based on the day by day input they receive, they redesign the products and then reprogram the robots every night. If you build something and the design changes, the parts you produce may not fit.

This is an amazingly high tech environment. Robots & human labor work together side by side. When a problem is encountered on the production line, lights that are positioned on the production line start to flash – at that point, the production line slows or stops. At that point, all of the workers on the line come to solve in real time - painters, welders, framers all work to solve the problem by making decisions in real time.

Meanwhile a clock tracks the amount of down time to the production line – that's because bonuses are paid on production, not just for showing up. This is high-pressure work. And you may be surprised to learn that the workers absolutely love it because they own the system. But to work here, a completely different set of skills is needed than in the past.

GenNext meets the new workplace

Junior gets a job in such a production facility. The days of storehouses of inventory are gone forever. They just cost too much. Timing is everything. If supplies don't make it in time, the whole production line may have to shut down. Junior works both independently and as part of team. His job is to deal with complex statistical numerical control systems in order to quickly load trucks in the correct sequence for delivery in a very narrow time frame. This is extremely high-pressure work.

One day, Junior's department has a problem. Suddenly there are an increasing number of complaints over missed and incorrect deliveries. There is trouble in loading trucks on time in the right sequence. Management asks for creative solutions to the problem. The department manager turns to Junior for help and requests a definitive solution in the next 24 hours.

How does Junior respond?

If Junior is a product of Industrial Age thinking and systems, we have a serious problem. If he's a product of the traditional system, throughout his schooling, he's been raised in a culture of dependency and probably has little if anything in his intellectual toolbox to help him solve the problem. That's because, in the Industrial Age model never expected Junior to make important decisions. He was just expected to follow orders and take multiple choice tests. So what does he do? Immediate physical & mental paralysis probably followed by a strong desire to run away

Chances are that he hasn't a clue as to what to do. Junior is a product of the system – he's been raised in a culture of dependency. In all likelihood, he is a dependent, theoretical learner with few applied higher level thinking skills. Consequently, he's generally paralyzed without specific direction because most of his learning has occurred in isolation. Thus, he doesn't easily make connections between subject areas or disciplines; and he has a fragmented, non-holistic, ready

fire aim approach to problem solving. With little self-confidence or experience, he waits for instructions.

Inevitably this leads to complaints from employers. While reading and writing is important to them, their number one complaint is not reading or writing – it's that students wait to be told what to do. And in business today, employers want workers that can hit the ground running because they do not have the time to teach them these skills.

Thus, when Junior fails to respond to the situation, this inevitably leads to questions and complaints about what we teach and what they.

In today's world, what do they want - what do they need?
Business today wants team and independent problem solvers with good interpersonal skills. They want people who view issues holistically and who can apply theory to real world, real time, real life situations and who demand excellence from themselves and their team.

To do this
We must teach in a fundamentally different way – we must teach a fundamentally different set of skills. We need to teach problem solving skills in a systematic manner. We much teach both the theory and the application of theory to real world, real time situations. Willard Daggett tells us that applied is a higher order thinking skill because you can't apply something until you first understand the theory behind the application of the skill. Typically today, the term applied as used as a euphemism for "easier", "dumbed down" or for skills for slow students.

How can we do this?
The way we should be - another one-act play. What would the curriculum look like? Focus, once again, on what is being valued.

Good morning class. Please hurry up and let's get going. I've got an interesting problem for you to solve this week so the quicker I get out of your hair, the quicker you can get on with it. Usual groups please.

Okay guys, let's go. Each group has been given an outline of the problem, the resource guides, the self & group evaluation forms and the problem solving forms. They're in the blue envelopes on your table. Your job for the next 5 periods is to become travel agents. Remember that in business today, it's really competitive - it's all about adding value to your services - there are lots of travel agents out there - how do you gain a competitive edge other travel agents?

Try to keep this in mind as you work through this problem You will shortly be receiving a phone call from Svenn Mikkelsen, the president of IT Pacific Shipping, they're one of our biggest clients. Your job will be to prepare a complete itinerary for 5 IT executives who will be traveling to the Konsai region of Japan on May 1st for two weeks. They will need 3 days each in Osaka, Kyoto, and Kobe where they will be looking for new business

IT Pacific will provide you with the dates they'll need to be in each city. IT also wants you to build in 5 days of holidays for them during the trip - be sure to arrange some good holiday & rest & relaxation experiences. They'll definitely want to slip in some sightseeing if possible. They've indicated that they'd like to visit some religious & historical sites, see the government buildings, do a bit of shopping, try some different foods, and maybe see a cultural event or two.

They've mentioned that they'd especially like to visit some places that Western tourists wouldn't normally go. No I don't think their boss will pay for the trip to the Geisha house Sam! And no, it won't help you or your group to get a better grade

Remember that their boss is very price conscious so don't even think about sending them first class! Yes, Marion, a Japanese hotel instead of a Western hotel would be just fine. Economy class is good! They'll need a complete itinerary including information on the hotels, airfare, railways, travel costs, historical background, tourist destinations - the works. You need to keep a log of your time and be ready to provide IT Pacific with a detailed bill. And you will also need to invoice me for your grade. The problem is written up in detail in your assignment envelope. I'm available for each group as & when you need me. Just call out my name if you need help.

What's different here?

How is this different? Who owns the learning? Will the students discover the content covered in the previous lesson using the traditional teaching we watched previously? Possibly. The difference here is that the content is learned within the context of a specific problem to be solved, which allows for a much greater chance of long term recall. Context is the key here. Here things are learned and taught. The learning is driven by the context of the problem. Who owns the problem? Students become the owners of their own learning as they deal with real world problems.

At the same time, the teacher takes on the role of a customer or client. The teacher gives the problem (in role) and sits down. Initially most students will sit there, waiting to be told what to do. The teacher (in role) may now stand up and say "it's worth 400 marks and it's due on Monday – do you have any questions?"

Giving the students the problem fosters the personal ownership of the learning. It becomes the learner's issue, not the teacher's. Plus it provides role-playing opportunities for people with little if any previous experience.

The teacher's task is to add value to the content and to add value to the experience by crafting problems that provide a framework on which to hang the information that must be learned, thus allowing the content to be learned in far broader context. The teacher is the one who shapes the learning so that the students interact with the structured process skills required to tackle such tasks.

The key here is developing an engaging methodology – something that hooks the students. This is combined with pre-determined criteria in the form of a checklist of specs negotiated by both the teacher and the student that outlines precisely what students need to do and what they will get in the way of a mark if they accomplish all of the criteria.

Learning is based on 4 D's of problem solving

The process Ted has developed for his students is called the 4Ds. It is based on the structured thought process found in systems analysis and design and it has proven to be effective in virtually every area of human endeavor. This process involves 4 distinct steps that lead to effective solutions to problems. The 4 steps are:

i) Define

Students must be taught to define a task so that the problem is fully understood before work begins. How many times have you seen someone waste time working on the wrong task? Thus, it is imperative that students learn to clearly define the task to be done and then confirm their understanding before proceeding any further. This is a valuable life skill. In addition, by turning the responsibility for defining a task over to the students, we force them to use a variety of higher-level thinking skills as they determine what needs to be done.

In the traditional approach to instruction, teachers do the defining and designing work for their students. Assignments are often presented as something already half-finished, with the questions and the directions for finding the solution already in place. This fosters and maintains a culture of student dependency on the teacher to provide the appropriate materials and information. The real world simply doesn't work this way and by teaching in this manner, we prevent students from learning to think independently.

ii) Design

Once a problem has been defined, students must then design a solution. Often this will require students to learn new skills or acquire new information to be able to successfully accomplish the task to be done. The goal in this step is to have the students themselves determine what they need to learn to accomplish the task they have been given. This is a key in fostering independent thinking in students. They will not be able to depend on teachers when they enter the workplace so we need to begin giving the responsibility for learning over to them before they leave us. This means new roles for teachers. If the students are given the job of determining what needs to be learned to accomplish the task they have been given, it becomes the job of the teacher to craft the problems that lead students into the material in the curriculum that needs to be covered. It also means that teachers become guides who point students in the right direction after they have determined what they need to learn.

iii) Do (Develop)

Once a problem has been defined and a plan for its solution has been designed, students must then put the plan into action. This could mean participating in a debate, writing a story, building a desk, writing an essay, baking a cake, doing an experiment, or creating a multimedia presentation. Whatever the task, the students must apply the learning that took place in the design step to do some real work.

iv) Debrief

This is a step that is often overlooked in education. However, determining whether or not you have actually accomplished what you set out to do is an essential part of learning. It provides useful feedback that helps students to do better next time. Continual feedback and performance reviews are just 2 examples of how the Debrief step is built into the procedures of many businesses who are striving for excellence from their employees. It is critical that students get feedback on both the product they have developed as well as the process they followed in creating it if we want them to get used to the environment of continual improvement they will surely face upon graduation.

It is critical that the learning in every stage of the 4Ds approach involve real world relevance. Students quickly see the worth in applying their problem solving skills to real world tasks. This fosters ownership of the problem solving process and leads to a culture of autonomy. Repeated and systematic application of the 4Ds empowers independent thinkers. When students are consistently taught to learn through this problem solving approach, they enter the real world knowing what to do when they encounter the problems they are certain to face.

While we cannot expect students in Kindergarten to have this set of skills, it's reasonable to expect them from all students by the time they reach Grade 12. Developing this set of process skills should be a curriculum goal applied through a combination of repeated practice together with a policy of progressive withdrawal. Using this approach, teachers first walk younger students through the process step by step. But as students get more experienced in applying the 4Ds to problem solving, teachers progressively withdraw from supporting students, expecting them to do more and more of the work independently. By the time these students reach Grade 12, they should have the necessary skills to allow them to work through real life problems independent of their teachers.

As we mentioned, graduates of the traditional school system find themselves steeped in a culture of dependency. From Kindergarten to Grade 12, they have been in a system that has reinforced the idea that content and memorization taught by rote learning is more important than thinking itself. When we take this system away from our students at graduation, we shouldn't be surprised to see they are not able to stand on their own. As we begin to make the transition from traditional teaching methods to a problem solving approach for all students, we must learn to gradually let go. It's like watching small children learning to walk. They fall often, but eventually they are able to move around on their own. When it comes to these problem solving process skills, we must equip students with an understanding of the 4D approach and then let go of them so they can fall and make mistakes. In that way, we can provide guidance and feedback to help students become better problem solvers while they are still with us.

Role-playing is a critical of this model

It's a process that can be applied across all human endeavors. How did you get better at anything? By practicing it! And if we want students to be ready for modern workplace, curriculum, we must have real world links

Do students learn content? Yes, of course they do. But if the content is forgotten, what else is learned? It's he process skills that can be used again and again because they are learned within the context of real time, real world tasks.

What would happen if:

Students were taught like this for 12 months? Students were taught like this for 13 years? If this was the norm? And what different skills would be in their skills toolbox at graduation if they were taught this way? And how can we get beyond TTWWADI? (That's the Way We've Always Done It)

Transcendental teachers at work

Transcendental teachers use a structured approach; they teach the 4Ds of problem solving (Define, Design, Develop, Determine) and the 5As of information fluency: (Asking the right questions, Accessing the data, Analyzing the information, Applying what has been learned, and Assessing both the process and the product.) For more details on the 5As see the It's Not the Internet, It's the Information and Born to Be Wired handouts at http://www.ianjukes.com as well for sections from the NetSavvy: Building Information Literacy in the Classroom book. These principals are used as the foundation for all learning.

What are the characteristics of teachers who teach this way?

Transcendental teachers teach students to work with incomplete information incrementally; they progressively introduce informational disorder and uncertainty as the norm. They model interpretation and extrapolation of information from a variety of sources; they walk what they talk, rejecting strategies that inhibits creativity and individuality or promotes a culture of dependence. Transcendental teachers consistently use the strategy of progressive withdrawal to create a culture of autonomy. They distinguish between covering and learning curriculum - they practice the poorly rule which states that "if it's worth doing, it's worth doing poorly in the beginning" - they encourage productive or useful failure and model the independent thinking, problem solving and information fluency skills that they want their students to develop. Transcendental teachers understand that kids do what you do, not what you say; and in particular, they understand that what's modeled by the teacher carries powerful implicit messages. Such teachers work to shift ownership/responsibility of learning to their students by explaining the relevancy of what is being taught by providing materials in the classroom that reflect the real world. How do they make all this happen in their classrooms?

The Seven Layers of Learning

Transcendental teachers make connections to the 7 layers of learning. The 7 layers are:

- *to content*
- *to process skills*
- *to tool (technological) competencies*
- *to real life/world/career/workplace situations*
- *to communities and community resources*
- *to parents*
- *to qualitative and quantitative assessment*

An Elementary Example

Scenario: I have owned a pet shop for many years and made a small fortune selling cats and rate, dogs and frogs, guppies and puppies ...you get the picture. But I'm an over the horizon thinker and I'm beginning to realize that the real money is in exotic pets. I'm putting a proposal out for tender to several groups in my class. I have now hired you as consultants, and I need you to come back in 7 days with recommendations at to how I should expand my pet shop and turn it into an exotic pet shop. You will need to create an expansion budget as well operational budget. You need to advise me as to what types of creatures I should be adding to my store – and if you recommend spitting cobras, or Komodo dragons, or giraffes, or elephants or whatever, you need to in each case be able to tell me how much they will cost, what will be needed to house them, what will be needed to take care of them, to feed them – and are there any special considerations that need to be taken into account? Applying the 4Ds and the 7 layers, let's ask some questions?

(Please note: We only have room for a quick overview here – for complete details, check out the recommended resources provided below)

Are there content connections?

1. *Science – characteristics of different animal – behavior – handling...*
2. *Math - calculating living area, feed requirements, estimating expansion & operating budget...*
3. *English - writing reports, communication skills, writing proposals...*
4. *Could you and your students make connections to other areas SS, Music, Art, Home Economics, PE...?*

Do they learn processes?

Could critical information processing, critical thinking, decision making and problem solving opportunities be introduced in a structured manner?

1. *critical thinking*
2. *problem solving*
3. *decision making*
4. *information literacy*
5. *technical reading*
6. *technical writing*
7. *working in teams*
8. *learning in teams*
9. *other process skills?*

Do they learn how to use tools *(notice we didn't say technology)?*
Is the use of the tools contextualized, with a focus on the task rather than just the tool, so that learning about the technology is just an incidental but essential by-product of the learning?

1. *could they learn how to use a tape recorder, not to learn the tool, but to use for interviews?*
2. *could they use a video camera to collect information?*
3. *could they use a network, CD, Explore, e-mail or other software for research?*
4. *could they use Word for report writing?*
5. *could they use Hyperstudio for presentations?*
6. *could they use Excel to create budgets?*
7. *any other software that might work?*

Are there workplace connections?
Who in your community could you call on to provide additional expertise above and beyond that held by the teacher? Could you contact and work with:

1. *pet store owners*
2. *veterinarians*
3. *accountants*
4. *contractors*
5. *builders*
6. *how about the virtual experts available on-line?*
7. *how about one or more of the more than 1400 virtual zoos or 300 virtual aquariums?*
8. *how about on-line societies such as the World Wildlife Foundation or Greenpeace?*

Are there community connections?
Who in your community has a vested interest in the fact that you are considering bringing spitting cobras into town? Could you contact and work with:

1. *city government – bylaw enforcement*
2. *other that are competition or partners to your businesses*
3. *the media*
4. *senior citizens*
5. *community activists*
6. *humane societies*
7. *animal rights organizations*

Are there connections between home and school?

How can we go beyond just informing & communicating with our parents about what is being studied in school?

1. *could we gain access to personal expertise from parents & specialist contacts they might have*
2. *could parents provide structured guidance with practice in interviewing, doing research & making oral presentations*
3. *are there ways to extend the learning beyond the traditional 9 to 3*

How about assessment?

1. *is it project-based?*
2. *does it allow for contextualized learning?*
3. *is there a means of authentically assessing learning?*
4. *is there a means for summative, formative, qualitative, and/or quantitative, measurements of learning that would align with state standards?*

A critical question

If they forget content, will anything else of substance be learned? And the answer is the process & problem solving skills that have been learned by applying content within context of real time, real world tasks

A Secondary Example

Scenario: I live in a town that has been growing dramatically for the past several years. In fact, it has grown so quickly that the existing water system has been completely overwhelmed. A bond has just been passed to upgrade the current water system but it will be 3 to 5 years before this will take place. I have hired groups of students in my class as consultants. Their task is to create a presentation for City Council outlining an interim plan to manage the existing water supply while effectively informing the community of the current situation and the steps they need to take in the meantime to conserve the existing water supply until the new system is in place.

(Please note: We only have room for a quick overview here – for complete details, check out the recommended resources provided below)

Are there content connections?

1. *Physics - creating water pressure*
2. *Biology - controlling water quality, protecting the existing water table*
3. *Math - calculating water volume & flow*
4. *English - creating effective information pamphlets, writing reports & proposals, making presentations*
5. *Social Studies, Music, Art, PE...*

6. *Could you and your students make connections to other areas SS, Music, Art, Home Economics, PE...?*

Do they learn processes?

Could critical information processing, critical thinking, decision making and problem solving opportunities be introduced in a structured manner?

1. *critical thinking, problem solving, decision making skills*
2. *research skills*
3. *information analysis*
4. *speaking & listening*
5. *technical reading & writing*
6. *working & learning in teams*
7. *other process skills?*

Do they learn how to use tools *(notice we didn't say technology)*

Is the use of the tools contextualized, with a focus on the task rather than just the tool, so that learning about the technology is just an incidental but essential by-product of the learning?

1. *would they use Explorer & e-mail for research?*
2. *WP for report writing?*
3. *Science probes?*
4. *graphing tools?*
5. *Power Point for presentations?*
6. *publishing tools for creating effective newsletters?*
8. *any other software that might work?*

Are there workplace connections?

Who in your community could you call on to provide additional expertise above and beyond that held by the teacher? Could you contact and work with:

1. *city planners*
2. *water engineers*
3. *well drillers*
4. *geologists*
5. *testing agencies*
6. *hospitals*
7. *bottling companies*
8. *waste recycling agencies*
9. *virtual experts?*

Are there community connections?

Who in your community has a vested interest in the water supply in your community? Just about everyone!! Could you contact and work with:

1. recreation organizations
2. environmental agencies
3. environmental activists
4. Sierra Club
5. businesses
6. realtors
7. senior citizens

Are there connections between home and school?

How can we go beyond just informing & communicating with our parents about what is being studied in school? Could we gain access to personal expertise from parents & specialist contacts they might have? Could parents provide structured guidance with practice in interviewing, doing research & making oral presentations are there ways to extend the learning beyond the traditional 9 to 3

How about assessment?

1. *is it project-based?*
2. *does it allow for contextualized learning?*
3. *is there a means of authentically assessing learning?*
4. *is there a means for summative, formative, qualitative, and/or quantitative, measurements of learning that would align with state standards?*

And now, once again, the critical question

If they forget content, will anything else of substance be learned? And the answer is... the process & problem solving skills that have been learned by applying content within context of real time, real world tasks

SOME GREAT RESOURCES

Bridges Career Explorer *(www.bridges.com)*

The Individual career counselor is an incredible web-based resource for teachers at all grade levels whether you want career information for your students or just want to embed life connections into your lessons. While it is a commercial product (between $800 and $1500 per year for all stations at a site depending on the size of the site), you can go out to www.bridges.com and take a close look by signing up for a free one-month membership – take the time to explore.

Bridges is designed for those who know & those who don't what they want to know there is the chance for students to search & research various careers and get

detailed information using tools that are driven by personal interests.

For example, suppose that you or a student wanted information about becoming a wildlife biologist – do a search and up comes a screen that describes what a wildlife biologist does in detail.

If you're still interested, you click again and up comes an interview with a wildlife biologist, telling you how they came to be one – what skills they have and how some of the issues are.

If you're still interested, then click again and it poses a series of problems related to being a wildlife biologist and challenges you to show your understanding of the science, math, language, decision-making, communications and personal skills you will need to be successful. In the case of the wildlife biologist, amongst other things, you have to calculate how much a grizzly bear weighs so that you can figure out how much tranquilizer you have to put in the gun in order to knock down but not kill the bear (and ensure that it doesn't wake up when you're moving it.

If you're still interested, you click and it connects you to multiple web sites set up by wildlife biologist organizations. The information is regularly updated by dozens of on-line researchers. THIS SITE IS A GOLD MINE

Analyze and Apply *(www.analyze-apply.com)*
Another commercial products with about 5 feet of paper-based materials – incredible resources – they cost about $10 per student – to get an idea of how comprehensive they are, go out to www.analyze-apply.com and download some of the grade specific sample lessons. There **3***06 instructional units (each having multiple lesson plans) for teachers that change the context and pedagogy for core curriculum instruction, reflect the proficiencies students need in an information rich learning and work environment. There are:*

- *Grades 1-5 - 96 units*
- *Grades 6-8 - 72 units*
- *Grades 9-12 - 138 units*

The activities integrate adult roles into the classroom and in doing so, connect the curriculum with the workplace by developing units that focus on cooperative, interdisciplinary, problem solving based learning. The materials include extensive authentic assessment standards and promote community partnerships. The 8 core SCANS proficiencies that students need to operate in an information rich learning & work environment are embedded into the lesson plans, thus changing the context & pedagogy for core curriculum instruction

Units by grade level and subject areas

- *Grade 1/2 - 12 Language Arts and Math units for each grade level*
- *Grade 3-8 - 24 Language Arts, Math, Science, and Social Studies units for each grade level*
- *Grade 9 - 36 Communications Arts, Math, Science, Civics, Algebra 1 and Biology units*
- *Grade 10 - 48 Communications Arts, Math, Science, Algebra II, Geometry, Earth Science, Chemistry, & World Geography units*
- *Grade 11 - 30 Communications Arts, Service, Learning and Law, US History & Sociology/Psychology, Trigonometry units*
- *Grade 12 - Communications Arts, Math, Calculus, Physics, Economics, and Government*

A connections to curriculum for a multitude of careers are provided, including:

- *advertising consultant*
- *health products*
- *automobile repair shop*
- *greens keeper*
- *computer technician*
- *wildlife biologist*
- *architect*
- *travel agent*
- *A multitude of careers*
- *nursery employee*
- *hospice coordinator*
- *engineer*
- *medical technician*
- *legal aide*
- *dietitian*
- *advertising*
- *piano tuner*
- *A multitude of careers*
- *stockbroker*
- *recycling engineer*
- *dermatologist*
- *hydrologist*
- *landscape architect*
- *police officer*
- *nurse/physician*
- *240 other careers*

There are more than 5000 pages of lessons, and the price is incredibly reasonable:

- *grade levels 1-2 - $100 per grade (12 units)*
- *grade levels 3-6 - $200 per grade area (24 units)*
- *grade levels 7-8 - $100 per subject (12 units)*
- *grade levels 9-12 - $200 per subject area (24-42 units)*

This resource is well worth considering! Go out to the web site, identify a grade level and download a sample lesson.

Teaching in a Digital Age *(www.glef.org)*

Teaching in a Digital Age is inspired by the commitment of filmmaker George Lucas to help transform learning. For several years, through the George Lucas Education Foundation, he has been on cutting edge of how new technologies can transform the learning experience. The site has a wealth of materials and resources including the 5 short Web documentaries that include interviews & articles with individuals and groups that are taking innovative approaches to school leadership, PD & tech use. There's also an excellent 35-minute video about Sherman Oaks Community Charter School plus 5 short Web documentaries that you can order from the site for $10

Beyond this, at the site there is an exceptional collection of articles, interviews, & digital video clips that highlight exceptional teaching practices in schools, districts or programs. One of the coolest parts is that you can have access all digital content according to an index of topics. By selecting a topic such as "Mentoring," you can find related articles, people, resources & organizations from the database. A powerful search tool enables users to search the GLEF database by keyword for articles, interviews, organizations, people (authors & experts), & resources (websites, books, & periodicals). In addition the GLEF produces a monthly newsletter called Edutopia. There's lots, lots more. Go spend some time out at the site.

How do educators typically respond to this kind of instructional model?

Yabbut - yabbut - yabbut - yabbut. Give me a break!!!!! How long will this take? What about the tyranny of the school calendar and the curriculum guide? What about all other stuff I have to teach? What about getting students ready for the test? How will I measure learning? Does this mean I'll have to change?

Getting beyond excusitis

It's easy to be yabbuts - it's easy to make excuses as to why it can't be done. If this is the approach of a colleague, then they are truly part of the problem rather than part of the solution. This doesn't have to happen overnight. You aren't expected to go zero to sixty overnight. Start with baby steps. How do you eat an elephant? One bite at a time!

Where do you start?

Declare war on old ways of doing things. Reject pureed, homogenized, predigested, formatted materials filtered through someone else's eyes. Stop reinforcing a curriculum that's a mile wide but only inch deep. Reject a system: that teaches and tests then turfs and that rewards the accumulation of vast amounts of useless, theoretical, obsolete information or that continues to emphasize and reward memorization and regurgitation. Reject a system that collectively leads to students suffering from informational anorexia and intellectually starved students.

Shift gears to:

A critical thinking, problem solving focused curriculum where process skills are transparently embedded into relevant content and which allows relevant content and processes to be internalized simultaneously.

What's our job?

We have two mandates. The first is the acculturation of our students through which we pass on the accumulated wisdom of our culture; as well as an appreciation of the aesthetic, esoteric, philosophical, and ethical. But our second mandate is equally important to the first. That being to help them become productive members of society who are able to contribute economically at same time they ensure their own financial success. Our underlying assumption must be that the future is not something that just happens to us but it's something that we build day by day and step by step. Education's job is to prepare students for that future they have to face. If we do this well, they will help us face the future we have to face. Our challenge is to revitalize public education. We have no choice. Public education is the cornerstone of this nation, the foundation of our freedom and the building block of our democracy.

For further information, contact:

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A Model for Training the Melioration Skill

1995..2000...2005..2015..2020..2025...2035..2045..2050..2055..2060...2065

Dr. David Passig

Ms. Adva Margaliot

Bar-Ilan Univ.

www.passig.com

Outline

1995...2000...2005...2015...2020...2025...2035...2045...2050..2055..2060...2065

- Defining Melioration
- The Training Model
- Research Design
- Syllabus
- Evaluation

Melioration

1995...2000...2005...2015...2020...2025...2035...2045...2050..2055..2060...2065

Definition: The skill of selecting the appropriate amalgam of information and implement it in problem solving in different situations dependent on time and place, in order to ameliorate that commixture

Behavioral terms:

Connotation, Adaptation, Forgetfulness

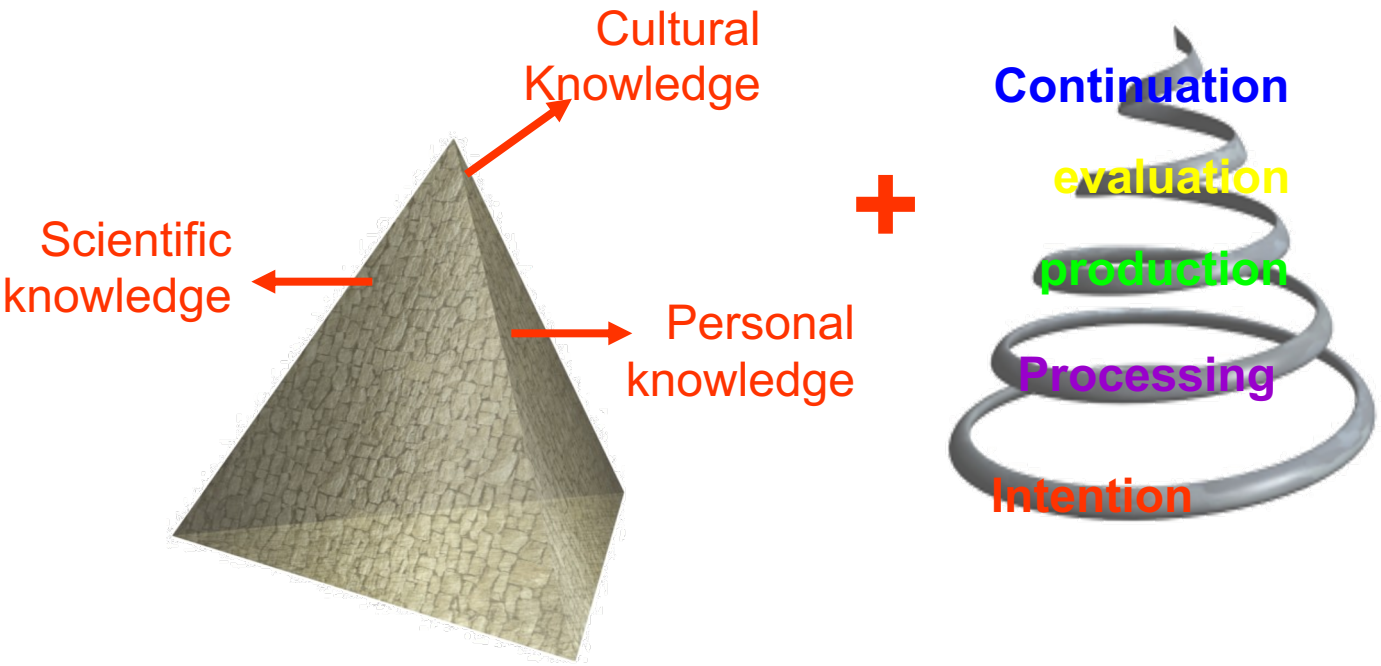
Five Stages in skill development: Intention, Processing, Production, Evaluation, Continuation

Training Model

1995...2000...2005...2015...2020...2025...2035...2045...2050..2055..2060...2065

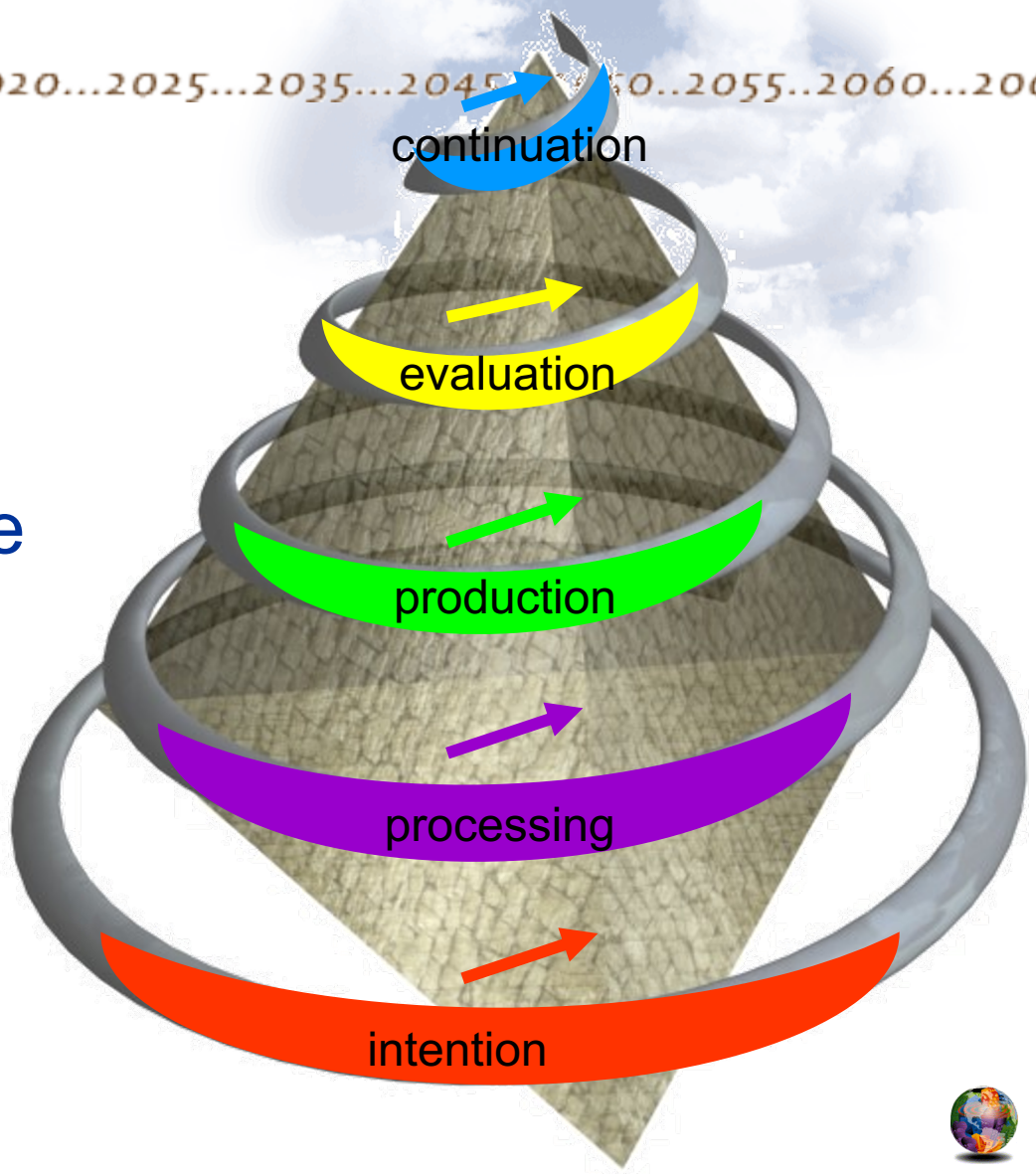
The Model combines to dimensions represented by two geometrical shapes:

- It reflects three types of knowledge
- and the five stages of skill development



Spiramid

The 3-D concept combines a more holistic perception of world knowledge with long term learning stages



Participants

1995...2000...2005...2015...2020...2025...2035...2045...2050..2055..2060...2065

- Teachers' college
- 20 students
- A course on science education
- A teaching unit on "energy"
- One semester, 3 hours a week =15 sessions

Syllabus

Dimensions / Stages	1. Scientific knowledge	2. cultural knowledge	3. Personal knowledge
1. Intention	1.1 The intentions of meliorating, green sources of energy	1.2 Cultural intentions of meliorating energy	1.3 Identifying the learner's intentions for meliorating his personal knowledge
2. Processing	2.1 The processes of developing new energy sources	2.2 The processes of producing and exploiting energy by people during the history	2.3 The processes of broadening personal knowledge about the production of energy
3. Production	3.1 The products of smart energy	3.2 Cultural products of energy in different areas	3.3 The use of energy from a personal perspective
4. Evaluation	4.1 Evaluation of the products of energy, and their influence on the development of future energy sources	4.2 Evaluation of the influence of the melioration of energy on different cultures.	4.3 Evaluation of the contribution of broadening of personal knowledge
5. Continuation	5.1 Additional areas which are relevant to the continuation of the melioration of energy	5.2 Location of melioration of energy among cultures	5.3 Focusing the area of personal interest in continuing to develop

Evaluation tools

1995...2000...2005...2015...2020...2025...2035...2045...2050..2055..2060...2065

- **Projects: generating and evaluating 2 new ideas that meliorate energy production**
- **Portfolio of the learning process**
- **Peer evaluation of validity of meliorated ideas**

Contact

1995...2000...2005...2015...2020...2025...2035...2045...2050..2055..2060...2065

Dr. David Passig, Futurist, Bar Ilan U.

Head Grad Program of Education Technology

www.passig.com

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IFIP - Melbourne 2003…

"The computers are fine, the staff's down."

Thinking skills and ICT use in the classroom
(Is it working and what does it do?)

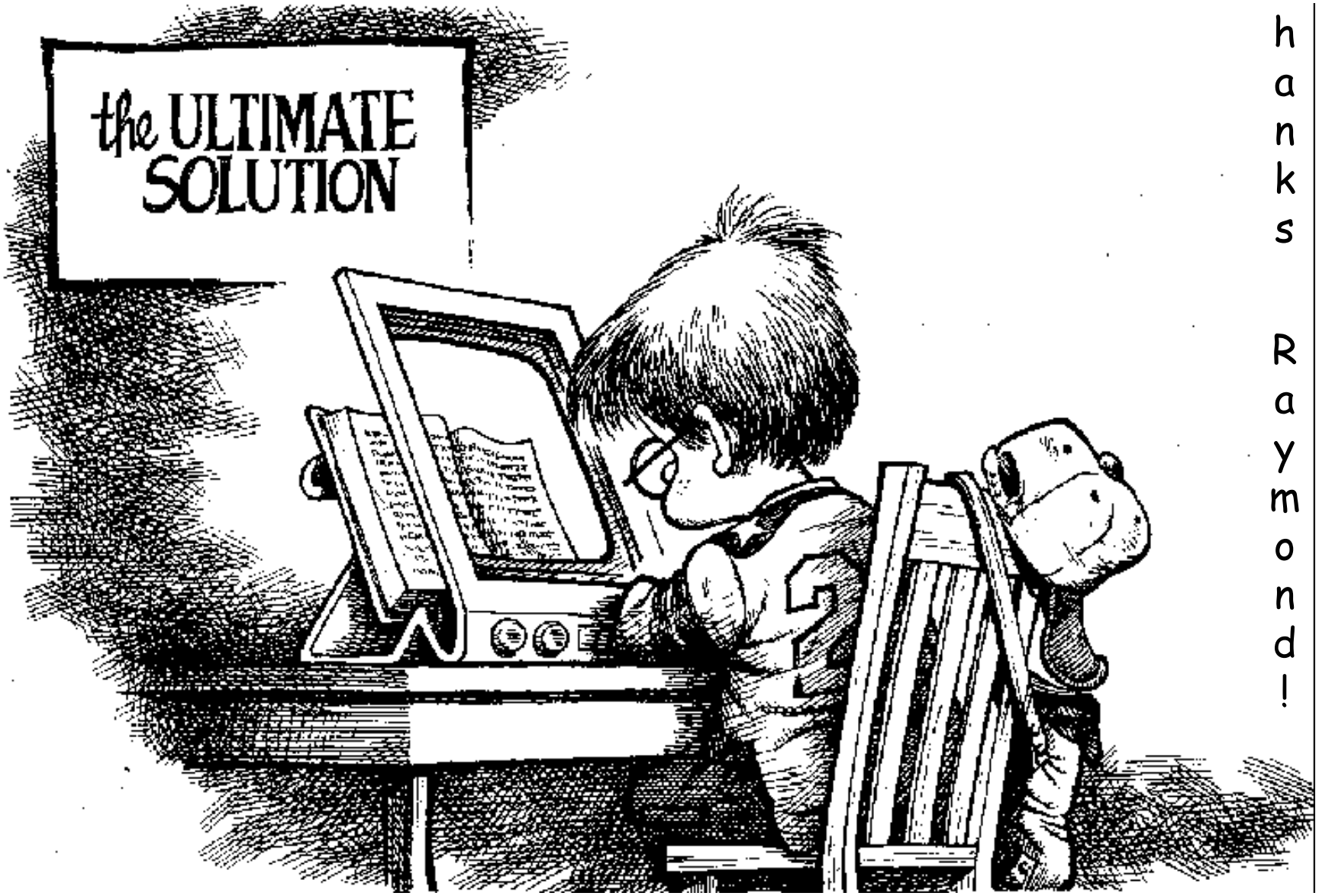
Tim Denning

Keele University

t.j.denning@educ.keele.ac.uk

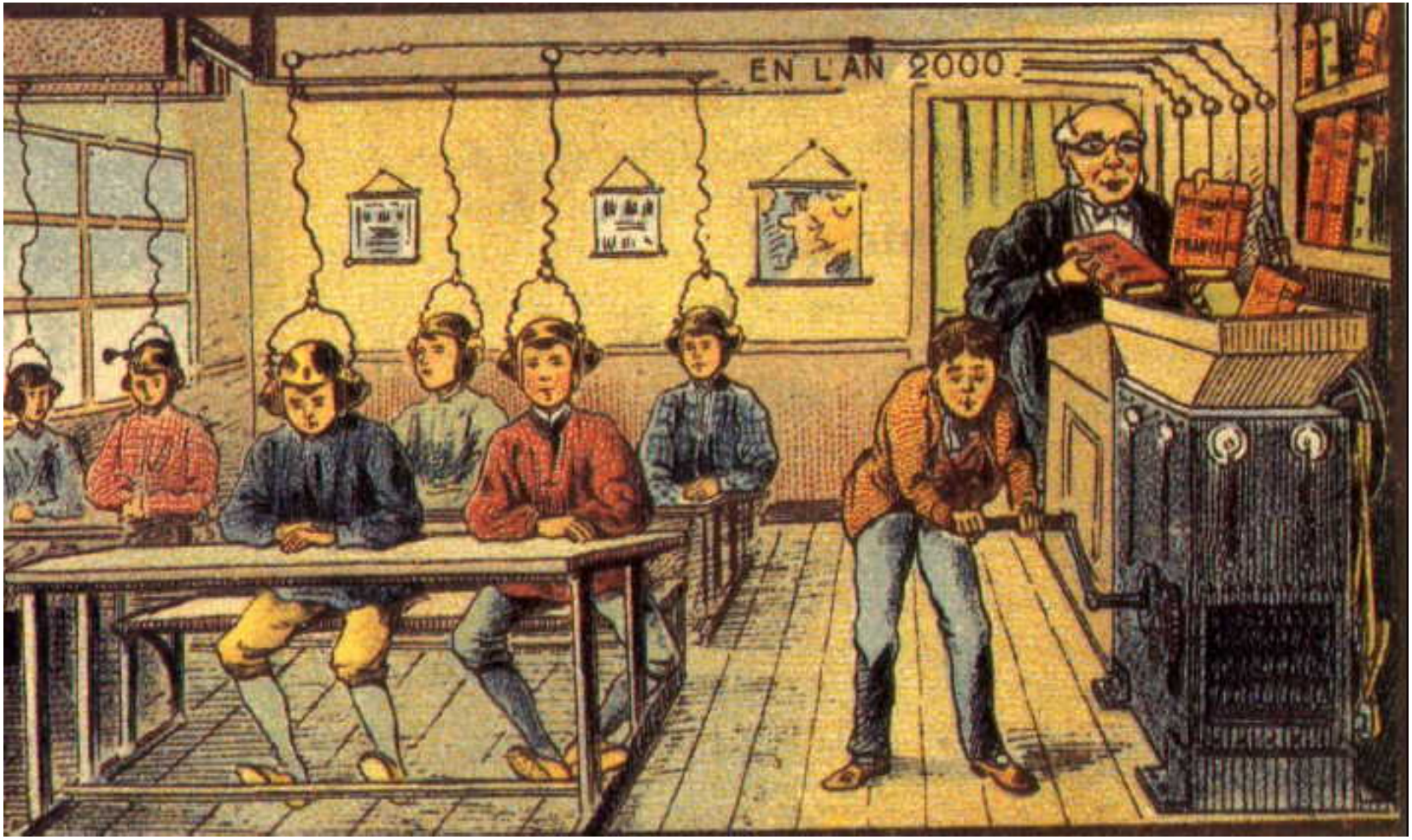
With a lot of help from:

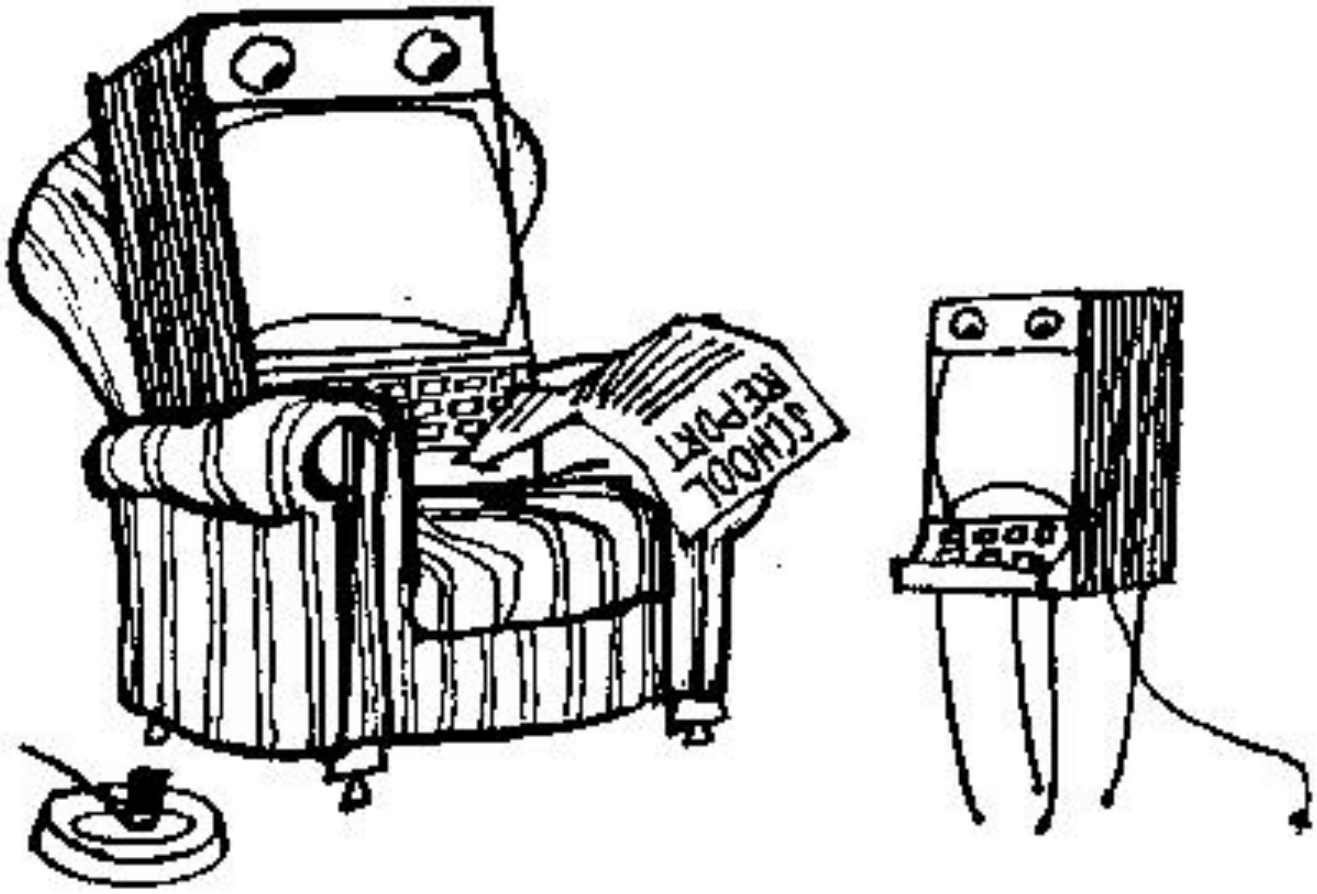
Avril Loveless – Chris Higgins – Tony Fisher – Rob Tweats



Thanks Raymond!

But …





"It says you're fast and accurate, but lacking in initiative and ideas of your own."

Consider…

Current indicators of success for ICT tend to focus on hardware, infrastructure and traditional measures of performance, linked to literacy and numeracy.

The success of public ICT investment by government utilises such measures.

Globally, current evidence does not suggest a significant impact.

IFIP WCCE 2001 Conference – Copenhagen

We got really excited about…

Department for Education and Employment Research Briefs

Research Report No 115

From Thinking Skills to Thinking Classrooms

Carol McGuinness
School of Psychology, Queen's University, Belfast

Main points…

A framework for developing thinking skills.

- the need to make thinking skills explicit in a curriculum;
- taking a metacognitive perspective;
- The impact of collaborative learning (including computer-mediated learning);
- creating dispositions and habits of good thinking;
- generalising the framework beyond a narrow focus on skills to include thinking curricula, thinking classrooms and thinking schools.

McGuinness, 1999

And…

Information and Communication Technologies

- Linked to the thinking skills framework in several ways
- Provides a tool for enhancing children's understanding and powers of reasoning through exploratory environments/microworlds, multi-media and hypermedia.
- Networked communication (local and wide area) provides special opportunities for collaborative learning.
- **Considerable evaluation remains to be completed on learning outcomes for both individual and whole class learning.**

McGuinness, 1999

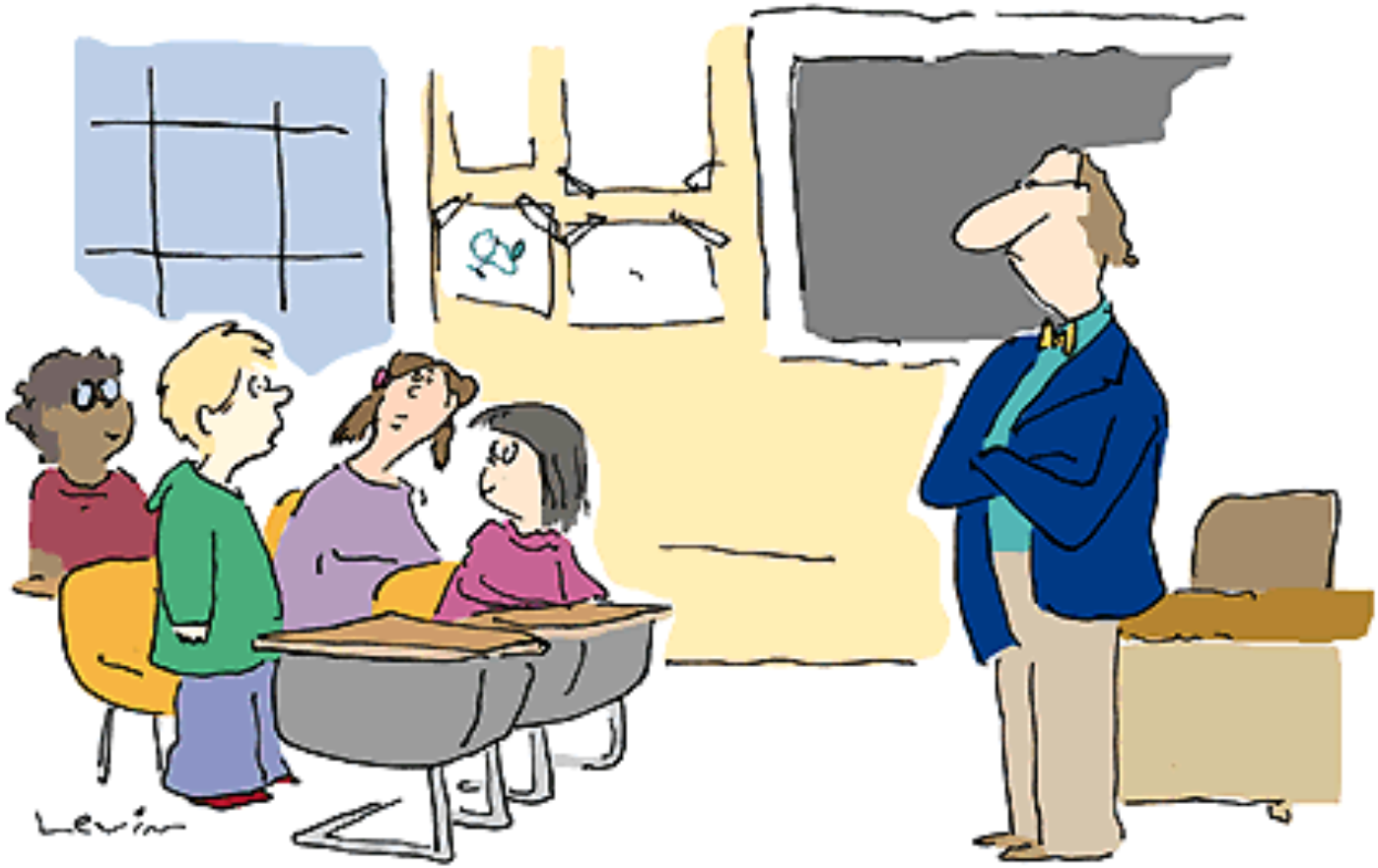
And this…

Nesta Futurelab Series

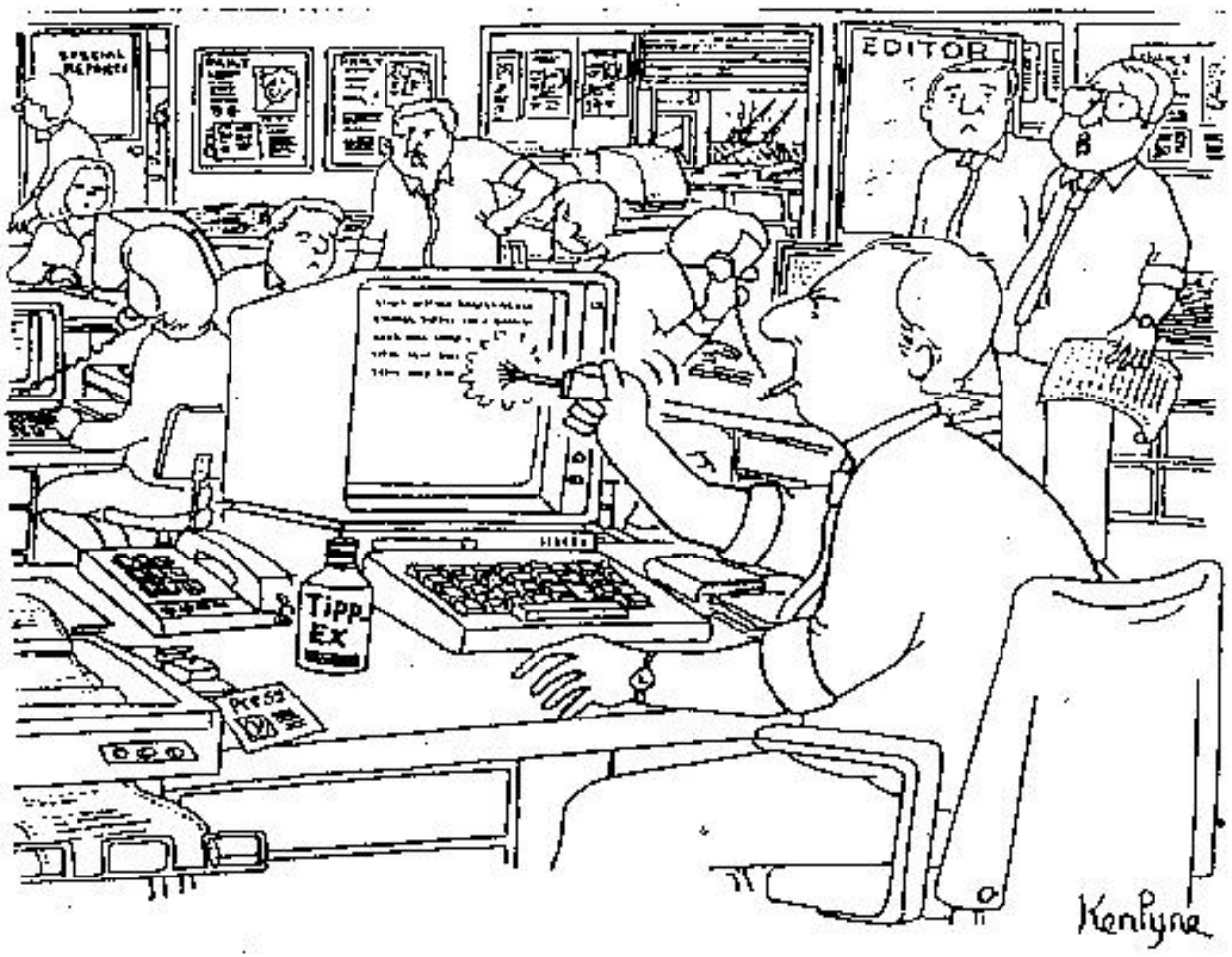
Report 2

A Literature Review in Thinking Skills, Technology and Learning

Rupert Wegerif
School of Education - Open University



"A computer virus ate my homework."



I'm afraid he still hasn't quite mastered the new technology.

Professional Development Initiatives…

And so…

BECTA ICT RESEARCH BURSARY: HOTSHOTS

(HIGHER ORDER THINKING SKILLS, HIGHER ORDER TEACHING STRATEGIES)

What is the potential impact on thinking skills of ICT in the classroom and how might this impact be tracked?

Our intentions…

"… to provide the initial framework for an assessment process that, subject to further development, would allow teachers to integrate the monitoring of higher order and metacognitive skills into their regular classroom teaching and assessment."

Becta Bursary Bid – Autumn 2002


STUPID
CHILD

Our activities…

- Literature Review - to identify and report on possible assessment activities – ***now completed***
- Assessment Model Development - creating an assessment instrument sensitive to identified 'Thinking Skills' that could be deployed using web technologies. – ***under way***
- Trials and Reporting - a small scale trial and the preparation of a written report suitable for publication. – ***scheduled for February/March 2003***

These made it very clear…

(How much there is to do.. and how little we know!!)

The ERIC Thesaurus..

And a Web Search

…because…

"This is our laptop model."

So far…

- We have adopted the idea of a cognitive profile – selected aspects of cognitive activity that might be indicators of wider, richer and more complex capability cf Resnick and Anderson/Krathwohl
- We are considering metacognition and perhaps learning styles as two areas for further work
- We have identified some possible resources

With a little help from…

NFER - Nelson

Learning Styles and Metacognition

Norah Frederickson and R.J.Cameron

- Cognitive Styles Analysis – Riding 1991
- Metacognitive Self Knowledge Questionnaire – Goos 1999
- Metacomprehension Strategy Index – Schmitt 1990

We have hunted for material….

- How People Learn - Bridging Research and Practice
- How People Learn - Brain, Mind, Experience, and School
- The ETS Test Collection database.
- Critical Thinking On The Web
- Mind Tools - Helping you to live an excellent life!
- Cognitive Development and Intelligence
- Cognitive Development Lab
- Cognitive Development

And …

- e-kolb
- The Interactive Institute
- Computer Adaptive Testing Tutorial
- Statistics Home
- DfES Publications
- Cognitive Science Links
- ERIC-AE Full Text Internet Library - (TESTS & TESTING)
- ERIC-AE Full Text Internet Library - (LEARNING THEORY) EPAA Vol. 6 No. 10 Wilson Educational Standards and the problem of Error
- Integrating testing with teaching. Rudman, Herbert C.
- Strategies for teaching critical thinking. Potts, Bonnie

Thinking skills and ICT use in the classroom
(Is it working and what does it do?)

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With a lot of help from:

Avril Loveless – Chris Higgins – Tony Fisher – Rob Tweats

Resnick...

- Higher Order Thinking is non-algorithmic. That is, the path of action is not fully specified in advance.tends to be complex.
- The total path is not 'visible' (mentally speaking) from any single vantage point.
- Often yields multiple solutions, each with costs and benefits, rather than unique solutions.
- Involves nuanced judgement and interpretation.
- Involves the application of multiple criteria, which sometimes conflict with one another.
- Often involves uncertainty. Not everything that bears on the task at hand is known.
- Involves self-regulation of the thinking process. We do not recognize higher order thinking in an individual when someone else 'calls the plays' at every step.
- Involves imposing meaning: finding structure in apparent disorder.
- Is effortful. There is considerable mental work involved in the kinds of elaborations and judgements required."

Metacognition…

- Metacognition refers to higher order thinking which involves active control over the cognitive processes engaged in learning.
- Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress toward the completion of a task are metacognitive in nature.
- Because metacognition plays a critical role in successful learning, it is important to study metacognitive activity and development to determine how students can be taught to better apply their cognitive resources through metacognitive control.

In Service Teacher Development Using ICT: the first step in lifelong learning

José Armando Valente

Multimeios and Nied - Unicamp & Cied - PucSP

Main idea:

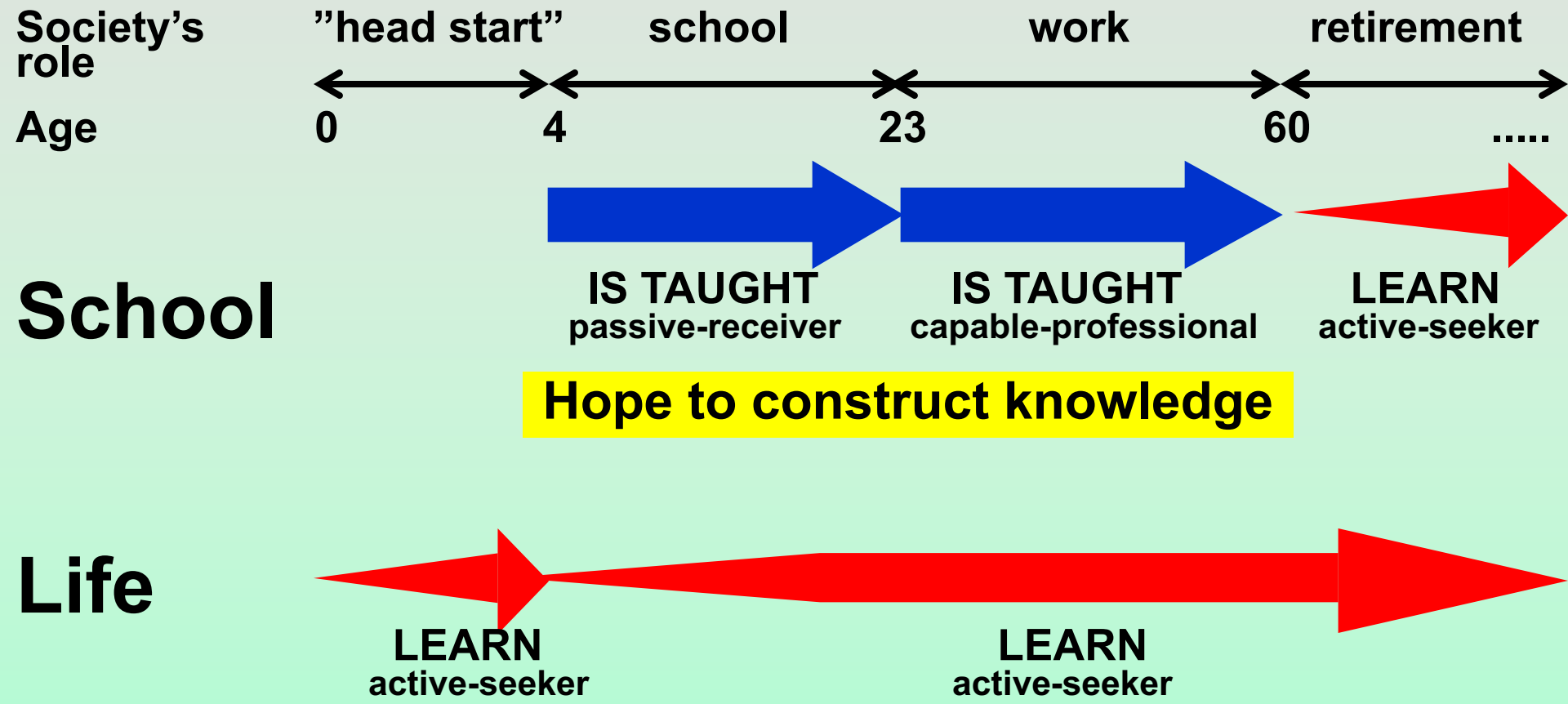
People should become lifelong learners and schools should help them to acquire lifelong learning skills

?

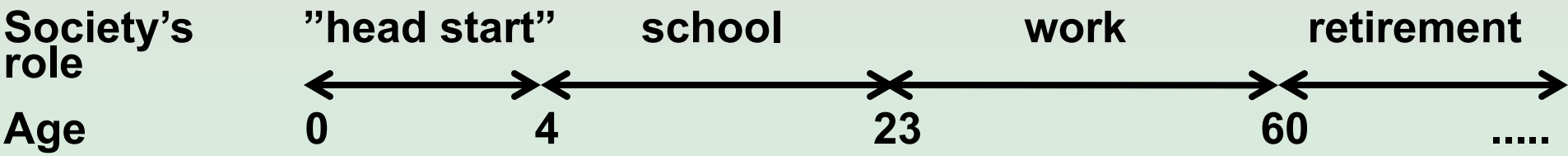
How to prepare teachers to use ICT to acquire and propagate lifelong learning mindsets

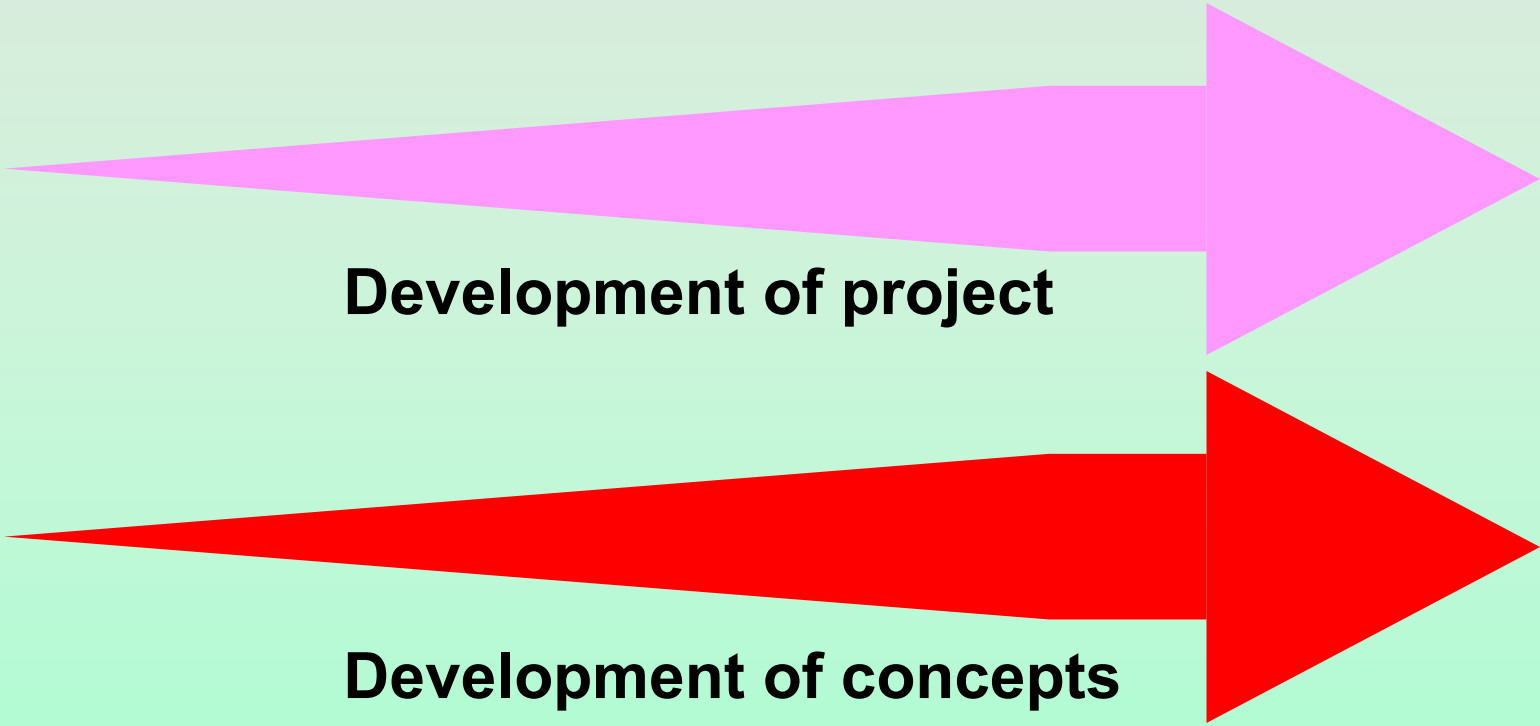
What is meant by:

- **ICT teacher = teacher who can use ICT in his/her classroom practice**
- **Lifelong learning = the possibility to learn at any time and in any place**


Society's role
"head start"
school
work
retirement
Age
0
4
23
60
.....
School
IS TAUGHT
passive-receiver
IS TAUGHT
capable-professional
LEARN
active-seeker
Hope to construct knowledge
Life
LEARN
active-seeker
LEARN
active-seeker

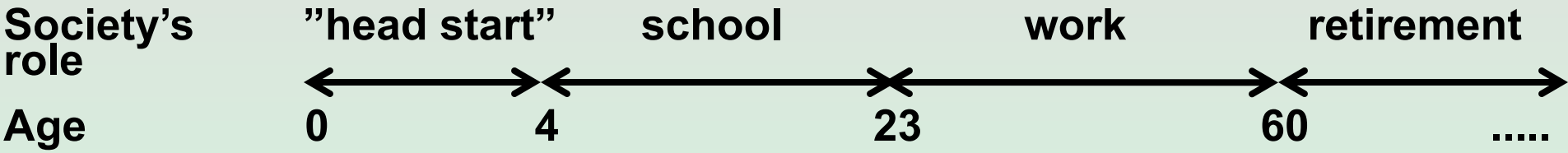
Project oriented education





Hope to learn about learning

Lifelong learning approach



School Life

LEARN CONCEPTS AND HOW TO LEARN
active-seeker, constructing knowledge through the development of projects

What are the implications for education?

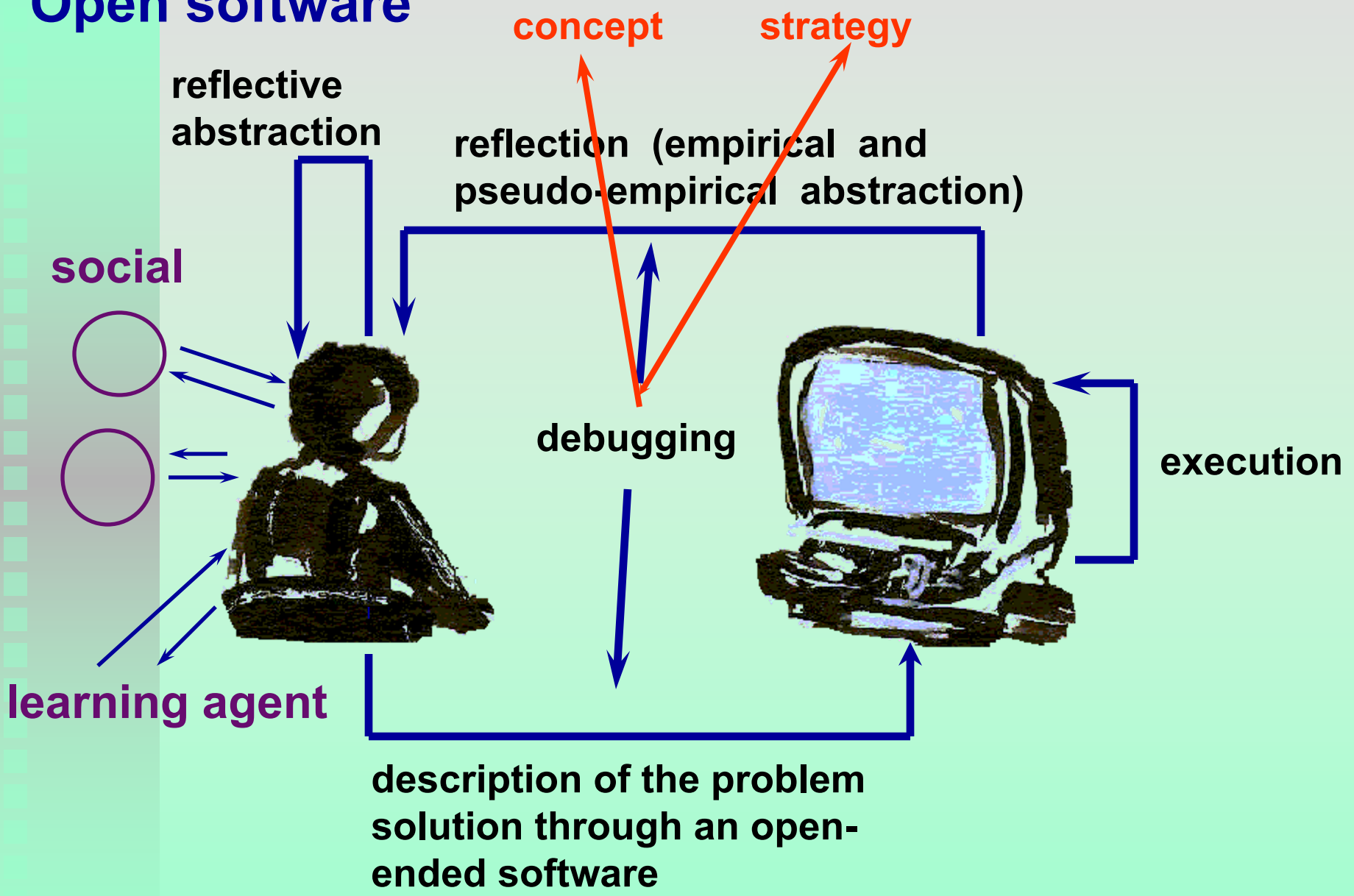
- Schools should rely on people's abilities to learn / teach
- Teachers should acquire and propagate lifelong learning mindsets
- ICT can help, functioning as:
  - Window into people´s mind
  - Tool for establishing a virtual learning network

ICT as windows into people´s mind

- Use of open-ended software helps to express thinking processes
- Interaction as a cycle of actions

  (description, execution, reflection and debugging)

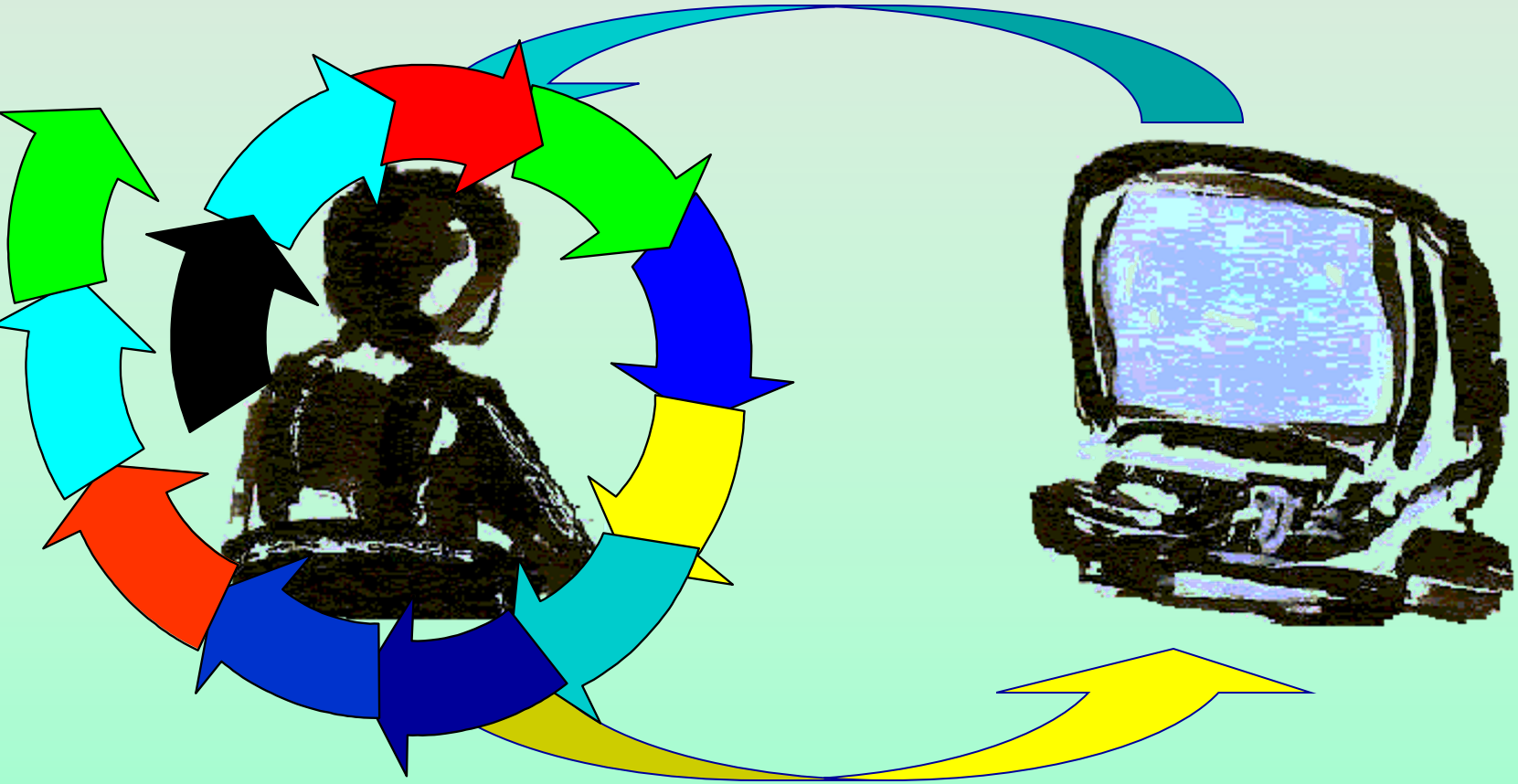
Open software



ICT as windows into people´s mind

- Use of open-ended software helps to express thinking processes
- Interaction as a cycle of actions
  (description, execution, reflection and debugging)
- Each action creates opportunities to increment knowledge, contributing to its growth in a crescent spiral – the learning spiral

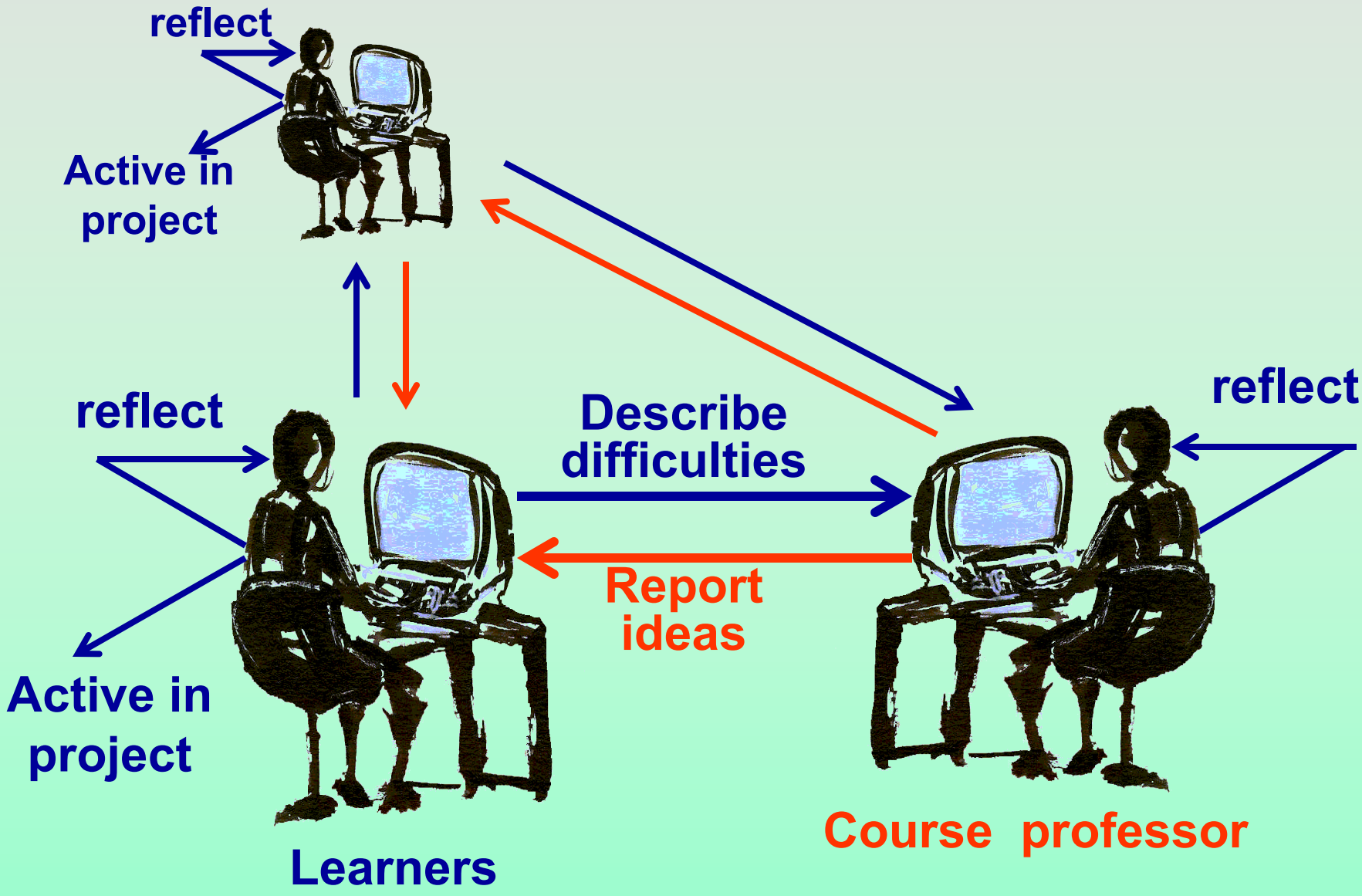
ICT interaction creates opportunities for constructing knowledge as a learning spiral



ICT as virtual learning network

- Learners and course professor being together, side by side
- Interaction, via Web, as a cycle of actions (description, execution, reflection and debugging)
- Knowledge being constructed in a crescent spiral – the learning spiral

Virtual learning network



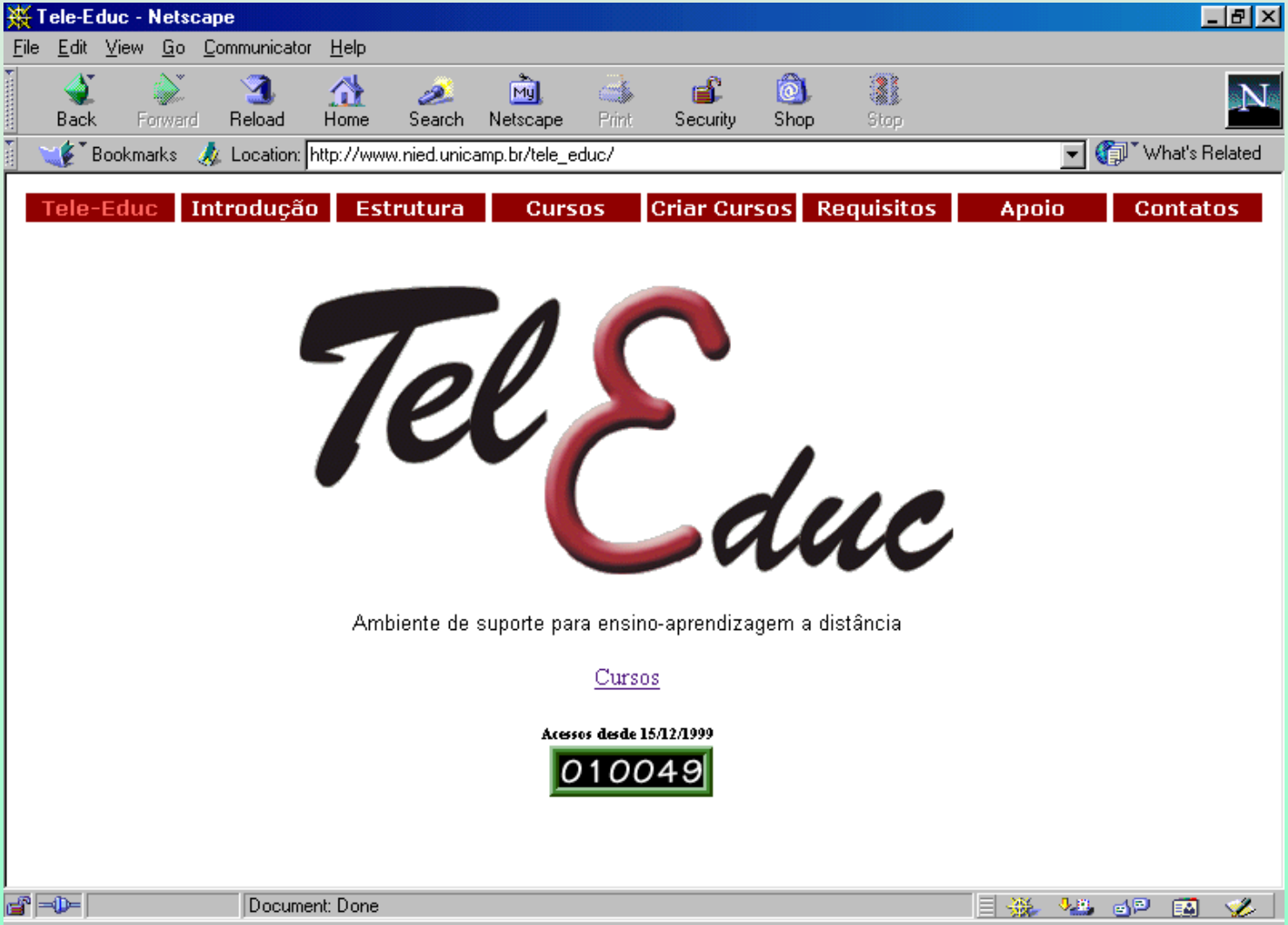
In service teacher training

The objective is to help teachers to learn about ICT so they can integrate these technologies into their practice

Course objectives:

- To understand the potentials of ICT as resources to construct new knowledge
- To know how to use ICT in pedagogical project activities
- To know how to interact with her/his own classroom
- To understand her/his actions as a learning agent
- To confront multiple pedagogic approaches
- To be aware of and to use lifelong learning ideas

Using TelEduc, a distance learning environment



- Developed by the State University of Campinas (Unicamp)
- Freeware system that can be downloaded from

teleduc.nied.unicamp.br/teleduc

Examples of teacher training activities

- **PROINESP - Project introducing ICT in Special Education**
  - **PROINESP I - developed in 2000**
  - **PROINESP II - developed in 2001**
- **Specialization Course on Development of Pedagogical Projects Using ICT (equivalent to a Master's degree without the dissertation)**

Projeto Proinesp II

- Sponsored by the Ministry of Education
- 210 hour course, 90 h face-to-face and 120 h via web
- Involving 389 teachers from 95 special education institutions (4 from each institution)
- Divided into 17 groups with 23 teachers each

Special Education Teachers

MA
São Luís

AL
Maceió

PE
Recife

MG
Ibirité
Muriaé
Pará de Minas
Pato de Minas
Patrocínio
Pocos de Caldas
Sete Lagoas
Ubá

ES
Cariacica
Linhares
Vitória

TO
Araguaína

GO
Goiania

MS
Aquidauana
Campo Grande

RJ
Angra dos Reis
Niteroi
Rio de Janeiro

PR
Cascavel
Maringá

SP
Araçatuba
Jundiaí
Pirassununga
Ribeirão Pires
Santa Bárbara D' Oeste
São João da Boa Vista
São José do Rio Preto
São Paulo

RS
Bento Gonçalves
Canoas
Porto Alegre
Santo Angelo

75 APAEs
9 PESTALOZZIs
11 Centers

States in Brazilian

Face to face part:

- Introduction to Windows:
  - Basic Windows
  - Windows Explorer
- Word
- Introduction to Internet

Activities via Web:

- Discussion about interfaces for handcapped children - 10h
- Pedagogical use of Internet - 40h
- Introduction to Logo and to Logo methodology - 30h
- Software analysis - 10h
- Integration of software into pedagogical projects - 20h
- Development of a pedagogical project to integrate ICT into classroom activities - 10h

Results from PROINESP II:

- Of the 389 enrolled, 11 (2.9%) were eliminated due to technical problems
- Of the remaining 378 participants, 344 were approved (91.0%)
- Overall success rate: 88.4% (344 out of 389)

Discussion:

- Teacher training process should provide means for teachers to change their pedagogical approach
  - Project based
  - Incorporating ICT as a learning tool
  - Promoting the development of lifelong learning mindset

Discussion:

- On line courses demand discipline
- Teachers should have at least 20 h / week to study
- As part of the course teachers should use ICT with their students
- Access to Internet at work and at home

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UNESCO - IFIP WORLD COMPUTER CONGRESS 2002 YOUTH DECLARATION

We, participants in the **IFIP World Computer Congress 2002 "Information Technology for our Times: ideas, research and application in an inclusive world"**, held from 25 to 29 August 2002, in Montreal, Canada,

Having examined the theme of "Youth and Information and Communication Technologies - Policies and Challenges in the Information Age", have adopted the present Declaration:

Taking into account UNESCO's commitment to enhancing the participation of all in the global information society, and IFIP's role in analysing and shaping future development of Information and Communication Technologies (ICTs);

Noting the substantial impact of ICTs in today's world and **convinced** that ICTs are central to bolstering the emerging global knowledge information society;

Considering that, beyond their role in economic development, ICTs can contribute significantly to building new partnerships and interactions and spreading innovative lifelong learning opportunities;

Further considering that the universal access to information and human interaction, by means of ICTs is essential for achieving goals of social cohesion, and economic and cultural empowerment;

Recognizing the need to promote digital inclusion in an environment preserving cultural diversity and heritage and promoting the respect for democratic values, human rights and tolerance;

Realizing that some young people are at the forefront of technological innovation and development;

Concerned about the continued deterioration of the status of youth worldwide (particularly of young women and youth with disabilities), who are among the most vulnerable and affected by difficult social and economic conditions, and who face, among others, a growing rate of functional illiteracy and unemployment, poverty and conflicts, epidemic diseases, substance abuse and HIV/AIDS pandemic, etc.;

Highlight the importance to sensitize governmental authorities, national and international institutions, the private sector and the civil society about the necessity to include the development of information and communication technology infrastructures and the ICT skills for young people as a high priority in their national ICT policies and respective agendas, as well as to take proactive measures in order to encourage the formulation of policies and regulatory frameworks determining the future of the information society,

Affirm our commitment to contribute to ensuring a youth oriented ***digital inclusion*** specifically in the fields of education, science, culture and communication,

Strongly recommend the following measures for empowering youth in the information age:

- promote the global access to information and knowledge sources of young people as a prerequisite to their competent social choice, behaviour and participation; disseminate information about issues having a practical impact on the every day life of young people;

- improve access to education and train young people in ICT skills enabling them to enter empowered into the information and knowledge society; improve network access at affordable cost, especially in underdeveloped urban, rural and remote areas, and expand information infrastructure for human development through the establishment of vocational schools at a community level, the creation of internet access points, distance learning and community multimedia centres, etc.;

- provide for the equitable expansion of the information society by promoting ethics in cyberspace through the involvement of young people in the elaboration of guidelines for the activities of information and content producers, users and service providers;

- strengthen the capacity to generate knowledge and indigenous production of freely accessible contents, while using local languages and thus expanding the existing information accumulated in the public domain;

- facilitate the production and dissemination of high quality free and open source software for education and training as well as scientific and cultural purposes;

- enhance the co-ordination of youth information related programmes and resource mobilising efforts of governments, specialised agencies, intergovernmental and non-governmental organisations, and invite international and national institutions and the private sector to design and implement specific funding schemes and programmes such as fellowships, competitions and contests, that would help improving the meaningful access of young people to ICTs especially in the developing countries;

- promote through the use of ICTs, specific measures and modules for enabling disabled and handicapped youth to participate more actively in society;

- cultivate creativity, open life-long learning opportunities for young people and promote their access to careers dealing with ICTs;

- support the efforts of youth to foster a culture of peace, tolerance, sustainable development and quality of life by using global information and communication means;

and

Commit ourselves to strive according to the spirit and letter of this declaration for the implementation of the above recommendations.

Montreal, 29 August 2002