Bar-Ilan University

WG 3.1 and WG 3.5
International Working Conference

IFIP

Information Technology:
Supporting Change Through Teacher Education

June 30 - July 5 1996

Kiryat Anavim, Israel

Call for Papers and Invitation to Participate
International Federation for Information Processing

WG 3.1 and WG 3.5
International Working Conference

Information Technology: Supporting Change Through Teacher Education

Hosted by
Bar-Ilan University School of Education

The WG 3.1 and WG 3.5 Working Conference

There are many examples from around the world of how information and communications technology can make a positive contribution to teaching and learning at all levels of education. The very wide range of possibilities shows every sign of further growth in the years ahead. Against this background, there is the daunting challenge of preparing and sustaining teachers who are capable of making appropriate use of new technology to support both traditional and emerging educational objectives and who are also able to thrive in a climate of continuous change. This challenge is compounded by the implications of computer and communications based technologies for the fundamental roles of the teacher.

In-service training has leading roles to play in improving the performance of both teachers and teacher educators. Lessons can be learnt from innovative work in schools and in teacher education institutions. These can, in turn, be disseminated through pre-service and in-service programmes organised by teacher educators. The aim of the conference is to provide a forum where fundamental issues can be critically discussed and where the experiences of those who are seeking to meet the challenges by initiating and supporting responsible change in pre-service and in-service teacher education can be shared.

Conference Topics

* The challenge to the teacher education curriculum posed by computers
* Strategies to enable teacher trainers to integrate computers into their curriculum
* Trainee teacher experiences with computers
* Trainee teachers and the use of computers in school experience
* Using communication technologies to link tutors and students
* Change capability: developing a critical skill for teachers and teacher trainers
* Effective IT focused in-service training for teachers
* Computer mediated courses to support practicing teachers
* The pedagogical challenges posed by computers
* IT and teachers of pre-school children
* The role of multimedia in teacher education
* The role of authoring in pre-service and in-service teacher training
* National initiatives to support change
* Computers in the home and their significance for teacher education
* The characteristics of the computer-capable teacher

Conference Programme

Preliminary discussion of some of the conference topics was conducted in the Professional Group meetings at the World Conference on Computers in Education (WCCE '95) held in Birmingham during July 1995. Those Professional Groups all

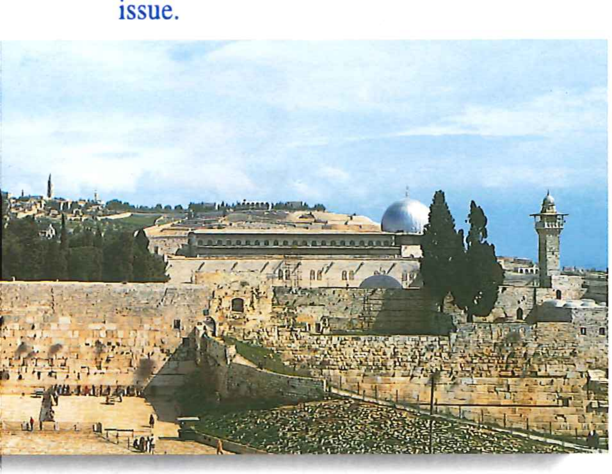
produced reports which were designed to promote further discussion of critical topics at this conference. In order to facilitate this further discussion the conference programme will include a number of Focus Group sessions in addition to the usual paper sessions. All participants at the conference will be asked to join a Focus Group of about 20 people and to make an active contribution to discussions designed to develop thinking in areas identified in the reports from the WCCE '95 (Birmingham) conference. There will be a Chair and a Rapporteur for each Focus Group, with the Rapporteur playing the leading role in creating a final report based on the deliberations of the Focus Group. The final report from each Focus Group will be published. Copies of the Professional Group reports from the WCCE '95 (Birmingham) conference can be obtained from the Chair of the Programme Committee, David Benzie.

Invitation to Contributors

This is a working conference of invited professionals from around the world and it is usual for all attendees to contribute to the programme and the resulting publication. Those invited to attend by the International Programme Committee are asked to submit an abstract of between 300 and 500 words outlining their proposed contribution. Contributions should be one of the following:

1. A written case study which shows how computers have been successfully integrated into some aspect of either pre-service or in-service teacher education.

2. A paper which reports on a national initiative or on research that is relevant to the conference theme or which presents a well argued position statement on an associated issue.



3. An offer to act as rapporteur for a Focus Group and an abstract outlining a proposed theme for the Focus Group. The task of the rapporteur is to prepare a discussion document which explores issues identified in one of the relevant WCCE '95 (Birmingham) conference Professional Group reports. The discussion document will be made available to conference delegates ahead of the conference so that they can consider their response to it.

Case studies and papers will be allowed 30 minutes for presentation and discussion at the conference.

Focus Groups will meet for four sessions of one to one and a half hours each during the week. During the Focus Group sessions (which will be chaired) it will be the rapporteur's responsibility to coordinate the writing of a report based on the initial discussion document and on the discussion in the Focus Group during the conference.

Please note that all papers presented to the working conference, the presentations, the discussions, and recommendations will be in the English language. The proceedings after the conference will be published by an international publishing company according to the established IFIP standards.

Abstracts (4 copies) should be sent to Yaacov Katz before December 31, 1995. Following review by the International Programme Committee, authors whose abstracts have been accepted will be asked to prepare full papers and rapporteurs whose proposals are accepted will be asked to prepare their initial Focus Group documents. These are to be submitted to Yaacov Katz before March 31, 1996.

Please address all correspondence regarding the submission of abstracts and papers to:

Yaacov J Katz
School of Education
Bar-Ilan University
Ramat-Gan 52900, Israel
Tel: ++972 3 5318444
Fax: ++972 5353319
email: F45410@mvsa.biu.ac.il

Deadline for applications: December 31, 1995

International Programme Committee

David Benzie GB - Chairman
Bernard Cornu FR - Vice Chair
Anton Knierzinger A - Vice Chair
Yaacov Katz IL
Raymond Morel CH
Paul Nicholson AUS
Baruch Offir IL
Erling Schmidt
Don Passey GB - Proceedings Editor
Brian Samways GB - Proceedings Editor

Organising Committee

Yaacov Katz IL - Chairman
Baruch Offir IL - Vice Chair
Shimon Ohayon IL - Coordinator
Daniel Millin - IL
Nurit Zehavi - IL

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Bar-Ilan University

IFIP
TC3 WG3.1 & WG3.5

International Conference
Information Technology: Supporting Change Through Teacher Education
Kiryat Anavim, Israel, 30th June - 5th July 1996

12.5.1996

Dear Delegate,

The Organising Committee is working full steam ahead on the technical details concerning the conference and would like to provide you with information relevant to your stay at the Kiryat Anavim Kibbutz Hotel during the Joint Working Conference.

1. Travel from Ben-Gurion Airport to Kiryat Anavim - When you exit the Arrivals Hall at the airport, please go to the Nesher ServiceTaxi Company office near Gate No 8. The taxi company provides a 24 hour service from Ben-Gurion Airport to Jerusalem and you are to instruct the duty officer at the taxi office that you wish to travel to Kiryat Anavim Kibbutz Hotel. The price of a one-way service taxi fare is approximately $13 and the taxi will bring you to the hotel entrance. This is the easiest and cheapest way of getting from the airport to the conference site. At the end of the conference, a Nesher taxi from Kiryat Anavim to Ben-Gurion Airport can be ordered from the hotel reception
2. The opening session of the conference will take place on Sunday 30 June at 19:00. The session will be preceded by a cocktail get-together for all delegates beginning at 17:30. Dinner will be served in the hotel at the end of the opening session. All delegates are requested to arrive at the hotel before the commencement of the opening session.
3. June - July is summer in Israel and you will need to bring clothes that are suitable for an mean daily temperature of 26°C - 30°C. However, nights are cool at Kiryat Anavim with a mean temperature of 15°C - 18°C, so please bring suitable clothes for evenings. As there is no rain in Israeli during the summer, raincoats or umbrellas are unnecessary.
4. Recreation facilities at the hotel include a swimming pool and hiking routes in the Jerusalem hills. Please bring a swimming suit and hiking shoes for recreational use if necessary. The hotel bar and cafeteria will be open for delegates throughout the conference.
5. The elecricity system in Israel is suited to appliances that are operated on a current of 220-250 volts. Please ensure that all appliances that you bring with you are suited to a current of 220 volts in order to prevent damage.
6. All delegates are requested to settle all their bills and outstanding payments for registration, accomodation, etc. on their arrival. All payments are to be made to the Conference Secretariat.
7. Jerusalem is situated 15 kms. east of the conference location. An excellent bus service is available for travel between Kiryat Anavim and Jerusalem (two to three buses per hour in each direction). The first bus from Kiryat Anavim to Jerusalem leaves the hotel at 06:15 and the last bus leaves the hotel at 22:15. The first bus leaves Jerusalem for the hotel at 06:15 and the last bus leaves Jerusalem for Kiryat Anavim at 23:15.

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8. The conference tour will take place on Wednesday 3 July. The participants will leave the hotel at 13:00 for an intensive half-day tour of Jerusalem ending with dinner at the Roman period style Colonarium Restaurant located in the Old City. The tour group will return to Kiryat Anavim by midnight. All delegates who have not yet registered for the tour can still do so on their arrival at the conference registration desk. The cost of the tour is $60 per participant.
9. There will be a Galilee Tours hospitality desk open at the conference registration desk during the course of the conference. Any delegate wishing to book a post-conference tour will be able to do so at the hospitality desk.
10. Foreign currency can be changed into Israeli shekels at the hotel reception. The present rate of exchange (which fluctuates to a certain extent) is US$1.00 = NIS3.25. Complicated currency transactions should be conducted at the nearest bank in Jerusalem. Letters can be mailed abroad from the hotel reception.
11. Citizens of most countries do not need visas for Israel. However, delegates from some countries, mainly those that have only recently established relations with Israel, must have valid visas in order to enter Israel. According to the conference registration list, delegates from Bulgaria, Egypt, Jordan, Poland and Singapore are advised to apply in person with a valid passport to the nearest Israeli Embassy in order to obtain a visa for Israel.
12. The conference terminates at the end of the closing session at 15:30 on Friday 5 July. As this is a Working Conference where delegates' input is of utmost importance, all delegates are requested to remain at the conference until it is officially closed at the end of the Friday afternoon session.

If delegates have any requests, queries or suggestions, please do not hesitate to approach David Benzie, Chair of the Programme Committee (email: 100441.3313@compuserve.com) or myself (email: F45410@mvsa.biu.ac.il) at any time, and we will do our best to be of assistance.

Yours sincerely

Dr Yaacov J Katz, Ph.D.
Chair, Organising Committee

School of Education, Bar-Ilan University, Ramat-Gan 52900, Israel
Tel: 972 3 5318444, Fax: 972 3 5353319, email: F45410@mvsa.biu.ac.il

International Federation for Information Processing
WG 3.1 and WG 3.5 International Working Conference

Information Technology: Supporting Change Through Teacher Education

June 30 - July 5, 1996 * Kfar Blum, Israel

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Bar-Ilan University **IFIP** **Safed Regional College**

Call for Papers and Invitation to Participate
International Federation for Information Processing

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International Working Conference

Information Technology: Supporting Change Through Teacher Education

Hosted by
Bar-Ilan University and Safed Regional College

June 30 - July 5 1996

Kfar Blum, Israel
Deadline for Applications: December 20, 1995

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1. A written case study which shows how computers have been successfully integrated into some aspect of either pre-service or in-service teacher education.

2. A paper which reports on a national initiative or on research that is relevant to the conference theme or which presents a well argued position statement on an associated issue.

3. A practical workshop which would give attendees at the conference direct experience of an innovative activity that is illustrative of good practice in the field of computers and teacher education.

Case studies and papers will be allowed 30 minutes for presentation and discussion at the conference. Workshops will be allocated one and a half hours in the conference programme. All papers presented to the working conference, the presentations, the discussions, and recommendations will be in the English language. The proceedings after the conference will be published by an international publishing company according to the established IFIP standards.

Abstracts (4 copies) should be sent to Yaacov Katz before December 31, 1995. Following review by the International Programme Committee, authors whose abstracts have been accepted will be asked to prepare full papers (papers on workshop activities will be requested but they are expected to be shorter than the other contributions). These are to be submitted to Yaacov Katz before March 31, 1996.

Please address all correspondence regarding the submission of abstracts and papers to:

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Bar-Ilan University
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WC96

The Open University

School of Education

1996/7

FirstClass Handbook

and

Tutor Guide

PGCE FirstClass Guide

Part 1 Setting up

Part 2 Using FirstClass

Section 1: Introduction

1.1 What is in this Guide?

This booklet is your introduction to the Open University's Electronic Campus, where you will be able to 'meet' OU staff and other students through the medium of your computer, send electronic mail and participate in on-line discussions.

The main communications software you will be using is an electronic mail and computer conferencing system called 'FirstClass'. The exercises in this Guide will help you to learn to use FirstClass.

Sections 2 - 4 contain a set of short exercises leading you through the basics of computer communication. The exercises are written assuming a reasonable familiarity with an Apple computer.

Section 2: Preliminary exercises

Before you start any of these exercises you should be familiar with your Apple computer.

You should know:

how to operate the mouse

that you 'single-click' on an icon to select it, 'double-click' to open it

how to close a window

that 'dragging' means placing the cursor over something, holding down the mouse button, moving the mouse till the object is in its new position, and then releasing the mouse button

that you often have to complete an action by clicking on a button which says 'OK' or 'Continue', or pressing the Return key.

Before you start the next exercise, make sure your modem cable is connected to your computer and plugged into your telephone socket . To avoid unplugging your telephone all the time, it is useful to have a double-socket adapter. These are available at electrical and DIY shops and are very cheap, as are extension cables.

N.B. Do not try to use the phone at the same time as you are using your modem.
(Incoming calls will receive an engaged signal while the modem is in use).

The modem is controlled by FirstClass, and there is not really much more that needs to be said. When the computer first makes a call, you will hear the modem dialling the number and exchanging bleeps with the modem at the other end of the line. After a few seconds the speaker cuts out automatically.

Please note that there are certain times when the FirstClass server is unavailable. It is taken off line at 10 a.m. every weekday for backup. On most days this usually takes less than an hour, except for Tuesdays, when a full backup takes about four hours. Other 'Down' times or changes in service availability are notified online in the OU Service News conference.

2.1 Exercise 1 - Installing and Setting up FirstClass on your Apple Mac

Note: In this and most of the other exercises you will find a mixture of instructions as to what to do, and discussions or explanations of those actions.

The actions are indicated by use of this font.

You are now about to use the modem that is inside your Apple Macintosh to communicate with your tutor and other students and to receive notices and bulletin items from the PGCE course team. Later you will use it to talk to students following your subject line or phase.

Set-up is very straightforward, and once done, connection to the FirstClass system at the Open University is simply a matter of clicking on a button.

We believe that FirstClass is simple to understand and that you should be able to learn to use it largely by exploration. Once you have made a first contact, you will be able to get help with learning it from the rest of us and from the on-line reference material. There is a full manual for FirstClass on your FirstClass disk which you might want to browse through (FirstClass Reference).

In this following section, you will learn:

- how to set up FirstClass to make contact with the OU system in the UK.
- how to make a connection to the FirstClass system.

When you received this document, you will also have received a computer disk labelled **FirstClass Client for Macintosh**. Insert the disk into the slot in the computer with the label upwards and the metal plate first.

1. Double-click on the disk icon to open it. Drag the folder called 'FirstClass® Client' from this disk to your hard disk icon and wait for the files to copy across.

   It will take up about 1 Mb of disk space.

2. Inside the 'FirstClass® Client' folder (double-click to open) you'll find another folder called 'Settings'.

   Open the 'Settings' folder.

It contains a single icon labelled OU FirstClass. Most of you will be setting this up to work from home via a modem. Try your setup first by using one of the OU numbers listed below. We tell you about finding alternative telephone numbers later on. ENERGIS or BT Dialplus can be used if one of the listed OU numbers does not give you local call rate.

3. Drag the 'OU FirstClass' icon onto your desktop.

4. Double click the 'OU FirstClass' file to open up the application.

   The login window (see Fig. 1) will appear on your screen.

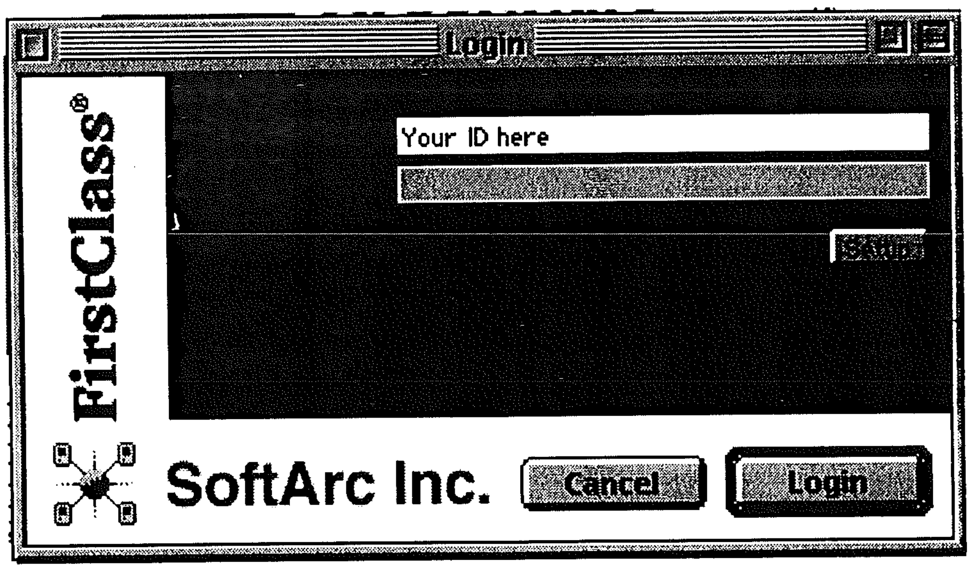

Fig 1 - The FirstClass Login Window

5. Click the 'Setup' button in the Login window.

   You will see a new window (Fig 2) - the 'service setup' window.

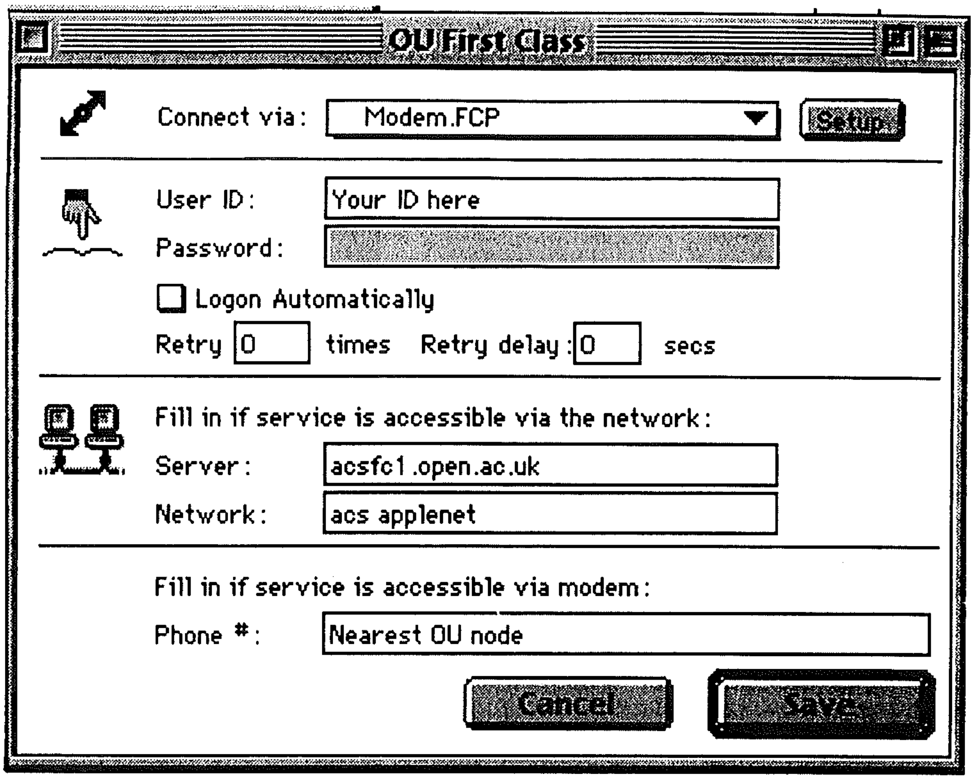

Fig 2 - The FirstClass service setup window

6. This screen is where you set up your personal details and the service you are going to log in to.

   At the top of this screen there is a box entitled 'Connect via' which contains the words 'Modem.fcp'. This is your connection method. Leave it as it is.

You will also need to know your login ID and initial password. You will receive a separate letter from the OU which contains your login ID and initial password. It will also tell you which of the Open University's FirstClass servers you are to be connected to. It will be Server No. 1 (acsfc1.open.ac.uk) for PGCE and the software is set by default to reach this server. You will need to have that letter to hand for this exercise. If you haven't received it, telephone the ACS Student Help Desk. (See Appendix 1 for details.)

If you wish to change your password to something you can remember more easily, you will learn how to do so in Exercise 4.

7. Type your login ID in the box titled 'User ID'.

   (Leave the password blank for now.)

This is *not* the name you will be known by while connected to FirstClass. You will be known on the FirstClass server by your natural name, as described in the letter you received.

8. To connect to FirstClass using a modem, you will need to configure the FirstClass Client software with the telephone number of the nearest OU connection point, and your name and password. After this has been done successfully once, you should never need to do it again. Logging in will require only one click of a button.

The following list gives the telephone numbers of the Open University's private dial-up network, OUNet.

Belfast	01232 244333
Birmingham	0121 4279911
Bristol	01179 277648
Cambridge	01223 324466
Cardiff	01222 231041
East Grinstead	01342 327287
Edinburgh	0131 225 1948
Leeds	0113 245 3333
London	0171 794 0611
Manchester	0161 881 7251
Milton Keynes	01908 271188
Newcastle	0191 285 0131
Nottingham	01159 414123
Oxford	01865 736352

This is the preferred set of numbers. Make a note of the one nearest to you. These are all high speed modems (28,800 bps) and their use incurs no extra cost to the Open University.

However, if you cannot reach any of these numbers at local call rates you can also use certain commercial networks. The numbers to use change, and are added to from time to time, so we provide a database service called QDIAL to help you locate those nearest you. We tell you about major changes in OU Service News online and explain the use of QDIAL under the FirstClass Reference area, Accessing OU Services, also online. You should use one of the OUNet numbers for your initial contacts with FirstClass and then find the other possible numbers. ENERGIS numbers provide a second preference if within local call distance for you; other numbers incur extra costs to the OU.

9. Decide which phone number will be best for you.

10. Type the telephone number you have selected in the box titled 'Phone #'.

    Most exchanges now support tone dialling. Try this first. If it doesn't work, you have an old exchange, so you will need to try pulse dialling which means you will need to make one more change. This is described in Appendix 2.

11. Now click the 'Save' button at the bottom right of the screen you are looking at. This will take you back to the original login screen.

Note:

If and when you want to use an alternative number to one of the OU numbers (e.g. ENERGIS, DIALPLUS or GNS) found using QDIAL or information in FirstClass, it will be necessary to go through a further setup step by clicking on the Setup button beside Modem.fcp on the first setup screen (see Fig 2 above). You will need to bring an appropriate script ENERGIS1.fcl, DIALPLU1.fcl, GNS1.fcl into the Script box on the second setup screen and 'Save' this change.

2.2 Exercise 2 - Testing your modem set-up and making a first connection

In this exercise you will simply attempt to connect to the OU FirstClass service. If you are successful, you should immediately disconnect and go on to the next exercise. If you are unsuccessful, telephone the ACS Student Help Desk for advice. (See Appendix 1 for telephone numbers and times.)

This is the one part of computer communications that is likely to prove most tricky. If you are lucky, what you have done in the previous exercise will be satisfactory and you will be able to connect to the OU FirstClass service with a single click of the mouse.

Also, computer network technology, while now quite good, is still not 100% reliable. The telephone number which works successfully for you at first, may one day stop working, only to be re-instated a day or so later. You should be prepared to try different routes on occasion if need be.

If you try connecting and get a "line busy" message, simply try again a few minutes later. If you repeatedly get busy signals you may be trying to connect at a peak time. Remember that a large number of students may all be trying to connect at the same time. The largest peaks are likely to occur early in your course, when people are trying these exercises. Try again at a time you think might be less popular.

1. Open FirstClass if it is not already open. Go to the Service menu and select Connect.

   The Login window should appear.

2. Click on the Password space, then type in your initial password.

   You will change your password to something personal in a later exercise.

3. Click on the 'login' button, and watch what happens.

At the bottom of the window you will see a changing display, telling you how the login process is going. Once the modem has made the initial connection, you should see the message "Executing connection script" on one line with a fast-changing line beneath it, as the various prompts are received and commands are sent. Once the script has finished running the display will show "Negotiating connection" for about 5-10 seconds, then "Connected" for another 5-10. Your FirstClass Desktop should then appear (Fig. 3).

If your FirstClass Desktop appears, and you can open the various folders by double clicking on them, you have connected successfully. Well done! You are in business!

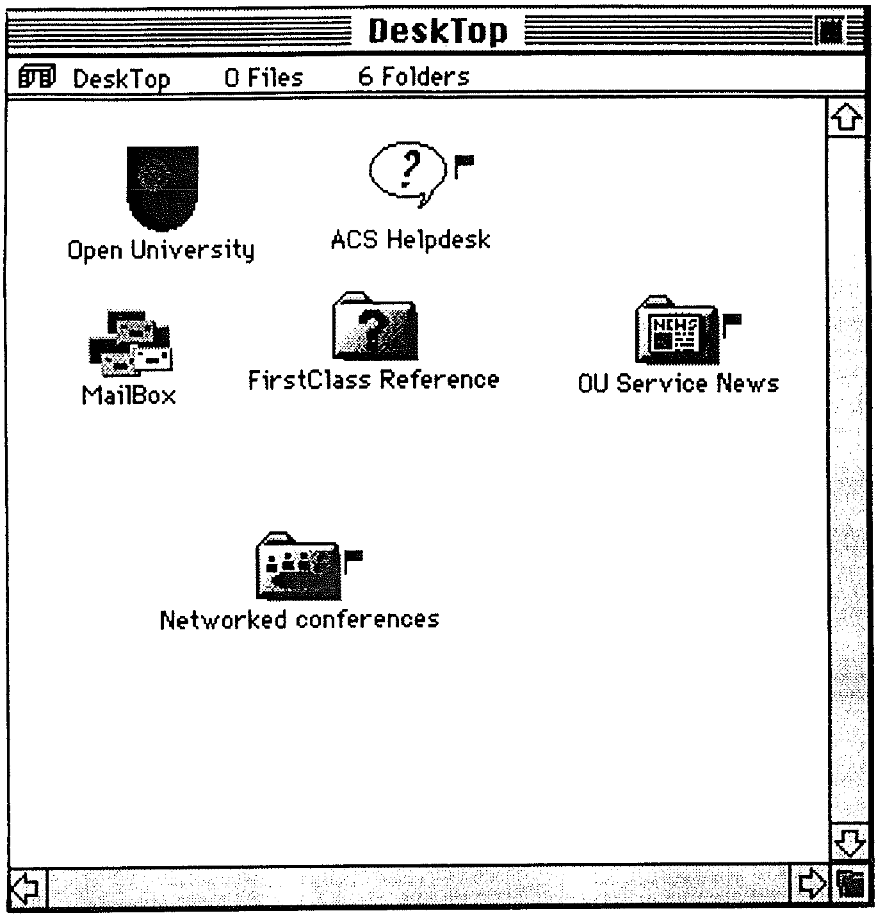

Fig 3 - The FirstClass Desktop

4. Go to the Service menu and select Disconnect.

That completes this exercise.

Be assured that it is quite common for this to fail on the first try. Once you have the parameters sorted out you will be able to connect directly most of the time.

If the login process fails, look in Appendix 3 for advice on what to do. If all else fails and you are unable to connect for any reason to the FirstClass system please inform your tutor as soon as possible and definitely by the end of April.

When you quit from FirstClass or get a communication link failure, check your phone line has cleared by making sure you have a dialling tone when you pick your phone up. Normally this is not a problem, but it is worth checking and prevents an unexpectedly large bill!

Section 3: Introductory Exercises

3.1 Exercise 3 - A first look at FirstClass (10 minutes)

Before attempting to explore the OU FirstClass service, here is a preview of what FirstClass looks like.

1. Open FirstClass if it is not already open.

There are two small windows which will be very useful while you are connected to FirstClass and you can preview them now. These are the Session Status window, which tells you whether or not you are connected and how long you have been connected, and the Palette, which is a handy set of buttons giving most of the main commands you will need on FirstClass.

2. From the View menu, select Session Status. Move the window which appears somewhere out of the way, like the lower right hand corner of your screen.

3. From the View menu, select Palette. Move the palette somewhere convenient but out of the way, like the upper right hand corner of the screen.

Some parts of each window pictured have dashed lines (---------) around them. If you click on any of these an explanation of that part will appear.

3.2 Exercise 4 - A first use of FirstClass (10 min.)

You should now be set up and able to connect to the OU FirstClass service. In this exercise you will begin to use FirstClass . You will change your password to something only you know. You will then find and download a file which might be useful to you.

Before you start you should

decide upon a password you wish to use. It should be something you can remember easily, but should not be too obvious. It is a good idea to include something other than letters, for example, numbers, or symbols like !,@,£,$. (You could also use a mixture of lower case and capital letters as FirstClass treats them as different.)

1. Open FirstClass if it is not already open.
2. Type in your initial password, as in the previous exercise.
3. From the View menu, select Session Status and then Palette, as before.
4. Click on the Login button and watch as the various stages of connection are made.

In the next few steps, you will personalise your password.

5. Once your desktop appears, go to the Service menu and select Password.

   The Change Password window will appear.

6. Fill in your old password in the Old Password field.

   Notice that, for security, all you will see is a row of asterisks.

7. Then type the new password you have selected twice, once in each of the two remaining fields, New Password and Retype Password.

   This is to make sure you get it right, considering that you cannot see what you have typed.

8. Click on the OK button, and your password is changed.

In the next few steps you will download a file.

9. Double click on the Open University folder to open it. Then open the PGCE Lobby conference denoted by the coffee cups. When the window has opened, double click on the 'For Downloading' message.

10. When the message opens you will see in the upper pane an attachment labelled 'Greetings'. Double click on this and the window in Fig 4 will appear. Click on 'Save' and the message will download onto your machine into the FirstClass "Download" folder, unless you select a different destination. You can read this later when you have disconnected from FirstClass

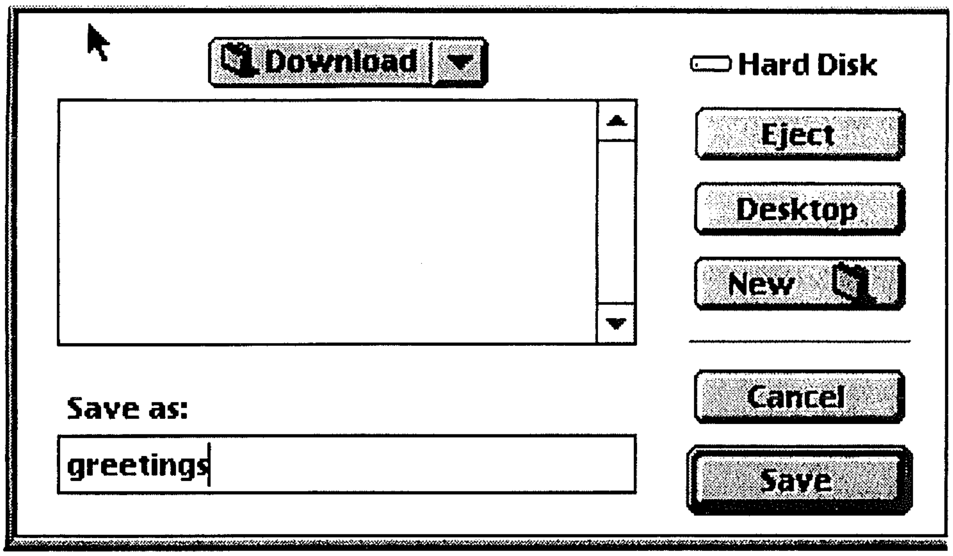

Fig 4 -The FirstClass Greetings Window

Saving money

The majority of people will be able to use local call rates when using FirstClass. Remember rates are cheaper after 6 p.m and particularly good value at weekends.

If you want to make a lengthy response to an e-mail or conference item then prepare it offline either by

- creating a Clarisworks word processing file and then copying and pasting to FirstClass when you next log in, or by
- attaching your reply as a Clarisworks file.

If you want to read messages offline:

- open all those messages so they appear stacked up on your desktop then
- select *disconnect* from the *service* menu.

You will be logged off from FirstClass but your messages remain on the desktop and can be printed out, read from the screen, or saved as a file using *save* from the *file* menu. (If you don't want to read any messages, select *quit* from the *file* menu and they will all disappear.) Remember that you cannot send replies to these messages until you re-connect.

Section 4: Using the OU PGCE Conference

4.1 Exercise 5 - A Tour of the OU PGCE Electronic Campus (Time: it's up to you)

In this exercise you will be exploring various parts of the OU Electronic Campus, using the skills you have practised in the previous exercises. Again, at this stage we suggest you just read messages but do not try to send any. That will come soon enough.

As you have seen in previous exercises, your Desktop window on FirstClass includes the following icons:

Your Mailbox: This is where your electronic mail will appear. It also will include a copy of any outgoing messages you send, whether as mail or addressed to a conference.

Networked conferences: This contains a selection of international files on using FirstClass.

FirstClass Reference: This contains a set of standard information files on using FirstClass. For information specific to this system, this folder is the place to look.

ACS Helpdesk: This contains a number of conferencing areas to which you can submit questions about using FirstClass.

OU Service News: This conference gives information of interest to the whole community using the OU FirstClass service, i.e. it is not specific to any one course.

The Open University: Specific PGCE activity takes place here - see Part 2 of this guide.

4.2 Exercise 6 - Finding out about people on FirstClass and preparing your own résumé (10 minutes on-line)

In this exercise you will learn how to find out about other people using FirstClass. Who else is on-line at the same time as you? How can you find someone's name in the FirstClass directory? How can you find out background information about other people? As part of this exercise you may complete what on FirstClass is called your 'résumé' (a brief description of yourself). This will give other people on FirstClass any information about you which you are willing to make public. You will also begin to practise working partially off-line so as to keep your telephone costs low.

Before you start, prepare your personal résumé using ClarisWorks. Be sure the margins on your word processor are set to 13 cm/5 in. or narrower (use Document in ClarisWorks), or you may get split lines. The whole résumé should be no more than a few paragraphs, or a page at the very most.

Your résumé will be visible to anyone on the OU FirstClass service who wishes to look at it (i.e. several thousand people), so think carefully about what you want to include or exclude. What you write is entirely up to you, but you might consider the following format:

I am a PGCE secondary mathematics student. I live in Norwich and have 2 young children. I used to be a personnel officer until I became a full-time Mum. I'm really looking forward to becoming a teacher. My hobbies, when I have time, are aerobics and badminton. I'd love to play the piano but can't ever see when I shall have time to learn.

It does not have to be long, but ought to give information about the course line you are following at the very least.

Also, before starting this exercise, be sure you have your tutor's name to hand as you will be looking up his/her résumé. (Tutors can find their regional staff tutor's name).

In the next few steps you will put your pre-prepared résumé on-line.

1. Leaving the ClarisWorks document open with your résumé in it, switch to FirstClass by clicking on Finder in the menu in the top right hand conner of your computer screen and selecting FirstClass.
2. Connect as usual.
3. From the Edit menu select *Résumé*.

   You will see a split window appear.
4. Switch back to ClarisWorks. Go to the Edit menu and Select *All* to highlight your résumé, and then select *Copy* from the Edit menu.
5. Switch back to FirstClass. Type your name in the upper pane of the Résumé window. Then click in the lower panel so you see the blinking cursor there. Now *Paste* your résumé. When it appears, close your résumé window.

You can use this same procedure later for preparing messages off-line to keep your connection times short.

In the next few steps you will learn how to find your own, or anyone else's résumé.

6. From the Service menu, select *Who's Online.*

   A window will appear with a list of names, which should include yours.

7. Double-click on your name and your résumé should appear. Close your résumé.

   In general, double-clicking on someone's name anywhere it appears on FirstClass will display their résumé.

8. Click on the DIR button on the palette. Type all or part of your tutor's last name in the window which will appear and then click on the 'Search' button.

   A Directory window will appear with a list of names which should include your tutor and anyone else whose name contains the characters you typed.

9. Double-click on your tutor's name (or staff tutor if you are a tutor).

   If he/she has prepared a résumé, it will be displayed.

10. Disconnect from FirstClass.

4.3 Exercise 7 - Writing messages (10 minutes)

Note: The main steps in this exercise are summarised below.

In this exercise you will learn how to write messages, reply to messages you have received and forward them to other people. You will also learn how to check on the 'history' of a message, to see whether it has been received and read.

For this first attempt at writing, you will only write short e-mail messages to your tutor (or your student if you are a tutor) and will work entirely on-line. Conference discussions work in a very similar way

1. Connect as usual.

2. Open your Mailbox. Click on the NEW button on the palette.

   A new message form will appear. It will have your name in the From: field and the Subject: field will be highlighted with a dotted outline.

3. Type "Hello" in the subject field.

4. Type part or all of the name of your tutor (or staff tutor if you are a tutor) in the To: field. Now press Enter.

   If you have typed enough of the name for FirstClass to recognise it unambiguously the rest of the name will appear. If not, a window will open listing all the names which could match what you have typed. (This directory window also gives you the opportunity of looking at someone's résumé, in case you are not sure which name is the person you want, by double clicking on their name).

5. Click once on the name of your tutor.

   Your new message form should reappear with their name in the To: field.

6. Write a short message telling them you have managed to log -on successfully. Then click on the SEND button on the pallette.

7. If there is a message already waiting for you from your tutor, then click on the REPLY button on the pallette. A new mesage form will appear but with your tutor's name already filled in on the 'To' line. Then type in your message and send it as in point 6 above.

4.4 Exercise 8 - Advanced Features of FirstClass

In the preceding exercises you met all the features of FirstClass you will need for successful electronic communication. In this final exercise you will learn a few extra features which are convenient or fun. You will learn

- how to do some electronic housekeeping in your mailbox: deleting messages, changing their expiry dates, putting them in folders.
- how to set up a personal address book for mailing lists and for sending mail to people outside the OU FirstClass service.
- how to attach files to your messages.
- how to have a real time 'Private Chat'.
- how to find out who has read a message.
- how to set up an 'alias' of a conference on your desktop.

Sometimes you may wish to send a mail message to several people at once. You can do this simply by putting all their names in the To: field of the message form, one below the other. However, if you have to do this frequently with the same group you may wish to set up a mailing list. Then you can type the name of the list only and messages will be sent to everyone on it. In FirstClass this is done with an 'Address Book'.

Also, you can use the OU FirstClass service to correspond with anyone who has an Internet e-mail address as well as with other OU students. Such an address will typically look like 'a.n.other@bumble.ac.uk'. To send such a person e-mail you simply put 'a.n.other@bumble.ac.uk,Internet' in the To: field of a message form. To save having to remember the person's full Internet address, you can use your FirstClass Address Book to create a nickname for the person. You could set it up so that when you typed 'Annie Other' into the To: field, FirstClass would know that you meant 'a.n.other@bumble.ac.uk,Internet'.

We'll start with some electronic housekeeping.

1. Connect to the OU FirstClass service and open your Mailbox.
2. Go to the Conference menu and select *New Folder.*

   if the upper pane of your Mailbox is visible, you will see an icon labelled 'New Folder'.
3. If the upper pane is not visible, move your mouse cursor to the double line just below the summary line until it changes to this: then drag downwards to reveal the upper pane.

   You should now be able to see the New Folder icon. In the next few steps you will change its name and icon and put some messages in it.
4. Click once on the New Folder icon, then go to the File menu and select *Get Info*. When the info window appears change the words 'New Folder' in the Name: field to 'To be saved'.

Now you have a folder in which to put messages which you don't want to expire. You can even change the icon if you want.

5. Double click on the icon in the New Folder info window and you will see a scrolling field with vast numbers of icons. If you double-click on any one of them it will become the icon for your new folder.

   (You can do this trick for any message or conference folder too.)
6. Now close the info window and click on *Save* to save your new icon.

Your New Folder icon will now be labelled 'To be saved'. Now you can put something into it.

7. Drag the icon of a message you sent to your tutor to the To Be Saved folder

You have just put the message into the To Be Saved folder for safe keeping. However, if you really want it to be saved you will have to stop it from expiring.

8. Open the To Be Saved folder and select the message you have just put in there. Go to the File Menu and select *Get Info.*

The info window which appears will include an expiry date. You can change this to anything you want, including 'never'.

9. To change the expiry date to 'never', click on the down arrow in the 'Expriry in' box and drag the highlight to 'Never'. Release the mouse button to select 'Never' then close the info window and save the changes.

Now you have a message which will never expire. However, you don't *really* want to keep it, so the final lesson in electronic housekeeping is how to delete messages.

10. Select the message again and delete it using the  button on the palette.

<u>Address Book</u>

In the next few steps you will learn how to set up and use an address book.

11. Go back to your Desktop. From the Conference menu select New Folder.

You could use the folder which appears to collect conferences to organise your Desktop, but we will now use it to create an address book.

12. Select the New Folder icon, then go to the File menu and select *Get Info.* When the info window appears, type 'Address Book' in the Name field. Then close the info window and save the changes.

    You now have an address book.

When FirstClass sees a folder on a Desktop with this exact name, it treats it differently from other folders.

13. Open your new Address Book icon. Click on the  button on the palette and a new personal mail list will appear. Type in it the name of your tutor or any of the students in your tutor group

You now have created a personal mailing list, but you must give it a name.

14. Go to the File menu and select *Get Info.* Type the name you have chosen (eg Jane's list) in the Name: field. Close the info window and save the changes.

If you now type the name of your mailing list in the To: field of any conference or mail message form, that message will be sent to the people on your list. If you had wanted to set up an alias for Annie Other, you could have typed a.n.other@bumble.ac.uk,internet in the personal mail list, and Annie Other in the Get Info window.

How to attach files to a FirstClass message

Find a short file in Clarisworks with just a few lines in it.

Open up a new message form and select someone to send it to (you won't actually send it this time).

Now go to the File menu and select *Attach file.*

A new window will appear from which you select the message you want to send.

Double click on the file to attach it to the message.

How to have a real time 'Private Chat'

In FirstClass, there is an opportunity to hold a 'Private Chat' with one or two (or more people) in real time. This is a text based 'chat'. You can type a message to the other people and they receive it immediately and can reply.

You do this by selecting *Private Chat"* from the Message menu.

A new window will appear as in Fig 5 below.

Select *Invite* and a directory of all those people currently online will be revealed.

If a name is in italics, this means that person is not available for a chat. Select the name you want. If the person accepts the invitation which appears on their desktop as in Fig 6 then you will get a message saying they have joined the chat. You can then hold your 'conversation' by typing in the box next to the talking heads and pressing return when you have finished your message each time. You leave the chat by clicking the small square in the top left hand corner of your chat screen.

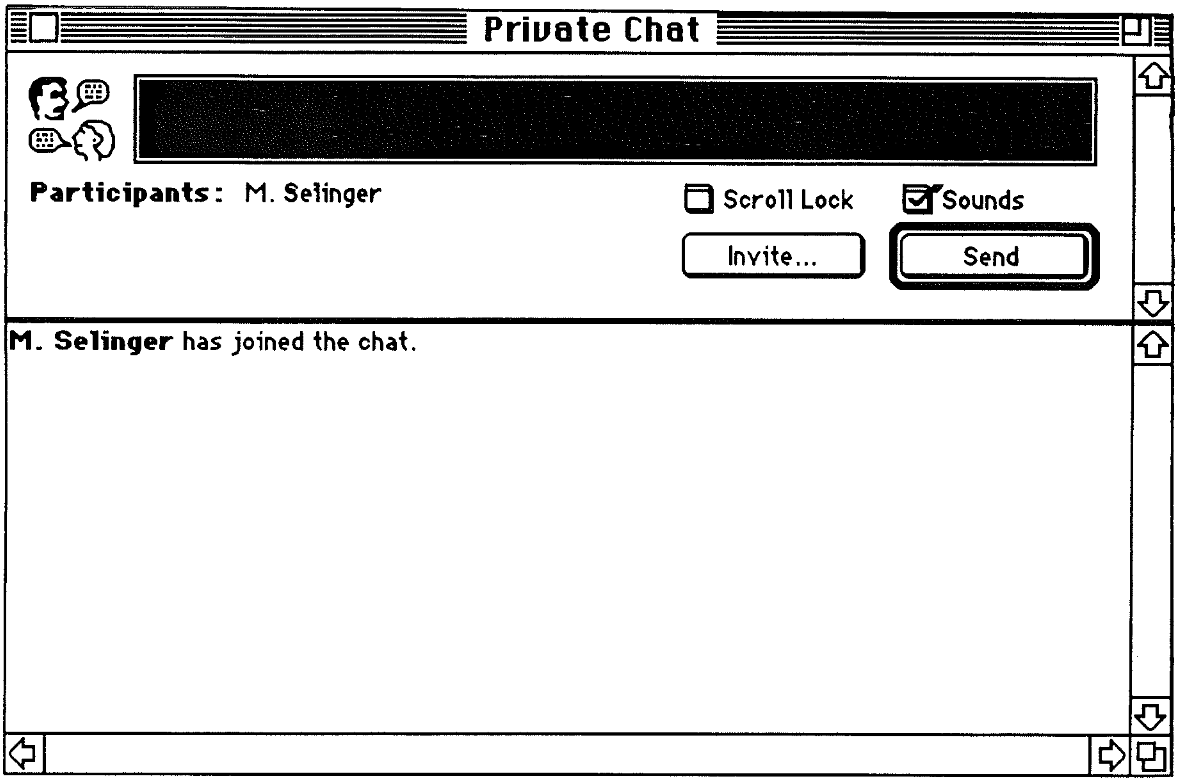

Fig 5 - private chat screen

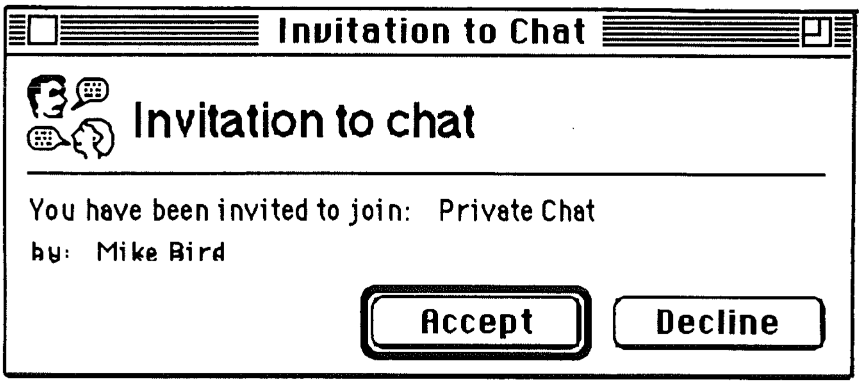

Fig 6 - invitation to chat

How to find out who has read a message

If you want to know who has read your messages (or any others) highlight the message and then select *History* from the Message menu. A new window will appear telling you who has read the message and whether they have saved it and downloaded any attachments.

Note that the OU operates a number of FirstClass servers. If the messages are routed to a person on another server History only indicates that the transfer through the server to server gateway has taken place, not whether the message has been read. All the PGCE contacts are, however, on the same server.

Setting up an 'alias' of a conference on your desktop

An alias is a copy of the icon for a conference or folder, put in a more convenient place, such as your FirstClass desktop. This is done by clicking once on the relevant conference or folder and selecting *Make Alias* from the Conference menu. When you click on an alias you are taken to the original conference or folder immediately.

Your final task takes the form of a short initiative test.

15. Suppose you are reading a conference message and want to send a reply to the sender only, and not to the rest of the conference. Find the command on the menu bar which will do this.

16. Disconnect from FirstClass.

Section 5: Using computer conferencing

In Part 2 of this guide there are guidelines on how to use the conferences and how best to write messages, but below there are some legal issues we would like you to consider.

All messages have a 'subject' line, indicating the contents of the message. People see this before they see the contents of your message and may use it to decide whether or not to read your message. Take the subject line seriously and make sure it is clear.

Please, no advertising. This is an academic network, not the place to conduct your business.

Legal issues:

If you copy something published in a book or magazine and put it on-line you are probably violating someone's copyright. When the OU puts published material on-line it first gets copyright clearance and usually pays a fee. (But very short quotations are allowed.)

If you are copying something written by someone else, put it in quotation marks and give them credit.

E-mail is generally considered private and should not be quoted without permission.

A conference is a public place, so be careful what you say to people. Although people are usually very tolerant, (and I suggest that you try to be too), there are rare cases when someone sues for libel when they have been offended. Be especially careful about remarks which might offend minority groups or which might be considered obscene. Such comments have no place on an Electronic Campus where the ethos is support and collaboration.

You will find an official 'Code of Conduct' on-line in the OU Service News conference. Please have a look at it as it will be assumed that you have read it. It opens automatically the first time you look in OU Service News, so that you wont be able to say you didn't see it!

Section 6: Setting up your tutor group conference

What follows is a list of common activities. You should check that you are comfortable with these.

Checklist of common actions

- Read a message in your mailbox, or in a conference
- Send, forward or reply to a message
- Upload an attachment from your hard disk
- Download an attachment to your hard disk
- Create an address book
- Create a mailing list for posting messages to all your students' mailboxes
- Check the history of a message
- Check the directory for a particular name
- Check a user's résumé
- Post your own résumé
- Create folders within your mailbox to contain different categories of message
- Post a message and then withdraw it!
- Use the Search command to find all messages on a given subject
- Use the 'Private Chat' facility to talk to others online

Once you are familiar with all these functions of FirstClass you should feel comfortable about using the address book. You can set it up to post a welcoming message to all your students and send messages to conferences, in particular, to your tutor group conference One small tip - if you include in the message an invitation to respond with a reply, it would be sensible to add a warning to use the 'Reply Special/Reply Sender' option on the Message menu when doing so. Otherwise you and all your students will see a graphic demonstration of the disadvantages of group mailings by comparison with group conferences, as all their replies land in the mailboxes of all the other students in the group!

Managing conferences

As well as providing an easy-to-use communications environment, the FirstClass system has many useful facilities for organising and managing information and discussion. The whole system is too complex to describe in detail here, but one of its advantages is that these facilities are available on a 'mix and match' basis. That is, some features can be made available to you as a tutor so that you can manage parts of your students' learning environment in much the same way as you organise your tutorials, without you having either to appeal to a System Manager to set things up for you or having to worry about the management of any other part of the system than just your conference. This section concentrates on the information and additional practical skills you will find useful in doing this. It may also provide useful additional information for responding to your students' questions.

As you can see from the description of the Electronic Campus Environment in Part 2, there are a number of PGCE conferences supplied for use by the whole course. These will be managed centrally and you are invited to take part in these conferences. Your private Tutor Group conference is for you and your students only, and, if nothing else, it will save you having to respond individually to the same question from each student! Anything put into a conference is seen by all members of that conference - in this case you and all the students in your group - so just as at a face to face tutorial, all participants can benefit from the answer to a question asked by just one person.

The essential jargon

Here are some basic definitions that you will find useful. Don't worry if you can't take in all the detail at first reading; things will become clearer as you explore your 'powers' in the activities described later. Within each definition, the words in italics are defined or described elsewhere in the material.

Desktops

In simple terms, the desktop is what the user sees on the screen when logging on to FirstClass (not to be confused with the Apple Mac desktop). Each user can customise their own desktop by rearranging the icons and adding or deleting aliases. One of the most useful features of FirstClass is that groups of users (known as a *Privilege Group*) can have a desktop designed for that particular group so that, for instance, students on a Technology course would see a completely different view of the system from students on the PGCE course. This also means that the 'Staff Room' conference cannot be seen by students. The initial design of a group desktop has to be carried out by the System Administrator.

If a conference is not placed on a user's desktop (either directly on their desktop or within another conference that is directly on their desktop) then they cannot open it and read the messages inside, or open any sub-conferences it contains.

Conferences, sub-conferences and folders

A conference is simply an area on the FirstClass server which may be restricted to certain participants by use of *permissions*. Its name usually indicates the topic to be discussed within it. A conference may contain sub-conferences and/or folders. You can address a message directly to a conference in exactly the same way as addressing it to a person.

A sub conference is a conference that is inside another conference!

A folder is just that; a place to keep messages. Access to a folder cannot be changed by use of permissions (see below); anyone who has access to a conference will also be able to open any folders within it.

Folders and conferences look very similar. To be sure of which is which, check the Get Info box for the object. You cannot address a message directly to a folder, but messages in conferences can be moved into folders by dragging. This is useful for organising older material. One other difference is that all conferences must have unique names, but folder names can be duplicated.

Privilege Groups

Users belong to one or more Privilege Groups. As mentioned earlier, the Desktop, or users' view of the FirstClass system, is initially set by their membership of *Privilege Groups*. Privilege Group membership can also be used to set up what facilities the members of the group can use within any particular conference - their *permissions* - this is explained below. On the PGCE, there will be 'PGCE Students' and 'PGCE Tutors' privilege groups to determine desktops, as well as regional privilege groups to determine access.

Permissions

In general, all members of a conference can both read and contribute messages to a conference. However it is possible to set up conferences and sub-conferences so that certain people, or groups of people, have different facilities within that conference - for instance some may be able to contribute messages whilst others may be able only to read the contributions. As an example, while you would want all members of your group to read and contribute messages in the main part of your tutor conference, and so wouldn't want to set up any special permissions, you might have a sub-conference where you will put announcements to your students. You wouldn't want general discussion to break out, so you could set the permissions for the sub-conference so that your students had 'read only' status. Similarly it is possible to have a 'Students only' sub-conference that your students can contribute to but you can't even read!

Permissions can be set by the *controller* (or controllers) of the *conference*, using the *Permissions form*.

Permissions form

Each *conference* or sub-conference has a Permissions form. It can be accessed by highlighting the conference or sub-conference by single-clicking and then selecting *Permissions* from the Conference menu. It is here that the status of each member of the conference is recorded. Someone with *controller status* can change this form but a member with *contributor status* can only read it. The Activities below will give you some experience in using this form.

Controller status

The controller of a *conference* is the one who decides who can do what within the conference! They can also delete others' messages, which normal members are - naturally - not allowed to do. You are assigned controller status for your tutor group conference. There can be more than one controller of a conference so, for instance, you could get together with another tutor or tutors and 'team teach' a tutor group conference.

Controller status gives the highest level of *Permissions*. Each of the 9 levels is a pre-defined mixture of the 12 different facilities available, or can be a customised mixture for special circumstances).

Contributor status

Contributor status is the default *Permissions* status of any conference member if no special permissions have been set up for them. This allows the member to read and write messages to the conference. Look at the history of any message and check the actual permissions status of the conference by looking at the *Permissions form*. This standard set of permissions can be modified by the controller to allow more or less facilities to any member.

Expiry

There are a number of items at the top of the *permissions form* which are explained in the later activities. One very important item worthy of separate mention is the expiry box. In general, conference messages are deleted automatically after a certain date. The FirstClass system as a whole has a "default" expiry time. But the message expiry on an individual conference can be set to longer or shorter than this default. You would probably want messages in your conference to last for at least a month. (This is done by simply typing a number into the box).

Individual message expiry can also be set on the Get Info form which you find get by highlighting the message with a single click and then selecting *Get Info* from the File menu.

Of course a conference can get very cluttered if it contains all the messages contributed during the course! A conscientious conference moderator will produce summaries from time to time, just as you would bring together the threads of a discussion in a tutorial, so that the messages can then be deleted or filed away in folders within the conference.

Customising your tutor group conference

This activity is optional and covers the elements of the Permissions form which would enable you to set up your sub-conferences more elaborately and control who can do what in which areas. For instance, as stated earlier, you may want to make an area for important announcements. You would probably want to set this up so that only you could post messages to it, but all your students could read it. Or you may wish to make a "Students Only" area that you can't even open and hand control of it to one of your group!

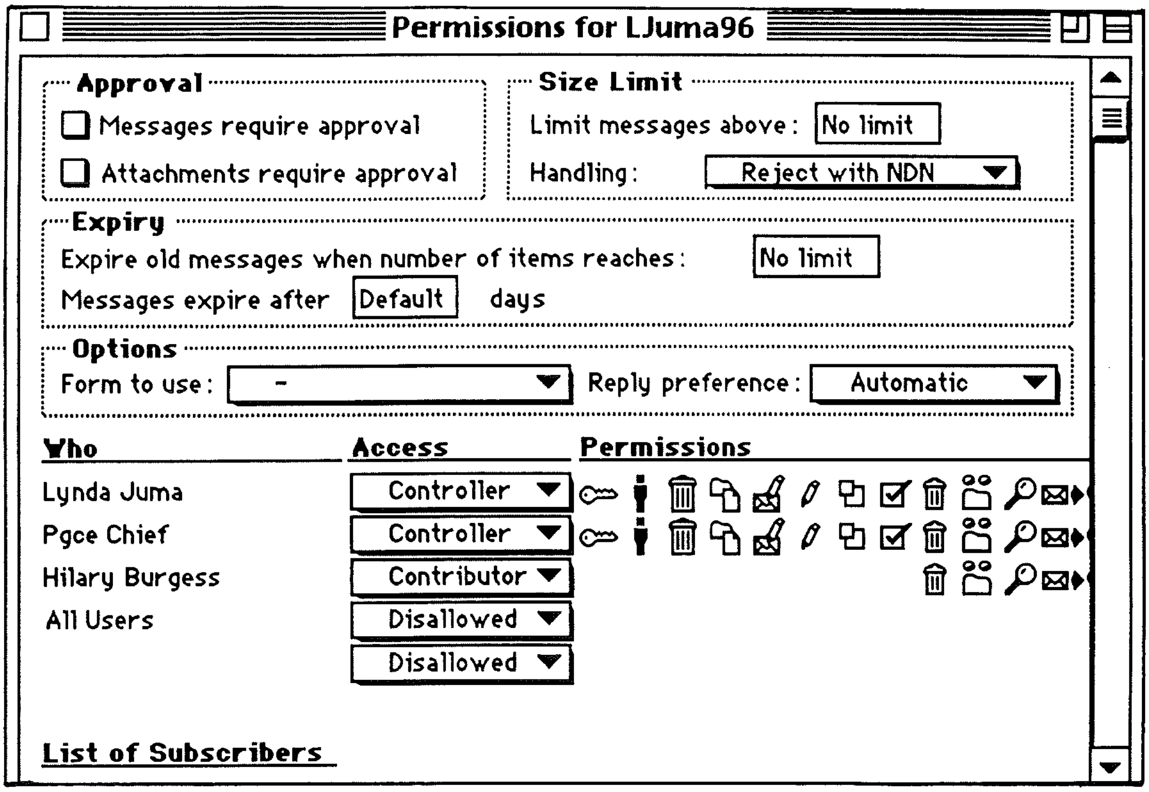

Fig 7 - permissions form

1. Click once on your tutor group conference (it can be found by opening your regional conference and will be the green door with you name underneath). There are no spaces between your first initial and your surname so that your conference does not get confused with your private mailbox. Now open the Permissions form by selecting *Permissions* from the Conference menu.

2. For the moment concentrate on the bottom part of the form. Under the heading 'Who' you will see your name with 'Access' in a pop-up menu which has been set to 'Controller'. The area to the right - Permissions - has a line of icons showing the various permissions given. You will see that, since you have full controller status you can do more or less what you like in this area. Amongst other things, you are able to make new sub-conferences. You will also find 'pgce chief' listed as having controller status. Please leave this unchanged as this is the conference administrator for the PGCE, and if you have problems with your conference they will be able to sort it out. It is very unlikely that they will read the messages posted.

3. You will also find the staff tutor for your region listed as a contributor under your name and pgce chief. Now you are going to add the names of your tutor group to the conference so make sure you have your list of students to hand. Underneath the names already listed under 'Who', and before 'All users', type part of a student's name in here and press return. If the part of the name you have typed in is sufficiently specific that there is one person it matches in the directory then the full name will appear; if not you will get a listing of close matches from which you can pick the correct name. The 'Access' area to the right of the name currently says "Disallowed". Hold the mouse down on this to pop up the menu and pick 'Contributor' from the list that appears. Continue adding students names until all students are in the list. If you also add your name and theirs under 'List of Subscribers' this conference will appear on the desktop and therefore works in the same way as 'make alias'.

4. You can now protect the conference by closing the permissions form and selecting *Get Info* from the File menu. Put a tick in the box that says 'Protected'. This makes it harder for you or another controller to delete it by accident. (It has happened!).

5. Conferences can be made private. Obviously if other users cannot 'see' the conference then they can't open it. But the conference can also be made closed to others even if they can see it. The way you do this for your conference is to make sure 'All Users' are 'disallowed' at the end of the list with all your students' names. **Encourage students to make an 'alias' of this conference on their desktop, so that they can quickly see once they have logged in if there is a message in this conference without having to open several folders to get there.**

NOTE: The order of names and privilege groups in this area is important, for instance your name MUST come before the students' names. Whenever any user tries to access a conference, the system checks down this 'Who' list for the first mention of them - their name or a privilege group that includes them - and takes the privilege level for this mention as the right one for the conference.

6. You can also try changing the other items on the Permissions form (those above the 'Who' line):

Approval

Used if, for instance, you want to vet contributions before other members of the conference read them (the top box).

Size limit

This is important if you don't want people to post messages and attachments in the conference that would take a long time to download.

Expiry

This is the element of the Permissions form which you are most likely to want to change, even if you don't want to bother with any of the other items. The whole FirstClass system has a default expiry date on messages (usually around 3 months) but an individual conference can override this limit. For instance, you might want some conferences to last for the whole period of the course, so you would set the time limit to reflect this while you might want others (a light-hearted 'Chat' conference, for instance) to last only a month so that the volume of messages is not too overwhelming. Whatever the limit, you just type it in (in days) to the relevant box. You can also limit the volume in the conference by putting a maximum number in the '..when number reaches' box. The maximum number of messages in one conference is 1024.

Options

This area contains two items. The first-**form to use for reply** - will probably not be particularly useful to you unless you are running a very specialised conference but the second - **Reply preference** - can be very handy. For instance, you may have a conference where you want to make announcements but don't want the conference cluttered up with any replies. By popping up the menu for this item and picking 'Reply sender'you can ensure that any replies are sent to your mailbox (or the mailbox for whoever posted the message) rather than going to the conference.

Once you have worked through these activities you should feel fairly confident about the practical side of setting up and running a conference on FirstClass.

Appendix 1 - The ACS Student Help Desk

The University's Academic Computing Service (ACS) offers a telephone Helpdesk for computing queries to all students currently studying a course using personal computing. The staff can provide help with hardware problems and difficulties installing the course software. They can also usually help with basic use of the course software and interpreting software errors.

If you have problems with your course disks please check with the ACS Helpdesk before returning any disks as faulty. Some errors that might appear to indicate a corrupt disk can in fact be due to things like incorrect copying or machine problems. The Helpdesk may be able to offer a solution without you needing to wait for the disks to be exchanged for new ones.

The Helpdesk hours are:

9:00 am to 5:15 pm Monday to Thursday

9:00 am to 5:00 pm on Friday

(except during the University's closure periods)

The Helpdesk staff also run a reduced but extended service on Monday and Tuesday evenings until

7:00 pm from the beginning of February until Easter.

The telephone numbers are:

01908-653972 and 0171-435-9624

Outside these hours, the University has employed some extra staff to assist with electronic communications problems related to getting your equipment set up and connected to OU services. Help with connecting to University services is available on 01908 652923 from 17.30 to 21.30 Monday to Friday evenings, and from 9.30 to 12.30 Saturday and Sunday mornings (except Bank Holidays and Easter weekend). This additional service will not be able to offer assistance with issues specific to your course work or course software.

Please be aware that there are many links in the network connection that you use to reach our conferencing systems. None of them can be 100% guaranteed, mainly because the OU does not own or control elements not on OU premises. If connection fails unexpectedly, or you find that you cannot connect using a setup that normally works, please try more than once before you call for help.

During very busy periods your telephone call may not be answered immediately. This does not mean that the staff are not there, just that they are busy with other calls. Please be patient and persistent!

Appendix 2 - Pulse exchanges

If your telephone exchange is pulse rather than tone (you can check this by ringing the BT operator) then you need to make changes to the settings document.

- At the modem.fcs screen click 'Setup' to get to the next screen.
- In the connection box change 'Phone' from 'Tone' to 'Pulse' by clicking on the downward arrow. Save this change. This will take you back to the previous screen .

Appendix 3 - Problems and how to handle them

If you are still unsuccessful after following the advice here, contact the ACS Student Help Desk (see Appendix 1 for telephone numbers and times.)

This appendix is largely devoted to helping you sort out difficulties with your first connection. However, I would like to start with one emergency rule:

1. So, you think you are connected to the OU FirstClass service, but none of the controls seems to work. You are afraid you will be running up big phone bills but can't disconnect. What do you do?

Unplug the modem from the telephone socket.

Then you know you are disconnected. If you have a double socket and your telephone is connected at the same time as your modem, pick up the telephone. If you hear a dial tone, then you are already disconnected.

2. Now, let's consider the problem of getting a reliable connection to the OU FirstClass service. There are many steps which occur after you click on the Login button: resetting the modem, dialling the number, making the connection to the OU modem, executing the script, sending your login ID and password. You may find that you get stuck at any of these. What is worse, you may make what appears to be a successful connection, only to find that it is unreliable. After a short while, FirstClass seems to 'freeze up' and not respond to the controls. What has probably happened is that you have lost the connection.

There are many possible reasons for these problems, but the most likely reason is that the modem file or some of the other modem parameters you set are not quite right for your modem. That may be the case even if you seem to have got all the way through and then lost the connection. (That has happened to me.) All the required changes you will need to make are on the FirstClass Connection Set-up Window, shown below.

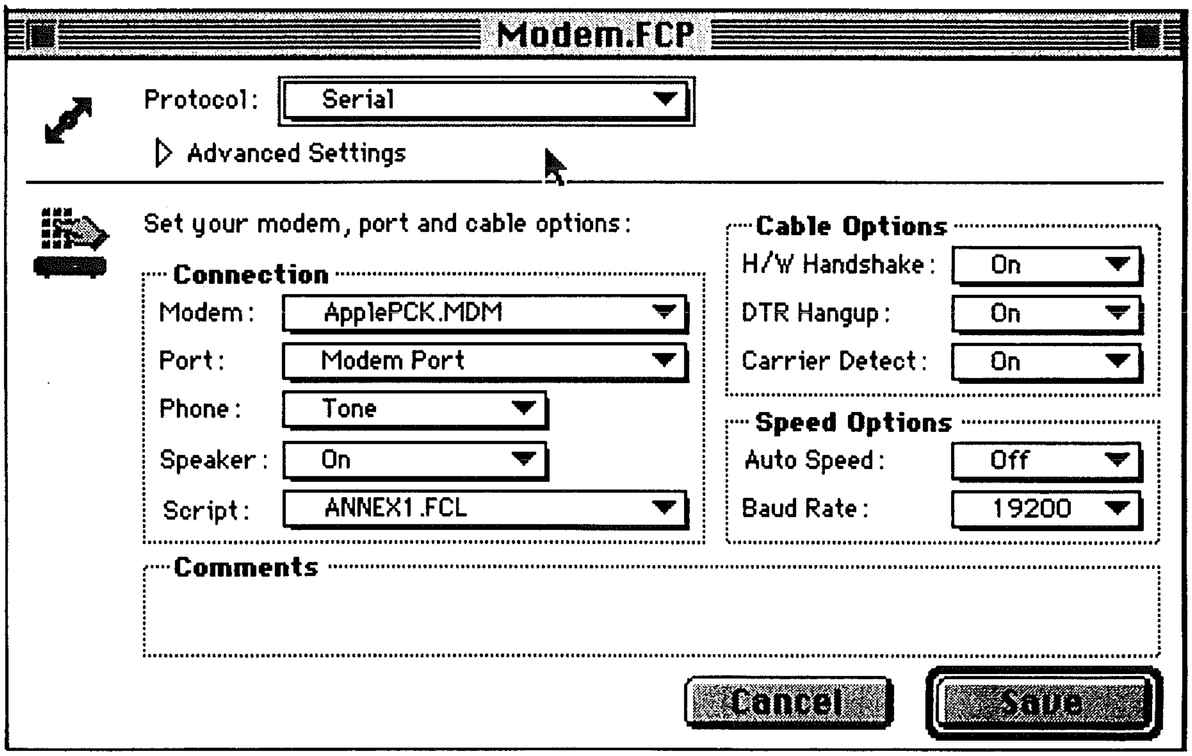

Fig. 8 - The FirstClass connection set-up window

What follows is a list of the most common problems and some suggested solutions:

(i) **FirstClass cannot reset the modem** - There are two possible reasons for this. The first is that you haven't selected the correct connection port on the connection set-up window. Try another connection port. It's also well worth checking that all connections between computer, modem and phone point are secure.

(ii) **The software reports "No dialtone".** You may have to change the "Tone/Pulse" entry in the connection set-up window. If neither setting works, make sure your modem is securely plugged in to the phone socket - and check that the line is OK by using a telephone handset instead of the modem. In a very few cases (mostly oustide the UK) FirstClass will just not have recognised your local dialtone - ring the Help Desk for instructions on what to do in this case.

(iii) **The modem dials OK but does not execute the script correctly (you will get a message saying "An error was encountered during the processing of the connection script").** There could be a number of causes for this:

(a) You may have dialled the wrong number! Check the number you entered at Step 12 of the set-up procedure with the "FirstClass Access Points" list and make sure you have typed it in correctly.

(b) You could be using the wrong script. Check that you have the correct script in Setup to reach Server No. 1 by the route chosen.

(c) If you are using a Dialplus or GNS number set the baud rate in the "Connection set-up" to the exact speed quoted for that number (14400, 9600 or 2400). Some of these access points aren't able to interpret the login commands given by the script unless you have connected at the exact speed they are set to.

(iv) **You can see the script executing correctly (the message in the login window is changing) but the "Negotiating connections" and "Connected" messages are on the screen far longer than the expected times and you never get to your FirstClass desktop.** Again there may be more than one cause:

(a) There may be something unsuitable in your modem set-up. Try the solutions in points ii and iv of this "Troubleshooting" list.

(b) There could actually be something wrong with the server you are dialling, the network, or the FirstClass server itself! This is unusual, but could happen. You could try a different telephone number, but in any case if the solutions in points (ii) & (iii) don't help, please contact the Help Desk. **Do remember the scheduled downtimes (for backup) of the server.**

(v) FirstClass connects and you can see your desktop but the link fails immediately or fails during data transmission (opening a conference with lots of messages or up/downloading a file). There is probably a mismatch between your modem and the modem document you are using. though this is unlikely with the PGCE machines. Contact the Help Desk for advice.

(vi) If the connection appears to work correctly but fails the moment the FirstClass desktop appears, or works OK sometimes but not others then the possible cause is a weak signal. The problem can arise when too many extensions/answering machines/etc. are connected to the line or you have a poor extension lead, but may also be due to problems between your phone point and the exchange.

Part 2 Using FirstClass

Section 1: What is computer conferencing?

Computer conferencing is a way of exchanging information and ideas with groups of individuals through electronic means. It can be through text and graphics, audio or video, and connections are made through telephone dial up services and linked to a computer. For the purposes of this booklet, the term 'computer conferencing' will be used to describe the transmission of text and graphics using the particular software, FirstClass.

1.1 Electronic mail (E-mail) and conferencing

E-mail is a system through which personal messages can be sent by one person to another. The message is addressed specifically to you. A message can be sent to a number of recipients who will each receive it in their own personal electronic mailbox.

Conferencing is more public. A message is sent to a conference rather than an individual and the conference is joined or 'subscribed' to by a group of people some who might be known to you and others who might not. Usually the conferences are interest groups who find electronic means facilitate discussion between them. They can be as diverse as groups of football fans or nuclear scientists, and they might have members in common. When you send a message to a conference, everyone who subscribes to that conference can read it and respond either to the conference, or to you personally.

1.2 Benefits of computer conferencing

Computer conferencing enables groups of people who are in diverse geographical locations to 'meet' and feel they belong to a community sharing the same interests. It is a great leveller in a sense because people have names but there are no immediate clues as to their status, race, and sometimes, gender. Discussions are 'asynchronous', that is they can be written at one time, read later, and then responded to whenever suits the reader or readers. Communication does not require everyone to be connected at the same time, but replies can be exchanged more rapidly than by post. Telephone conversations are often extremely useful, but finding the person in when you most want them is always a problem. This way messages can be left in your mail box or in a conference and you decide whether to respond by contacting the person by telephone or by leaving an electronic message.

Having to write a contribution to a discussion is likely to improve thinking and writing ability, and it provides a written record. It also avoids the task of noting down enough key points of a telephone conversation to remember it afterwards. In addition the quality of contributions to a conference may be more effective because there is time to reflect before composing a message, rather than having to react immediately as in a telephone conversation or a face-to-face discussion. Tutorials can become a richer experience because students have had time to discuss the issues beforehand and tutors are more aware of the position different students might adopt.

With some systems like FirstClass you can use colour, layout , graphics etc., making this a novel and exciting form of communication.

1.3 The structure of the electronic conferences in the OU PGCE

The electronic communication model mirrors the course structure. The whole programme is represented in the 'PGCE Lobby' area where all staff and students can communicate across phase, subject and region. There are a number of other conference areas to 'visit' and join in the discussions These are the *regional conferences*, one for every OU PGCE region and run by the staff tutors, and within each region there are individual *tutor group conferences* run by tutors. Then there are *subject conferences* and a *Primary conference* which offer a range of forums in which to discuss aspects of the course that are particularly relevant to students at key points. This structure also saves time in sifting through messages that are irrelevant to needs and interests.

Students are allocated to a Primary or Secondary tutorial group on a geographical basis . In Secondary tutorial groups there is a mixture of students specialising in the different subject lines. Students in any one primary tuorial group will be composed of those specialising in both lower and upper years. Tutors therefore offer general support and advice. Subject-specific topics and issues are addressed through the course materials and the student's school-based mentor. This also means that access to other students following the same specialism is limited to perhaps two or three per tutorial group. Through FirstClass this access increases to 100 or 150 or more students depending on the course line. In addition Primary students, who have to teach all subjects, can have access to the subject expertise of their fellow students following the Secondary lines and to the Secondary subject co-ordinators.

Discussion in these conferences will vary considerably according to the phase or subject. For example, in the past, the mathematics conference has had an extended discussion on the problems associated with mixed attainment groups while the English conference has had a lively debate about the teaching of poetry. An important point throughout is that FirstClass recreates much of the dialogue that happens on notice boards, in coffee bars and in doorways on a traditional PGCE course. Thus it is part of the life of the PGCE and extends to newsletters, visiting lectures etc. The conferences provide a forum where students can consider their views on a range of topics associated with teaching and discuss these with other students, tutors and the course team. To some extent this mirrors the discussions that might take place during seminars in traditional institutions. However, there is an additional bonus - these discussions are recorded in a form that can be copied and referred to at later date. Students have time to consider their response, prepare it in advance and refine it before posting it in a conference. They can also prepare a joint response with another student or group of students.

Students communicate with tutorial staff nationally as well as with subject specialists on the course team, who, between them, have a tremendously wide range of specialisms, interests and expertise. The conferences provide a fertile ground for mutual support across the whole age-range and issues of continuity and progression between school sectors are readily discussed. In the conference which appears on the desktop as 'Lobby' students and tutors discuss many topics including the structure of course materials, self-evaluation, differentiation, and the assessment demands of the course. The pattern of topics discussed varies in response to the demands of the course and topical issues such as political debates, seasonal festivities etc. By dividing the conferences into areas, students can be made to feel part of different sub-communities. It also makes it easier for them to find postings of particular relevance to their interests.

Section 2: The OU PGCE Electronic campus

In Part 1 we described all the folders you will find on your desktop except the one marked 'The Open University'. Double clicking on this will reveal the PGCE electronic campus. All the conferences in here are for PGCE purposes only - with the exception of the ACS Helpdesk. We now describe each of the conferences. In Phase 1, you will only be able to access your regional conference, your tutor group conference, the PGCE lobby and the ACS Helpdesk. In September, when Phase 2 starts, the subject and Primary conferences will open.

2.1 Function and composition of each PGCE conference

2.1.1 Tutor group conferences

The tutor group forum will be the first experience students have of conferencing in the PGCE. The personal contact made at the first tutorial will encourage students to join in 'electronic' discussion. Then, later in the course, wider conferencing in the subject and phase 'rooms' will be supported by the academic co-ordinators.

The tutor group conference is a forum for:

- preparing and following up issues raised at Day Schools
- setting agendas and continuing discussions in tutorials
- sharing ideas/good practice/'moral support' during school experiences
- raising topical educational issues e.g. selection, parent and other adult help in the classroom
- reminding students of how their use of IT will help in studying and getting a job
- sharing ideas for writing job applications
- finding out about local teaching jobs/LEA pools etc.

For tutors it has an important administrative function. It enables you to keep in touch, send reminders etc. (Much of this is what would be 'corridor talk', i.e. what happens in the corridor, outside lecture rooms and other places on traditional courses).

2.1.2 Regional conferences

Each region has its own conference to which anybody involved with the PGCE in that region can contribute - students, tutors and regional staff. It is used to provide a forum for discussion which is wider than the tutorial conference, but less inhibiting than a fully open national conference. It has many uses, including:

- opening up a discussion raised in a tutorial conference to a wider audience - particularly any which relate to cross-phase issues.
- discussing local activities or events - such as publicising local meetings of subject associations or arrangements for the next Day School.
- raising questions of a regional nature - students might wish to compare experiences with others from a different tutorial group.
- In some regions, students have used this conference to arrange sharing cars to get to Day Schools.
- regional staff can use it as a means of communication with all the students in the region - for example reminders of procedures at various times throughout the course.
- sharing local knowledge about application procedures for LEAs within the region, passing on information regarding vacancies in local schools, feeding back the sorts of questions which have been asked at interviews.

2.1.3 Primary base *(Jill Bourne and Jennifer Rogers)*

In the Primary conference, students from different regions come together to share thoughts on issues, swap ideas and work together on solving problems rising out of their reading and their practical work in schools. A Primary Bulletin Board helps keep them up to date on events, and on the progress of the PGCE.

2.1.4 Subject conferences

Mathematics *(Michelle Selinger)*

Students are invited to discuss contentious issues like the use of calculators in school or to offer their views on how mathematics classrooms are structured. The good and bad aspects about school experiences are shared and students, tutors and the mathematics specialist offer support and ideas for teaching different areas of the mathematics curriculum. There are also opportunities to clarify or discuss the specific mathematics materials in the course.

English *(Jenny Leach)*

Students across regions and phases are encouraged to discuss the English sections of the course, exchange teaching ideas and materials and share information about conferences, publications and media texts. Discussions have been vigorous, ranging from debates about gender and literature to language awareness and the literary canon and involving students from a variety of subject backgrounds. Some students have initiated collaborative writing ventures including a spoof on 'The Net' and a newsletter of reviews and articles on topical educational issues. The atmosphere is friendly and lively; as one student commented "Going into the English Room is like popping into a student refectory or bar" whilst another said" It's a place to offer ideas and where contributions are always welcomed, it's a vital part of the course."

Science *(Ann Benson)*

Within the friendly and supportive environment of the Science Conference, students are able to ask for help and advice about the science sections of the course. They are encouraged to swap ideas for lessons, worksheets and book titles; obtain news of ASE and other scientific events; discuss a variety of scientific issues as well as seek advice on aspects of safety. The Conference serves as a forum for the sharing of students' scientific expertise and the enjoyment of science for its own sake.

Design and Technology *(Frank Banks)*

Design and Technology(D&T) has a particularly wide range of students with different subject-specific expertise. There is always someone who can help with particular subject-content questions. Also, general experiences of designing and making can be shared here and resources and ideas for project work exchanged. There is an opportunity in this conference for debate as to the interpretation and perceived purpose of D&T in different schools and the ways D&T is implemented.

History Room *(Hilary Bourdillon)*

How do students find out the latest information about teaching history during their PGCE course? The answer is to go to the History Conference room. Here they are able to exchange ideas with other History PGCE students throughout England,Wales and Northern Ireland about what worked well and what didn't) on each of their school experiences. They will also be asked to participate in the debates about the nature of school history and the issues involved in learning history. In addition, we have invited 'Guest Speakers' to lead the discussion on a particular topic, for example "Teaching History - Art or Science?" or "History and bi-lingual pupils". The History Conference room offers students a friendly meeting place to debate all apsects of teaching history throughout the PGCE course.

French *(Ann Swarbrick)*

The MFL (French) conference, 'Salle de français', is ideal for developing linguistic competence and keeping in touch with other linguists. French is the main medium of communication and messages are often short and prepared in advance off- line. We discuss a wide range of issues from the teaching of grammar to current affairs. Students often swap ideas for lessons and resources, ask for help with vocabulary, recommend interesting reading and listening both for use in the classroom and for pleasure or ask for advice about particular events which have taken place in the languages classroom. The ambience is supportive, friendly and non-judgemental.

Music *(Gary Spruce)*

The music conference seeks to create a friendly, supportive and above all non-judgmental environment within which students can seek help and advice from others on the course, exchange ideas for lessons, and discuss issues relating to the course and to the wider musical and educational worlds. Students are encouraged to share their expertise and to let other students know about interesting events (concerts, conferences etc.) which are taking place; perhaps arranging to meet other music students there.

2.1.5 Staff room

This conference cannot be seen by students. It provide a forum for tutors and course team to discuss course related issues, to seek support for tutorials and clarification on parts of the course. Each region has its own staff room for local communication which can prove useful for planning Day Schools, and as a means of communication between tutors - swapping ideas/materials for tutorials - catching up on the latest amendment to a document etc.

Section 3: Using computer conferencing

3.1 The nature of communication in computer conferencing

Computer conferencing can remove the barriers to communication as a message can be easily and quickly responded to. Unlike a letter where more thought and care might be given to the construction, a similar message through computer conferencing might not be given the scrutiny or 'weight' it deserves. This seems to conflict with the earlier discussion where we said conferencing can improve communication and writing skills. We still think this is true but responses can tend to be impulsive and this can lead to *flaming*, which will be discussed in the next section. A whole way of communicating has been developed with computer conferencing which is less formal than letter writing and more like everyday conversation. As the tone of a person's voice cannot be heard through this medium other alternatives are used like punctuation ('!!!!,'or '?????'), capital letters (we must do it NOW) and asterisks for emphasis (we have *got* to talk); multiple vowels to indicate intonation ('soooooo'), and icons to represent facial expressions (';-)') - a wink if looked at sideways. Also greetings tend to be more informal than in letters, people rarely write 'Dear Jane' and 'yours sincerely' in computer conferencing.

As a tutor you will be the first line for students making contact about any aspect of the course. At your tutor briefings you will be informed about the procedures for dealing with those queries you feel unable or unqualified to handle. Below we have asked two tutors to describe how they encourage students to use FirstClass.

3.2 Getting your on-line tutorial going
(by Bridget Cooper and Lynda Juma)

3.2.1 Support

- Good initial relationships seem to help the distance discussion to work later. The pre-course (regionally organised) meeting in mid-November focused on computing, and created a real buzz among many. In R06 we invited 2 students along to talk to small groups about (among other things) how they had used the computer and conferencing to support their studies, including 'virtual' self-help groups. We also used overheads to show people the sort of discussion that was possible.
- Get to know your students well initially - read application forms carefully - send a friendly welcome letter out. Try to make sure you know who they are, where they are and what they are doing. This first contact with students needs to be upbeat, ensuring students *want* to come along to the first tutorial.
- Mention the computing element as an exciting prospect, with quotes from current students, and offers of reassurance and support for anyone who feels anxious about this aspect. Offer telephone

contact *before* the first tutorial on this aspect specifically. We had several students who took this up. We found that we had to sort out difficult problems at this stage like how to get a phone up two flights of stairs, etc. A survey in Region 1 by Peter North showed that most students managed the FirstClass manual without too much difficulty - even if their children did it!

- Make good use of the first face-to face tutorial with an ice breaking session to start with.
- Make sure they swap names and addresses and know a bit about each other. We made sure we memorised their names for the next tutorial (they noticed this). It also helps when they go on-line.
- Before it arrives, encourage the students to use the computer from the start. We were prepared to take phone calls to get them started once it did arrive although anything too technical we referred them to either ACS or Apple.
- Re-assure students about costs of being on-line (60p an hour at weekends at local-call rate), and taking along an extension telephone cable pack to the first tutorial with the price on helped to show them that the logistics for connecting a telephone and a computer were simple and cheap. We have put together a set of hints on using FirstClass economically in the technical guide
- Sell the benefits of IT both to them and to their teaching and as far as getting jobs are concerned. Emphasise the part their use of IT plays in references etc. For many students the 'survival' value on school experience is a plus. The History Room had several answers to pleas like "Who knows how to teach William the Conqueror?"
- Tell them how useful FirstClass can be for teaching ideas, reassurance, etc. and how much fun it is, and perhaps give them examples of discussions from last year. (We have given some examples of these in Appendix 1.
- Once students have received the FirstClass software they need reminders by letter or by a phone call to get logged-on and get started. As well as a general welcome for when they logged on Bridget sent everyone a personal comment back praising them for getting logged on and tried to make it particularly relevant to them. This is vital - there has to be a sense of achievement when you have made it!!!! Reading the notes on getting started carefully first and then following them step-by-step should iron out most of the problems.
- It is really rewarding to receive mail initially and you need to have something to read. So if you make an address book (see Part 1) with all their names you can send little messages to all of them very easily and regularly.
- We cajole/praise/bully (occasionally!) students into conferencing in the tutor group. The follow-up of slow/non-starters is important. It can be quite difficult, (We were amazed at the number of non-starters who seemed to have answerphones permanently on!) Most people were happy to log on the first time, and sent a personal message to our mailbox. We followed each up with a question which received a personal reply. Then we asked their permission to forward it to the tutorial conference - usually agreed. Once Lynda had 2 or 3 students contributing, they were issued with a challenge - whoever got the whole group on-line won a bottle of wine (probably quite unethical, but it got more than two-thirds of the group started). She made a presentation of the wine at Day School 3 tutorial at the end of the day with sherry & mince pies for the season, and invited the staff tutor in.
- Whenever a student phoned Lynda, she 'talked up' the use of FirstClass, and encouraged them to talk to each other using it. Because she has easy access at work she can log-in every day, and several have commented on how useful knowing they can get a quick answer is - particularly those students who have previously studied with the OU and who have found tutors hard to get hold of sometimes. Bridget is making a commitment this year to her students that she will guarantee a response to e-mail messages within 72 hours. She will also monitor the practicalities of this.
- Tutors must check messages regularly - in order to keep the momentum going. It is also important to have a least one or maybe two sessions each week where you nudge the system - forwarding messages from subject conferences, picking up 'lurkers' from your group and suggesting that they ought to contribute - even suggesting areas on which they could contribute.

- Conferencing can bring real friendship.- one couple even got married! Several of the group logged on at the same time for a 'virtual' tutorial, discussing, for example how to balance commitment to the schools they are teaching in with preventing them being overworked by staff under pressure and delighted to have willing extra bodies to call on for 'supply' cover!
- To get students going with on-line tutorials you need to raise something topical so that they can contribute without it being too daunting initially. As soon as they contributed we sent a message back thanking them for their contribution and to encourage them - sometimes continuing the discussion or raising other issues. If it was a particularly interesting point, we would add comments to the conference about it again adding to the discussion or raising a new point. This seemed to be essential.
- Put together a collection of brief 'thoughts for the day' on topics such as 'classroom order', 'problem children' etc. which can act as discussion starters. Another thing we did during school experience 2 was 'my best and worst experience of the week'.
- A mixture of public and private cajoling and praise is needed to keep discussion going - also a fair bit of humour to keep it relaxed. Bridget did not make rules about what was discussed but tried to lead by example - e.g. personal matters go direct to the person - not to a conference.
- If someone sent inappropriate material to the conference we replied personally and we did have to pick up a few students on issues of protocol.
- We try to allow other students to respond to each others comments before we did so that we didn't dominate the conference, sending a personal reply rather than a public one at times.
- If we suspect a student is having difficulties with using any aspect of the software from one of their messages we send suggestions about how to use particular features, e.g. 'make alias' or 'history' - We think this helps a lot. We also give them advice about these technical issues at Day Schools and tutorials.
- Problems we encountered - only a couple of the men really got into contributing though most of them read the discussions. Bridget had been worried about this until she read an article about the way men and women converse and realised that men like a single platform and like to be experts rather than contributors to an on-going dialogue. Noticeably they seem to contribute more to subject conferences and higher profile debates preferring to write lengthy pieces which they can then attach as files. You might need to monitor this.
- The main way of starting and keeping momentum going has to be putting in the time and effort.

3.2.2 For the future

We think that pairing tutor groups, perhaps cross-phase, might be worthwhile as this would increase the critical mass of students and encourage discussion about continuity and progression etc..

We would also like to consider adopting an alumni to each tutor group conference. Feedback from students suggests they value the opportunity to discuss issues with someone who really knows about the course and is now teaching.

3.2.3 Teaching

We have deliberately left this to the end of this section because we found it useful to create the expectation/culture that it was an integral part of the course, but not threatening in the early stages. We use the tutor conference to discuss:

- *topical educational & related issues* - we refer them to the TES/TV/radio etc. as much as possible. While observing and reminding them of the protocols, we think it does no harm to be quite provocative at times to get a good discussion going.
- *putting out requests for tutorial agenda items* and refining them through discussion beforehand so the tutorial is very much *their* agenda and quite different in character from the more formal Day School. If somebody has to give apologies we put out a personal note to them about what we covered and invite them to join in the follow up on-line discussion.

- *discussion around preparatory reading for Day Schools.* This worked well for Day School 3, and the analytical and sensitive discussion of 'learning for all' which followed was impressive.
- *invitations to share good ideas about school experience and teaching in a second school*
- *use colour, font and style to create interest*, with 'catchy' titles and encourage students to do the same.

3.2.4 When to use mail boxes and when to use the tutorial conference.

There is no rule of thumb about this, but generally if the discussions about the course can be kept to conferences as well as general administration issues, the mailboxes can be kept for sending very important messages or for private one-to-one communication. Remember that all conference messages are public - it is like putting a notice up on a board for everyone to read. If your reply is private use the *reply special, reply sender* option in the "message" menu. This will ensure it only goes into the mailbox of the person you want to read it.

Section 4: Moderating computer conferences.

The advice given by Bridget and Lynda above is all helpful in moderating a conference. As a moderator you will be the only person who can delete messages from the conference, and you will be able to add and remove people from the conference. The way you do this is described in detail in Part 1.

As computer conferencing allows people to 'talk' to each other from remote locations at different times. it provides many benefits to tutors and learners. However, the newness of the medium and its ambiguity (in that people are 'alone' when 'talking' to others) may cause some problems. Therefore the purpose at the following section is to identify some of the main issues which have implications for practice.

A number of limitations and paradoxes exist. It is not yet possible to discern whether these are caused by the use of the medium per se or are simply a lack of familiarity with and therefore confidence in using computer conferencing. However, the problems do exist and awareness of them is useful. They are:

- *Perceived impersonality of the medium.* People have to read text to decode the message. Communicators feel greater sense of anonymity, detect less individuality in others and report feeling less empathy, guilt or concern for them.
- *Talking into a void.* Context and climate are lacking as are social nuances, body language, visual and auditory cues via which some 70% of a message is transmitted. Many of us know people who say "I've got to be able to see/hear people to communicate with them.. "
- *Lack of immediate feedback.* Normally people receive feedback as they are speaking. In a face-to-face situation, it is easy to read body language to see if one's words are being understood or accepted. Over the telephone, comforting sounds such as "um", "yes", repetition of key words reassures us. There is no such feedback from electronic messages, which can be unsettling for some people.
- *Misunderstanding may occur.* The lack of context in an electronic message means that individual words may contain greater significance and may be interpreted in ways not intended by the writer.
- *Communication anxiety may occur.* Contributors to a conference feel that they are 'publishing' rather than speaking and may have concerns about their efforts being recorded.
- *Long silences.* Time for reflection gives rise to long pauses which may be intimidating for the sender (because they receive no immediate feedback) or frustrating (because the discussion is prolonged).
- *Unintentional self revelation.* One sense of anonymity created by lack of context, social cues, dress and manner may lead people to be more direct or self-revealing than they would in other social situations.

Section 5: Code of conduct

- Reread your messages twice before sending
- Avoid expressing strong feelings of disagreement in public forums (use an individual's private mailbox)
- Be careful about copyrights and licences.
- Ask permission before forwarding or copying other people's messages.
- Avoid sexist or racist language
- Avoid using all upper case letters (it appears as if you are shouting)
- If the message is very important, controversial or open to misunderstanding consider a face-to-face discussion or a telephone conversation instead.
- Select the right forum - mailbox or conference. If your comment is only of interest to a limited number of people, send it to the private mail boxes of those individuals.
- When joining a conference which has been in existence for some time, read through all the contributions to date to avoid asking a question or making a point which has already been made.
- Avoid starting a 'flame'. Many people feel less inhibited when using the medium because of the absence of a physical context, so before sending a message, ask yourself if you would say this to a person's face.
- Calm down before responding to an offensive message
- Do not assume that all outrageous messages are intended to inflame opinion (They may be a clumsy attempt at humour or lack of familiarity with the medium).

Section 6: To make sure your messages are read

- *Take the recipients point of view.* Readers are motivated by their own needs and interests. They want to read the results of the sender's thoughts, not the process. Before writing clarify the purpose and supporting content of the message, the recipient's aim in reading their views and level of knowledge of the subject.
- *CCs.* Avoid overloading people by sending copies only to those people who really need them.
- *Use strong subject lines.* Make sure the title of your message is relevant to that message
- *Make the first screen count.* People will decide whether or not to read the whole of your message from the impression given by the first screen. Make sure your message has form which is friendly, appealing and logical. A friendly greeting, clear statement of purpose including who, why, what, where in the first paragraph with important supporting evidence following on the first screen seems to work well.
- *Keep messages short.* Ideally no more than two screens
- *Make responding easy.* To speed up communication, check that you have provided enough information to avoid bouncing messages to and fro to clarify points. Phrase your message so that it is easy for the receiver to provide a short response. Inform them in the first paragraph about the type of reply you require so that they are primed to read your message with this in mind.
- *Use short paragraphs.* People are overwhelmed by large pieces of text. Short coherent chunks allow readers to breath between chunks of thought and also provide relief to the eye. Double line spaces between paragraphs help and bulleted or numbered lists are a good way to display separate ideas.

- *Adopt a friendly tone.* Start a message with a friendly greeting such as 'hello', or 'greetings'; use a person's first name if you are on first name terms. Conclude with a closer such as 'regards', 'thanks' and your name. Avoid the more formal 'Dear John' and 'Yours sincerely' of traditional letter writing.
- *Be positive. Be tactful.* If you need to communicate a negative message, try to ease the situation by making motivating suggestions for improvement. Avoid embarrassing, criticising or offending the reader by avoiding expressions such as wrong, fail, error, never, not, neglects. 'When' is a more positive word than 'if'.
- *Long messages.* When sending a message longer than a couple of screens, it is important to keep the reader's interest high. Ways of doing this are to inform the reader of the response required in the first screen, provide a contents list and summary.
- *Headings* are useful for breaking up long messages and guiding readers through the material.

Section 7: Time management and getting organised

- *Negotiate acceptable periods of computer/telephone time.* Other people (family, friends, work colleagues) will have claims on both your time and on the equipment (computer and telephone). It is worth getting them on your side by discussion and negotiation of acceptable frequency, timing of electronic sessions.
- *Decide frequency of logging-on and tell students.* Decide how often you are prepared to log-on. Let students know your pattern so that they know when not to expect an immediate response.
- *Try to log-on regularly.* Develop the habit of logging on regularly however briefly, once or twice a week. This helps you to collect mail messages, act on them reasonably promptly and avoid being overwhelmed by new material. Your conference contributions should appear close in time to the discussion to which they refer.
- *Anticipate some initial difficulties.* Sometimes telephone lines are busy, response time is slow, or there maybe difficulty logging-on. Be patient and try again later.
- *ACS Helpdesk* If technical problems do occur. The Helpdesk provides friendly advice (see Part 1).
- *Acknowledge student messages promptly.* Even if you cannot make a full comment straight away, send a quick message to let the student know that their message has been received.

Section 8: Possible problems

- *Irrelevant contributions from students.* Generally students will follow the tutor's example of making concise, task-related contributions to a conference. Should an irrelevant contribution be made by a student, a tutor's response will depend on a number of variables such as knowledge of the student and their general level of confidence and experience of computer conferencing. Possible tutor responses include a polite note in the conference to demonstrate to the contributing student and others that this conference is not the best place for this type of message, a telephone call to the student (if you judge the entry to be a counselling issue) or a message in the student's private mailbox.
- *Aggressive messages.* Assume the best of your audience. Should you receive an unduly critical or angry-sounding message, avoid responding in the spur of the moment. Allow a cooling-of period because most 'difficult' messages are more likely to be the result of a poor choice of words or lack of familiarity with the medium than genuine malevolence. An angry rejoinder from the tutor will only inflame the situation

- *Be sensible and realistic*. Computer conferencing is not acceptable to all. Despite Herculean efforts on the part of tutors, the medium has limitations. There seems to be a rule of thirds. One third of students will actively participate, one third will log on to 'listen' but will not contribute, one third is unlikely to even try. Decide in advance what your goals are.

Section 9: Conclusion

The opportunities which new technologies provide for enhanced learning are exciting. People develop their own style through experience and the hints contained in this guide should provide a starting point to be developed. Whilst no amount of advice, training or reading alone will prepare a tutor completely for on-line tuition, first attempts using computer conferencing will no doubt be successful. However it is unlikely that everything attempted will turn out quite as expected. Never mind, the important thing is to experiment and learn from experience. Remember that the rules are still being written and your feedback can help shape the use of computer conferencing by the University in the future.

Note

Thanks to Ann Howells, a tutor from the Open Business School, for allowing us to adapt a draft of the SOL reader chapter on tutoring with electronic conferencing for sections 4 to 8 of Part 2 of the guide. Thanks also to RAS for permission to make use of materials.

Appendix 1

Monday, October 23, 1995 7:59:46 am

From: Lynda
Subject: after the deluge!
To:

Cc:

Most of you will be finishing your second school experience soon. This is a really good time to share your experiences, while they are fresh (even raw!) in your minds. As we won't be meeting again face-to-face until December 9 at our day school (with a busy schedule- details to follow!), I'd really like to share here

* examples of lessons/activities that went well, & why

* anything that surprised you / you hadn't expected: from pupils, your planning, the school context etc.

* any comments you have on the issues you've studied to date - did you try out different types of assessment?
  is it possible to use the same instrument for formative/summative assessment?
  did you try out collaborative teaching? what were your experiences? etc.

Look forward to hearing from you all!

Friday, November 17, 1995 3:11:35 pm

From: Janet
Subject: SE2 Co-teaching
To:

Cc:

I have completed SE2 and am looking forward to going straight into my second school on the 20 Nov.

SE2 was very tiring but enjoyable. As I had taught in the first placement in March, I initially felt that co-teaching was taking a step backwards, especially as my mentor had seen me solo teach and expected me to carry on doing so.

However, I found a very enthusiastic chemistry teacher with which to co-teach and try out different ideas. The class were told that we would be co-teaching and accepted this new approach very well. It also gave me the opportunity to focus on certain aspects rather than everything at once! I would recommend to prospective students to emphasize to their schools how beneficial co-teaching is, however capable they are at solo teaching.

Due to teaching practices in quick succession, I will find it difficult to complete Block 5 - is anyone else having the same problem?
-Janet

Tuesday, January 30, 1996 2:59:14 pm

From: Timo
Subject: Fast track / wrong track
To:

Cc:

Fast track, Slow track or Wrong track!!!

"The train leaving Year 9 is destined for Fast track. Passengers and pupils are reminded that Super Saver Under achiever tickets are not valid on this service.

However for a supplement of £300 passengers may use first class University accommodation situated to the front of the train.

Fast Track would also like to apologise for the late arrival of childrens' education, this is due to the wrong type of teacher on the line"

I have just listened to the news and also "Call Nick Ross" forgive me if I have missed something but it seems to me that the Labour party are advocating a top stream for Super attainers.

While I think anything that can be done to improve performance of pupils is a good idea. I immediately think of all the under achievers, low ability and SEN pupils we have to deal with. Will not fast tracking:-

1 Increase the divide between top and bottom ability pupils.
2 Place ever more strain on class teachers trying to differentiate.
3 Demotivate otherwise able pupils who don't get selected for the fast track.
4 Divert resources and teacher time to the pupils who will improve the league table position of the school, rather than to the pupils who really need the help.

A final thought, will fast track pupils be statemented as having SEN and so receive the same pitiful support afforded by a statement under current legal provisions of Statements. (I am not knocking SEN staff here)

Just wondering, as in all the talk about this on the media I have heard nothing about help for the pupils at the bottom of the class!

International Conference
Information Technology: Suppporting Change Through Teacher Education
Kiryat Anavim, Israel, 30th June - 5th July 1996

Conference Programme

Sunday June 30th 1996

14:00 **Registration**
17:30 **Cocktail Reception**
19:00 **Opening Ceremony - Oren**

Chairperson - *Yaacov Katz*

* Musical Interlude - *Aharon Gurov*, Composer
* Welcome - *Yaacov Katz*, Chair, Organising Committee and Bar-Ilan University
* Greetings from IFIP - *Bernard Cornu*, Chair TC3 WG3.1
* Greeting from Working Group Sponsors - *Anton Knierzinger*, Chair TC3 WG3.5
* Greetings from UNESCO - *David Harari*, Sec-Gen, Israeli Commission for UNESCO
* Musical Interlude - *Aharon Gurov*, Composer
* Welcome - *David Benzie*, Chair, Programme Committee
* Keynote Lecture "Telecommunications and Technology in Education Towards the Year 2000" - *Shahaf Gal*, Director, Computers in Education, Centre for Educational Technology, Israel
* Training for IT in traditional and futuristic schools: Part 1 - *Alnaaz Kassam*
* Musical Interlude - *Aharon Gurov*, Composer

20:30 **Dinner**

Monday July 1st 1996

09:00-10:30 **Session 1: Change and Innovation - Oren**

Chairperson - *Anton Knierzinger*
Time for change: Critical issues for teacher educators
Gail Marshall
Getting ready to change: The place of change theory in the information technology education of teachers
Brent Robinson
The U-curve process that trainee teachers experience in integrating computers in the curriculum
Zemira Mevarech and Livi Lanir
Converging technologies in teacher education: Key issues, key competencies
Paul Nicholson and George Duckett

10:30-11:00 **Coffee Break**

11:00-12:30 **Session 2: Mathematics Education - Oren**

Chairperson - *Gail Marshall*
Using videotaped lessons to analyze changes in teachers' teaching practices of mathematics
Menucha Weiss
Computer integration in the mathematics study of pre-service teacher education: Experiences with Project CIMS
Herbert M. Loethe
Learning to bridge classroom and lab activities in math education
Vincenzo Auricchio, Giuliana Dettori, Simonetta Greco and Enrica Lemut
Integrating graphing technology into teacher education: A case study of an algebra program for prospective secondary school mathematics teachers
Beverly J. Ferrucci and Jack A. Carter

12:30-14:00 **Lunch**

14:00-15:30 **Focus Groups Session 1**

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit,
Group 4 - Dafna

16:00-17:00 **Session 3a: National Projects and Strategies - Brosh**

Chairperson - *Anne McDougall*
The centrality of affective variables in the implementation of a national strategy for teacher and pupil IT suitability in elementary schools
Yaacov J. Katz
Present role of informatics teachers in view of applications
Marta Turcsanyi-Szabo
Advisory centre for new technologies : An addition to teacher training
Wolfgang Weber
The TTACOS Project : Laying the foundation for national technology standards for students in the United States
Harriet G. Taylor and Lajeane G. Thomas

tics Education - Oren

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16:00-17:30 Session 3b: Developing Science Based IT Use - Gefen

Chairperson - *Baruch Offir*
Software evaluation as a focus for teacher education
David Squires
The electronic spreadsheet and cognitive skills in inquiry oriented biology
Amos Dreyfus, Benjamin Feinstein and Janet Talmon
Computer science education based on fundamental ideas
Andreas Schwill
What training do teachers require to facilitate pupils' self-expression with multimedia?
Hiroyuka Tanaka

19:00 Dinner

Tuesday July 2nd 1996

09:00-10:00 Keynote Address - Oren

Chairperson - *Bernard Cornu*
Vygotsky, informatics capability, and professional development
Jim Ridgway

10:00-11:00 Coffee Break and Poster Sessions

11:00-12:30 Session 4a: Taking learning theory into account - Brosh

Chairperson - *Margaret Cox*
Understanding our instrument of representation
Micheal Ó'Duill
Communication - Learning - IT Applied examples
Lisbeth Appelberg
Education IT seminars to support teachers' use of IT to enhance learning of curricular topics
Sindre Rosvik
The use of practical experiences and models to prepare teacher trainees to use technology effectively in their teaching
Harriet G Taylor

11:00-12:30 Session 4b: Social Implications - Gefen

Chairperson - *Rachel Cohen*
Identification of the changes in attitude and pedagogical practices needed to enable teachers to use IT in the school curriculum
Margaret J. Cox
Networking educational change
Bruce Rigby
An Israeli model of a Networked Teachers' Training Center (NTTC) for implementation of Information Technology (IT) in curriculum development
David Passig
Patters of reform: Teachers' thinking about students' thinking in computer intensive guided inquiry
Michal Yerusahalmy and Shosh Gilad

12:30-14:00 Lunch

14:00-15:30 Focus Group Session 2

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit,
Group 4 - Dafna

15:30-16:00 Coffee Break

16:00-17:30 Session 5: The Role of the Teacher Within the Changing School Context - Oren Hall

Chairperson - *Raymond Morel*
Teachers and teacher education facing information and communication technologies
Bernard Cornu
Training for IT use in traditional and futuristic schools
Alnaaz Kassam and Ron Ragsdale
In-service teacher education: A way to integrating IT into secondary level curricula
Yvonne Buettner
The computer as a toy and tool in the home: Implications for teacher education
Toni Downes

19:00 Conference Dinner and Entertainment

Wednesday July 3rd 1996

09:00-10:00 Focus Group Session 3

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit,
Group 4 - Dafna

10:30-10:45 Report on SITE Conference - Oren

10:45:12:00 Session 6: Integration - Oren

Chairperson - *Paul Nicholson*
A dichotomy of purpose: The effect on teachers of government initiatives in IT
Deryn M. Watson
From personal use to classroom use: Implications for teacher education in France
Georges-Louis Baron, Eric Bruillard and Alain Chaptal
A new approach in teaching information technologies: Shifting emphasis from technology to information
P. Hubwieser, M. Broy and W. Brauer
Teacher educators: A case study of integrating information technology into teacher education
Qi Chen

12:00 Lunch

13:00 Depart for Conference Tour

Thursday July 4th 1996

09:00-10:30 Session 7: Integrating Change Through Teacher Education - Oren

Chairperson - *Bridget Somekh*
The integration of IT into teachers' decision-making
Steve Kennewell
A Case Study: A New Zealand model for teacher development in information technology
Kay J. Rye
Breaking the cycle of ignorance: Information Technology and the professional development of teachers
Jean D.M. Underwood
An adventure in integrating educational computing within teacher education
Phil Nanlohy

11:00-12:30 Focus Group Session 4

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit, Group 4 - Dafna

12:30-14:00 Lunch

14:00-15:30 Session 8: Pedagogy and Methodology - Oren

Chairperson - *Deryn Watson*
Towards effective learning with new technology resources: The role of teacher education in reconceptualising the relationship between task setting and student learning in IT-rich classrooms
Bridget Somekh
Teacher professional development in a technology immersion school
Anne McDougall and Jennifer Betts
Research on telematics for teacher education
Antonio J. Osorio
IT capability: Is our definition wide of the mark?
David Benzie

15:30-16:00 Coffee Break

16:00-17:30 WG3.1 & WG3.5 Meetings

Working Group 3.1 - Brosh, Working Group 3.5 - Gefen

19:00 Dinner and Social Evening

Friday July 5th 1996

9:30-10:30 Keynote Address - Oren

Chairperson - *Toni Downes*
Learning in wonderland: When are computers worth the trouble?
Gavriel Salomon

10:30-11:00 Coffee Break

11:00-12:30 Session 9a: Networking and ODL to Support Teacher Education - Brosh

Chairperson - *Brent Robinson*
The PIT-project: A teacher networking approach for broad-scale use of ICT
Pieter Hogenbirk
Learning to teach at a distance: Exploring the role of electronic communication
Michelle Selinger
Supporting professional development of math teachers through telecommunication
Ruth Reiz and Nitsa Movshovitz-Hadar
Distance learning: A new concept in university teaching in Israel
Baruch Offir

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11:00-12:30 Session 9b: The Teaching of Informatics as a Subject - Gefen

Chairperson - *David Passig*
Informatics education as a new discipline
Joyce Currie Little
Issues in the preparation of teachers of programming for children
John Oakley and Anne McDougall
Teaching the subject informatics in schools: Aspects of education in this field
Steffen Friedrich

12:30-14:00 Lunch

14:00-15:30 Closing Session - Oren

Chairperson - *David Benzie*
Focus Group Reports
Panel Discussion
Official Closing of Conference

The Organising Committee extends sincere thanks to our sponsors who facilitated the convening of this conference

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Telephone: 02-348999
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Bar-Ilan University

IFIP
TC3 WG3.1 & WG3.5

INTERNATIONAL CONFERENCE
INFORMATION TECHNOLOGY: SUPPORTING CHANGE THROUGH TEACHER EDUCATION
KIRYAT ANAVIM, ISRAEL, JUNE 30 - JULY 5 1996

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SCHOOL OF EDUCATION, BAR-ILAN UNIVERSITY

IFIP TC3 WG3.1 & WG3.5 International Working Conference
Information Technology: Supporting Change Through Teacher Education
Kiryat Anavim, Israel, 30 June - 5 July 1996

Focus Groups

As mentioned in the conference "Invitation and Call for Papers", an important feature of our Working Conference will be the Focus Groups. These groups will provide all delegates with the opportunity to make an active contribution to deliberations on a key conference theme. Delegates are asked to join one group for the duration of the conference. Each group will meet on four occasions during the conference. The four sessions will be led by the Focus Group Rapporteur and Chair who will guide the discussions, session by session. The aim of each Focus Group will be to produce a paper on the topic under discussion in the group by drawing on the experience of delegates in their professional activities in their respective countries. Following are the oulines of the topics to be discussed in the respective Focus Groups:

Groups 1 & 2 (both on the same topic)
Title: How Should We Teach Teachers to Change? Effecting Technological Change Through the IT Education of Teachers
Rapporteurs: Brent Robinson (cbr10@cambridge.ac.uk) and Paul Nicholson (pauln@deakin.edu.au)

Focus
"It is likely that we have much to gain from the application of change theory to the introducation of IT in education....Teacher educators should consider the need for preservice and inservice teachers to understand and master change processes alondside their IT development" (Final Report of Professional Group DG04b - IT in Teacher Education - World Conference on Computers in Education, Birmingham, 1995). Effective implementation of IT in schools requires successful understanding and management of educational change. This group will examine how teachers might be usefully supported in their technology change efforts through teacher education, both at preservice and inservice stages. The group will examine the nature of technology as an educational resource and will discuss the consequent changes required of technology using teachers in the three possible dimensions of change - knowledge, attitudes, and skills. Then, moving from a personal to an institutional level, the group will consider the skills and knowledge required for teachers to be effective agents of change beyond their classrooms. The final task of the group will be to consider implications for the content and delivery of teacher education curricula. How can preservice and inservice training be adapted to produce greater and more effective technological change in schools?

Group 3
Title: Issues Associated with the Evaluation of the Use of Instructional Technology in Schools
Rapporteur: Gail Marshall (74055.652@compuserve.com)

Focus
This Focus group will continue the discussion on the topic of evaluation and assessment of IT use in schools. The discussion, begun at the World Conference on Computers in Education, Birmingham 1995, identified factors that must be considered in designing, implementing, and reviewing evaluations conducted in IT settings. Factors include the conceptual base of the evaluation - Constructivist versus Behaviourist - as well as social, cognitive, motivational, political, and economic issues. The need for evaluation and research to inform teacher education practices and the need to examine the role IT tools play in developing new types of learning strategies and were also discussed art WCCE '95 and will continue to be examined in the Focus Group at this conference. We will identify key questions that might be asked in the evaluation of IT use and will discuss models of research and evaluation conducted in pre-technology settings that could be used to evaluate and assess a wide range of IT related effects. Specific attention will be paid to important technical issues such as guarding against the evaluation of "non-events", ensuring internal and external validity of the evaluation and assessment process, and choosing and using relevant evaluation and assessment instruments.

WC'96
Israel

Group 4
Title: Using the Internet in Preservice Teacher Education
Rapporteur: Toni Downes (t.downes@uws.edu.au)

Focus
This Focus Group will concentrate on the sharing of information, resources, strategies, and ideas about the use of the Internet in preservice teacher education. Some pre-conference preparation by participants is expected in terms of collecting and recording (in note form) some or all of the above, and sharing these before and during the conference. Two possible outcomes of the group would be an informal (electronic) and more formal paper-based publication recording what the paprticpants in the group shared, as well as the setting up of some international preservice teacher education discussion groups on particular topics of common interest to all preservice teacher trainers and trainees.

Delegates are requested to indicate (on the tear off slip below) their fist, second and third choices of Focus Groups they would like to join. Delegates will be allocated to Focus Groups on a first-come basis. Before the start of the conference all delegates will receive a full briefing paper written by the Focus Group Rapporteur.

We would also like to encourage delegates to participate in discussion on the theme of the conference by sending email messages to the conference listserver. Delegates can do this by sending the following message *subscribe israel96 your name* to *majordomo@deakin.edu.au* after which they can then join in the discussion by sending messages to *israel96@deakin.edu.au* and these messages will be distributed on the listserver.

Please note that this list is shared by all the Focus Groups so this is also an opportunity to find out about the topics that all groups will be discussing.

--Tear off Slip--

Bar-Ilan University

IFIP
TC3 WG3.1 & WG3.5

International Conference
Information Technology: Supporting Change Through Teacher Education
Kiryat Anavim, Israel, 30th June - 5th July 1996

28.11.1995

Dear Colleague,

I do hope that you received an invitation to the IFIP WG3.1 & WG3.5 joint working conference on "Information Technology: Supporting Change Through Teacher Education" a short while ago. Some further information about the conference has now become available and I thought that you might find it helpful to have it.

Enclosed is a brochure form the conference hotel. David Benzie, Chair of the Programme Committee, visited the hotel recently and was very impressed with the facilities. Please note that the cost of the hotel room includes full-board. In order to ease the arrangements for those arriving early or staying on late and to help those who would like to minimise costs by sharing a room but who are travelling alone, we have redesigned the booking form. Please could you use the new booking form enclosed with this letter rather than the one that was sent with the "Invitation to attend and call for papers" (If you have already sent the old form ignore this request). Please note that the price for the optional nights of Saturday June 29th and Friday July 5th only includes bed & breakfast. The new booking form also includes a space for booking for the WG3.1 pre-conference. Please ignore this unless you are a member of WG3.1!

If you have not yet responded to the "Invitation to participate and call for papers" please consider sending in a proposal as we would welcome a contribution from you. If you have any questions please contact either myself (email: f45410@mvsa.biu.ac.il) or David Benzie (email: 100441.3313@compuserve.com) and we will do our best to answer.

Yours sincerely,

Yaacov J Katz
Chair, Organising Committee

School of Education, Bar-Ilan University, Ramat-Gan 52900, Israel
Tel: 972 3 5318444, Fax: 972 3 5353319, email: F45410@mvsa.biu.ac.il

Wc 3.1 ...

IFIP

INTERNATIONAL FEDERATION FOR INFORMATION PROCESSING

Date: February 24, 1996

Reply address: Bernard Cornu
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IFIP WORKING GROUP 3.1
"Informatics Education at the Secondary Education Level"

To WG 3.1 Members

Dear Working Group Members,

It is now time to send you some informations about the activities of our group.

1. Next activities in Israel :

1.1 Israel Working Conference

As you know, the next important event for our working group will be the International Working Conference on **"Information Technology : Supporting Change Through Teacher Education"**, to be held at **Kiryat Anavim, Israel, june 30 - july 5, 1996**, and which is organized jointly by WG 3.1 and WG 3.5. I hope that all of you will be able to participate in this working conference ; the topic is certainly a major one for us.

Please, let me know whether you plan to attend the Israel Working Conference.

1.2 Working Meeting

The next working meeting of WG3.1 is to be held on saturday june 29th, 1996, in Israel, just before the Working Conference on Teacher Education. This working meeting will take place on saturday 29th, june, at the same place than the working conference in Israel. Participants are asked to arrive at the Kiryat Anavim hotel on friday night, june 28th. Rooms are booked at the conference hotel for Friday night 28th and Saturday night 29th June for those wishing to participate in the WG3.1 pre-conference working meeting. The price for a room with full board (single occupancy) is $200 (for the two nights) and for a room with full board (double occupancy) is $140 (for the two nights).

Please, when registering for the Working Conference, do register also for the pre-conference working meeting.
At the working meeting, we will discuss the current work about the guidelines we planned to write.

Please let me know whether you plan to attend the Working Meeting on june 29th in Israel. I must know very soon, because we need to reserve rooms. In case there is not enough participants, we would have to cancel this working meeting.

1.3 WG 3.1 - 1996 Annual Meeting

The next Annual Meeting of WG 3.1 will be held during the Israel Working Conference :

WG 3.1 Annual Meeting
Thursday 4th July 1996, 16.00 - 17.30
Kiryat Anavim, Israel

Please consider this letter as the official invitation to the annual meeting.
Provisional agenda :

- Welcome
- Apologies
- Approval of the minutes of the 1995 annual meeting (July 27th 1995, Birmingham, UK)
- Members of WG 3.1 ; proposals for new members
- Activities of WG 3.1 : guidelines for good practice ; "success stories"
- Future activities, working meetings, new developments
  - Teleteaching 96 and the IFIP congress in Canberra
  - Zimbabwe Conference
  - Grenoble Conference
  - WG 3.1 on the web ?
- Next annual meeting
- Miscellaneous

Please, let me know whether you plan to attend the WG 23.1 Annual Meeting, and let me know any point you would like to be added to the agenda.

2. Other future activities :

The next IFIP World Conference will be held in Canberra, Australia, 2-6 september 1996. "Teleteaching 96" ("*Practising what we preach*") is a major part of the Conference. You have already received invitations to participate, on site or at a distance.

Two working conferences are in preparation for our working group :
- "Capacity Building / Professional development for IT", Harare, Zimbabwe, August 1997. In collaboration with WG 3.4 and 3.5. (PC Chair : Deryn Watson ; OC : Sam Gumbo).
- "Secondary School Mathematics in the world of communication technology : learning, teaching and the curriculum", Grenoble, France, october 26-31, 1997. (PC Chair : Bernard Hodgson ; OC Chair : Philippe Jorrand).

3. Guidelines :

We have produced 3 guidelines :
G1 : Informatics Education in Secondary Schools ;
G2 : Integration of Information Technology into Secondary Education - main issues and perspectives ;

G3 : Telecommunication in Education.
The 4th one, in preparation, should be :
G4 : Integrating social and ethical issues of informatics into secondary education.

At the working meeting, we will discuss the current work about the guidelines we planned to write. I remind you that some of us have agreed to work on different themes :
- Ethics : Deryn Watson, Paul Nicholson, Chen Qi.
- Teacher Education : Bernard Cornu, Paul Nicholson, Anna Kristjansdottir, Peter Bollerslev, Sam Gumbo, Charles Duchateau.
- Computer supported simulation and modelling : Erich Neuwirth and Viera Proulx.
- Networking and multimedia : Jan Wibe, David Squires, David Tinsley.
- Education and Multimedia : Bob Aiken and Ferran Ruiz.
(some of these may merge...).

4. Mailing list :

Hubert Christiaen has set up an e-mailing list for our working group. Thus, if you send a message to the following address : IFIPWG31@CC1.KULEUVEN.AC.BE , then all the members who are on the list will get it. It is a very convenient way for sharing information. Two or three members of WG 3.1 have no e-address, and are not on the mailing list. Let us hope they will join very soon ! Many thanks to Hubert.

5. Members of WG 3.1 :

As you know, three new members were accepted at our last meeting in Birmingham : Klaus-D. Graf (Berlin, Germany), Pieter Hogenbirk (The Netherlands), Viera Proulx (Boston, USA).
Three members resigned : K.G. Ahlström, Bernard Levrat, Peter S. Jensen.

I hope to meet all of you next june in Kiryat Anavim, Israel,
With my best wishes,

Sincerely yours,

Bernard Cornu

Bernard Cornu
W.G. 3.1 Chairman

<u>Enclosed :</u>
- Draft Minutes of the 1995 Annual Meeting (to be approved at the next Annual Meeting)
- List of WG 3.1 Members

Draft Minutes of the Annual Meeting of IFIP Working Group 3.1
Thursday 27th July, ICC Birmingham UK

Present :
Zoraini Abas, Bob Aiken, Herminia Azinian, Peter Bollerslev, Hubert Christiaen, Bernard Cornu (chair), Charles Duchateau, Bernard Dumont, Sam Gumbo, Bernard Hodgson, Immo Kerner, Anna Kristjansdottir, Jeff Moonen, Raymond Morel, Erich Neuwirth, Paul Nicholson, Chen Qi, Ferran Ruiz i Tarrago, Brian Samways, David Squires, Harriet Taylor, David Tinsley, Deryn Watson (minutes), Tom van Weert, Jan Wibe.

Invited Guests :
Klaus-D Graf (D), Pieter Hogenbirk (NL), Viera Proulx (USA)

Apologies :
Apologies were received from:
Ulrich Bosler, Umberto D'Ambrosio, Judy Hammond, Gilbert Schuyten, Peter Waker.
K. G. Ahlstrom had sent his apologies and indicated that he would resign from the group.

1 - Minutes of last meeting
The draft minutes of the Annual Meeting, October 17th 1994, Barcelona, Spain were approved, with no amendments.

2 - Welcome
Bernard welcomed all members to the meeting, and noted our seven new members were all here. The current group was very dynamic and had been making a major contribution to WCCE 95 this week.

He wished to record his thanks to the retiring chair of the group, Tom van Weert. We all know of the excellent work he has done and the high level of activity, in quality and quantity, with which he has led our group. We appreciate both his scientific and human qualities, and on behalf of the group, Bernard expressed sincere thanks for all that he has done.

3 - Membership
Three new members were being proposed at this meeting: Klaus-D Graf, Pieter Hogenbirk and Viera Proulx. All three had been present at a number of IFIP events and all were supported by their TC3 member. Each spoke briefly about their areas of interest, and all three were appointed by acclamation as full members. Their names would be formally presented to the next TC3 meeting for approval.

4 - Current Activities

4.1 Barcelona Working Conference October 1994 - Integrating IT into Education
The chair of the programme committee, Bernard Cornu, and chair of the organising committee, Ferran Ruiz, were both thanked for their work. The working conference had been a great success. The book, edited by Deryn Watson and David Tinsley, had been published by Chapman and Hall in February 1995, and an article about the conference had appeared in the IFIP newsletter.

4.2 WCCE 95 Birmingham.
4 different professional groups (teacher education had split into 2) were being provided by WG 3.1. It is too early to discuss them, but the summaries will appear in the post-conference report. It is for WG 3.1 to follow up matters that emerge. In the first instance, issues that arise on teacher education will be incorporated into the working conference being held jointly with WG 3.5 next summer in Israel.

4.3 UNESCO curriculum
All English copies had been distributed from Geneva by Raymond Morel. Copies had also been made available for a regional UNESCO summer conference in Malawi, and a meeting is planned in Zimbabwe next year to coordinate regional dissemination and distribution.

Peter reported that there had been a number of discussions with UNESCO about translations. Those for French and Spanish had been finished and delivered for approval; Japanese and Chinese versions were also being planned. It is unclear how these will be produced and disseminated, and there were ongoing discussions between UNESCO and IFIP. Various members of IFIP at regional workshops currently planned (Tunisia, Jerusalem, Moscow) would be pressing for progress in this area.

4.4 Success stories
Everyone had received a copy of the "golden booklet" from Raymond, for which he was congratulated, and a presentation on Success Stories would be made during the conference.

5 - Guidelines

5.1 Current position
There were English and Spanish versions of Guidelines 1 and 2; English only of Guideline 3. Bernard Dumont offered to produce a French version of G2. There was still the ongoing issue of publication via the Bulgarian Academy of Science. They have just produced the long-awaited book for WG 3.5, so Peter will now negotiate with them about the guidelines.

5.2 Responsibilities
It is clear that someone needs to coordinate the translation, publication and dissemination of guidelines, especially if more are produced. It was agreed to split the function of editor and "links" person. Tom agreed to continue to work as editor, and Bernard C accepted the task of coordination.

5.3 New Guidelines.
Following a discussion on relevant areas, the following ideas emerged, with the members showing interest noted.

G4 - Ethics. There had been no progress over the year, but it was hoped that progress could be made in the next year to keep this one alive. Deryn, Paul N and Chen Qi.

G5 - Teacher Education, incorporating the notion of a re-definition of a teacher's roles, and a developing world perspective; using as seedcorn the notes from working groups in Barcelona and the PGs at WCCE 95; and with the Israel conference acting as a further catalyst. This may be in cooperation with WG 3.5 and 3.6, and we must also be aware of the Israel conference publication. Bernard C, Paul N, Anna, Sam, Peter B, and Charles.

G6 - Computer supported simulation/modelling at the secondary level. Erich and Viera.

G7- Networking/Multimedia. Possibly a second version/updating from G3. Need to inform about what is going on. Jan, David S and David T.

G8 - Education and Multimedia, our view of multimedia in contrast to the marketing activities of the industry itself. Relationship between networking and multimedia. Bob and Ferran. It may be that G7 and G8 will merge.

Drafting where possible will take place over the next year, and a working meeting will be fixed for further progress in 1996. Members should now contact others directly for work on drafting. The address list was being circulated for updating/corrections and all email numbers, and this would be distributed with the minutes.

Hubert Christiaen undertook to set up an email list server for the WG.

6 - Future Activities

6.1 Joint Working Conference WG 3.1 and 3.5. IT: Supporting Change Through Teacher Education in Israel, June 30th - July 5th 1996.
This is a working conference with attendance by invitation only. A call for papers and invitation to participate was circulated; all WG 3.1 and WG 3.5 and TC3 members are invited. WG 3.1 members are asked to send in names to Bernard C. of potential contributors to the conference, with a short statement on why you support them.

6.2 IFIP Congress in Canberra, Australia, 2nd - 6th September 1996.
Teleteaching is one of the main streams of the conference. There will be no papers at the conference; the programme will be based around half-day connections with a variety of schools and other groups around the world. It is an activity-orientated event.

Bernard asked the meeting to discuss potential ways in which WG 3.1 may be involved - should WG 3.1 make a "stream"? There was discussion around a number of issues, including how to activate networking, support for group work, asynchronous communication, and the need to put content into all this networking.

6.3 "Capacity Building"/Professional Development for IT, in Harare, Zimbabwe, Summer 1997.
WG 3.1 accepted the invitation of Sam Gumbo to hold a conference in Zimbabwe in 1997, when there would also be an event in association with the UNESCO curriculum. Deryn Watson would chair and set up the Programme Committee.

6.4 IT and Mathematics Education, in Grenoble, France, sometime in the academic year 1997-8.
This will be the third Maths and IT event. Bernard Hodgson would chair and set up the Programme Committee.

7 - Next AGM and Working Meeting.
It was agreed that the 1996 AGM would take place during the Israel Conference.

It was also agreed to try to hold a two day working meeting immediately before the conference, that is on 28th and 29th June, if local conditions permitted.

8 - Any Other Business

8.1 It was noted that there was nothing on WG 3.1 in the IFIP pages on the Web. Erich agreed to write something and have it put in.

8.2 Qi Chen would like us to hold a workshop, rather than a specific WG meeting/conference in China in 1996 if this was possible. It was agreed that discussions wiould take place between her, Peter and Bernard following this meeting.

It was proposed also that we might in the future consider a series of workshop meetings as "reaching out" activities.

IFIP WG3.1 & WG3.5 International Working Conference
Information Technology: Supporting Change Through Teacher Education
Kiryat Anavim, Israel, 30th June 1996 - 5th July 1996

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WG96 K3

TECHNOLOGY'S PROMISES AND DANGERS IN A PSYCHOLOGICAL CONTEXT: IMPLICATIONS FOR TEACHING AND TEACHER EDUCATION

Gavriel Salomon

University of Haifa, School of Education

July, 1996

Historically, our understandings of the human psyche, particularly cognition, and the technology we employ as metaphors or as tools for teaching, tended to go hand in hand. There was, and still is a sort of parallelism between the two. Concerning metaphors, think of Man as God's potter's wheel or as God's Clockwork, of our drives and defense mechanisms as a steam engine, of communication as a telephone switchboard, and of the mind as a computer (Bolter, 1984). Concerning means for teaching, think, for example, of Skinner's teaching machine to instruct according to the rules of reinforcement schedules, of instructional TV to allow for dual coding, imagery, and top-down teaching of well structured knowledge, and of CAI as a means for the realization of learning as a matter of repeated drill and practice.

Many things have changed in recent years, but this parallelism between our psychological understandings and the technologies available to us remains unchanged. In fact, the coupling between the two have become even tighter. Indeed, in the age of the mind as a computer, whether as wetware for information processing, for symbol crunching, or as neural-like connectionist parallel processing, the way we believe people learn and think and the information technologies we develop to make that possible continue to live in a tight reciprocally supportive marriage. The only difference now is in the content of our psychological understandings and in the power of our technologies.

I wish to explore here two psychological aspects of this reciprocal relationship: (a) the nature of our current psychological understandings of learning vis a vis the possibilities afforded by present day information technology, and (b) the potential effects - both pedagogical and psychological - of that marriage. I will then turn to discuss the implications for teaching and for teacher education that follow.

Novel understandings of learning

Constructivism

There are many ways by means of which our age is characterized: the information age, the postmodern age, the end of history, etc. Seen from our narrower, psychological perspective, I'd characterize our times as the age of active participation whereby learning is seen as an active, intentional and somewhat idiosyncratic process. Learning is perceived to be active in the constructive sense, as so eloquently put by Phillips (1995, p. 5):

> These days we do not believe that individuals come into the world with their "cognitive data banks" already prestocked with empirical knowledge, or with pre-embedded epistemological criteria or methodological rules. Nor do we believe that most of our knowledge is acquired, ready-formed, by some sort of direct perception or absorption. Undoubtedly humans are born with some cognitive or epistemological equipment or potentials... but by and large human knowledge, and the criteria and methods we use in our inquiries, are all constructed.

The extent to which knowledge is a function of the personal creation of the individual or of external instruction, is one yet to be debated and determined. Obviously, there cannot be a single answer as it greatly depends on numerous factors such as the richness and organization of one's prior knowledge, the forcefulness with which knowledge is imposed on the individual, one's dispositions to reach better understandings, and the like.

Such fine points aside, there are a number of issues that emanate from the general constructivist position. One such issue pertains to the relationships between knowledge acquisition and utilization. Another issue pertains to the nature of understanding, and a third - to the nature of knowledge itself. Given the little time I have, I will not burden you with a constructivist treatise; I will just elaborate on each of these points briefly.

Knowledge and acquisitions: The difference between knowledge acquisition and utilization appears to be losing its validity. For knowledge to be acquired it needs to be actively utilized, lest it will not be constructed but just swallowed as-is and become inert. So, there cannot be acquisition without utilization. On the other hand, the active process of utilization in the form, for example, of problem solving, leads to acquisition. The typical separation of the two ("today we'll learn the processes of evaporation, and next week we'll employ it to solve a problem") just won't work.

Understanding: Concerning understanding - what is it when seen from a constructivist perspective? Perkins (1993) has suggested performance criteria by which to judge understanding, mainly the ability to function flexibly with what one has learned, improvise, translate, innovate, in short - go beyond the information given. Lately, though, Perkins (1996) has come to view representations -- mental models, prototypes, plans or beliefs -- as neither necessary nor sufficient for understanding. Instead, he suggested that understanding is no more no less than the flexible performance itself. an acquired capability to performs flexibly with the information acquired. The symptom has thus been elevated to being the essence. Understanding is paraphrasing, going beyond the information given, and solving novel problems.

I don't think that this will do. What about memory? Could it be without any representation? Even Winograd and Flores (1987), promoting the idea of cognitions san representations, concede that representations are necessary when an otherwise smooth operation fails. So, what is understanding?

The idea that human behavior cannot be understood except for within the context in which it takes place (e.g., Geertz, 1973) may well apply also to individuals' understanding of physics, math, history or of their own actions: Understanding is a matter of connecting an information item, be it a principal, a historical date, or a concept, within a wider context to other such items. Thus, the quality of understanding, in my opinion, is a function of the network of connections within which the individual constructively places the item to be understood. The single date, concept, or principle is quite meaningless unless embedded in the network. Such a network can be comprised of associational, correlational, causal, part-whole and other logical, emotional and even sub-conscious connections. The denser the network, and the better organized - the better we might say is the understanding.

Thus, understanding is not an all or none "entity"; it is the process of constructing a mental product. The process is relating; the product is the relational network. Indeed, Noel Entwistle (1996) who studied the way students describe understanding, found that they describe it in terms of (what he calls) "knowledge objects" and which they depict as real graphic networks of relations. Such objects have breath and have depth, they can be better organized or more randomly thrown together (see figure 1). This has important implications for teaching and for teacher education, as I will try to show shortly.

Figure 1 about here

The nature of knowledge: The third issue I want to mention in the context of constructivism is the nature of knowledge itself. This of course is a thorny, exceedingly complex, and controversial issue that cannot be fairly handled in a talk. What with the question of representation (e.g., Winograd and Flores, 1987), the question of the situatedness of knowledge (e.g., Brown, Collins, & Duguid, 1989), or the question of the validity and accuracy of knowledge idiosyncratically constructed (Bereiter, 1994). I will mention here only one idea, namely - Herbert Simon's (1982) idea that the term "knowledge" was considered until now a noun denoting possession, as if knowledge is an object one comes to posses, borrow, forget, and retrieve. Now, though, with the availability of communication technology, and the ease of computing and accessing, knowledge comes to be a verb denoting access (Simon, 1982). It is not so much what you know but whether you know how to get to the knowledge and whether you know what to do with it once you have accessed it. In other words, knowledge is not just some accumulation of facts, perhaps even connected in a network, having been constructed for idle purposes, sitting there awaiting to be called upon; rather, knowledge is sought after, accessed and situationally and purposefully constructed ad hoc.

The idea of knowledge as access rather than as something possessed may be taken a bit too far. After all, one cannot effectively and intelligently access information without already possessing some knowledge; one cannot formulate an intelligent query of an otherwise dumb database without some prior knowledge, nor could one pick out the relevant from the irrelevant flood of information on the basis of total ignorance. Moreover, we now have reason to believe that cognitive skills, say those of search, access, selection and construction, are not as decontextualized and innocent of content as we once used to believe. If skills are even somewhat context- or content-bound, then by necessity - some knowledge needs to be possessed. Still, extending Simon's idea and assuming that knowledge is both a possession and an act of accessing is an important one which also has important implications for teaching and teacher education.

The social aspects of learning

It is pretty obvious that the learner, constructing knowledge in his or her own way, is not an isolated entity, clean of social influences concerning what is and what is not important, how to treat a piece of knowledge, what to favor, where to direct one's mental efforts, and the like (Longino, 1990, in Phillips, 1995). The social context within which one operates turns out to be rather crucial. Lee Shulman (1985) has observed that the way a classroom learning task is perceived -- whether it is consensually taken to be a chore or something to be taken seriously -- makes a huge difference in the way the individual treats it. Similarly, we find that the learning environment of the classroom, its climate and socially shared way of perceiving what is going on, determines whether the individual learners are more likely to rely on their abilities or intentionally mobilize their mental effort.

All this is well known and pretty obvious. Somewhat less obvious is the gradually unfolding story of how team work, collaborative learning, reciprocal teaching, and related arrangements affect learning. There are in fact two stories here to be told - a more conservative and a more radical one. Common to both stories is the growing awareness of the social role in learning: learning is not just an intra-individual affair, but at least as much an inter-individual one. Meaning is said to be socially appropriated (Newman, Griffin & Cole, 1989), knowledge is assumed to be embedded in social activities (Lave & Wegner, 1991), even claimed by Vygotskians to be the source of learning and development.

At this point, though, the two stories begin to differ. According to the more conservative story, for a variety of reasons, team work facilitates the individual's "solo" learning. Some of the reasons concern the facilitation of the constructive process in the individual's mind, the need to verbalize and share the constructions, providing the necessary zone of proximal development, and the like. Much research supports this version of the learning-as-a-social process story.

The second, more radical story goes back to the idea of distributed cognitions and learning mentioned before. Knowledge is said to be "in between" individuals rather than "inside" the single individual (Lave & Wegner, 1991), meaning that it is a quality that jointly emerges from social interaction and partnerships with intelligent technology rather than something that is "just there" (e.g., Pea, 1993).

Both stories lead to important implications, although not the same ones. I will discuss these before long.

Novel technological affordances

Now I wish to briefly turn to the other side of the parallelogram - the technological affordances. Many of the usages of technology in education were not really mindful, top-down, principle-guided designs. Many of the past technological attempts were inspired by technological opportunism and the "Gee wizz" battle cry. Often, they were no more than what Papert (1987) has called technocentrically guided." Still, this is not the full and real story. As I have suggested before, psychological conceptions and technology, particularly technology designed for psychological and educational purposes, develop hand in hand and this can be evidenced in the general short history of computing in education. It all began with CAI drill and practice programs, clearly influenced and further reinforcing Skinnerian operant conditioning principles. The general trend away from behaviorism caused this paradigm, slowly but surely, to fade away. This was followed by grandiose aspirations of shaping students' minds through programming (Papert, 1980) as a cognitive counterpoint to the behavioristic approach. But research on the effects of programming led to much disappointment (Pea & Kurland, 1984), joining the general trend away from the belief in general mental skills. The full swing of the cognitive revolution with its emphasis of computer simulation led to bold flirts with artificial intelligence (e.g., Yazdani & Narayanan, 1984), and its new technological possibilities (e.g., ICAI, ITS), but alas, leaving us again puzzled and disappointed.

Last, came multimedia, the internet and world-wide student communication networks, reflecting as well as further developing the psychological notions of constructivism, team work, and the social distribution of cognitions. Ideas about understanding as the construction of knowledge networks was partly inspired by students' designs of multimedia presentations. Indeed, such an activity affords the opportunity to construct knowledge networks, interact with them as if they are veridical "object of knowledge", and examine one's own cognitive map as if from afar. The construction of multimedia presentations is thus an interesting realization of the idea of understanding-as-network-construction, and the social process of collaborative construction furthers this realization. In this sense, I find multimedia to be one of many suitable technological partners of the constructivist process. As I will try to show later on, it may also carry with it some undesirable side effects, like all partnerships do...

Similarly, ideas of distributed cognitions (Salomon, 1993) have received their strongest impetus from the development of human-machine intellectual partnerships, leading to such distinctions as cognitive effects with and of technology, (Salomon, Perkins, & Globerson, 1991), pedagogical and performance tools, cognitive off-loading (Pea, 1993), apprenticeship, and situational learning.

But perhaps the most important yield of current technological affordances -- from simulations to world wide communication, and from multimedia designs to elaborate laboratory experimentation -- is the fact that clever and imaginative employment of today's technology can help us put into real practice many of the implications emanating from the psychological principles and ideas presented above. Things have happened in the past also without technology, but they were limited to a few outstanding teachers and they were piecemeal: a fragmented innovation here, a fragmented innovation there. Now, on the other hand, large scale changes of the kind I will describe in a minute take place all over, and -- due to technology's affordance -- they pertain to whole learning environments.

In short, technology serves a dual function: on the one hand, it provides the needed tools for the realization of learning-as-construction and as a social process of meaning appropriation, while on the other it offers novel opportunities that suggest novel learning activities and ways of teaching, which in turn require novel psychological insights.

Psychology and technology together

The marriage between technological opportunities, when actually taken, and psychological principles yields both proximal and distal results. Proximal results in my eyes are the new learning environments that appear to emerge all over the world on experimental grounds, potentially serving as the sign posts for the classrooms of the future. These learning environments, as I will try to show, are the stages on which an orchestration of the principles I have discussed earlier becomes realized through, among other things, the clever roles played by technology. More distal results are far less clear and tangible, some of them are frightening, possibly manifested in long range sociological, epistemological, and psychological changes in the form of a gradual loss of educators' expert authority, shallow processing, the construction of flimsy associationistic cognitive networks, and the like.

Proximal effects:

Psychology, as I have argued, offers certain principles and technology can help put these into practice. This combination is indeed best manifested in the design of whole new learning environments. The hallmarks of these are --

- Team work that allows the social facilitation and scaffolding of the individual's learning as well as the emergence of distributed knowledge;
- authentic interdisciplinary problems such that cognitive networking is afforded;
- the diverse and intensive employment of technology to serve as the tools for information gathering, selection, communication and construction;
- guided by teams of teachers to allow for the necessary rich improvisation.

Learning environments that embody these elements can now be found all over the world. The contents differ from place to place as do the particular emphases: Examples are the "communities of learners" by Brown and Campione (1994), with its strong interpersonal interactive emphasis, similar to the one in Finland, designed by Sanna Jarvela,1995); the Jasper series designed by the Vanderbilt Cognition and Technology Group led by Bransford (1992), in Australia (1995), in Belgium (De Corte), in Israel (our SELA project), and a fast growing number of projects in which long-distance communication through the Internet among students and teams of students for the solution of common problems. Common to all these examples is the fact that a whole learning environment is designed, that it tries to embody the principles described above, and that it employs technology intensively on a wide scale.

Distal effects:

Here I am on quite uncertain grounds. We have already learned that neither the grand promises of the New Educational WWW (Wishful Wonderful World) nor the threats of an intellectual Armageddon of the Neal Postman kind are likely to take place. Things are far more complex and often self-balancing and adjusting. Offices have not disappeared; despite technological possibilities people still like to touch each other. Print materials have not disappeared despite MTV; there is no other symbol system to replace print. Despite confident predictions, the teacher and the school have not disappeared simply no technology can replace the former and no parent wants to assume the time consuming responsibilities of the latter.

Still, there are some distal effects that we can already predict and which teacher education will have to start taking into account. The list is of course pretty lengthy, particularly if you read the futurists, but I will focus on only ....

If the described psychological principles, the outlined learning environment and the technology, are going to spread and become a standard staple of our life in and out of school , then one could expect a few outcomes, as follows --

(a) A gradual disappearance of the walls between the disciplines.

(b) An opening up of the curriculum, turning it into no more than a flexible framework for suggested activities.

(c) A growing autonomy for both teachers and students, which in turn will lead to-

(d) a greater spread of individual differences among the students.

(e) However, with all that search for information for the solution of open ended problems, there is a danger of intellectual shallowness that comes to replace the alleged systematic and deeper handling of carefully crafted disciplined knowledge.

(f) and to the extent that the symbolic modes and organization of knowledge in the media become gradually reflected in students' minds (Salomon, 1994), there is the danger of a growing preference to think in effortless "multimedia terms" - associationistic, fragmentary, sound bite-like, hoping all over, undisciplined.

(g) With the tremendous quantity of unorganized information, as indeed one can witness already today on the internet, there is the danger of information swamping, and with the ease of accessing huge amounts of it - not only the feeling of being lost in the overpowering tide of information but also and of longer duration devaluation of information in general: easy come easy go.

(h) Last, not least, and this time not on the individual level -- the danger of increased social alienation. Now, this would sound strange - why alienation at a time when finally social interaction -- face to face or though something like the internet - is so highly promoted and cherished? The reason, I am afraid, lies in this very paradox: The internet, as its soothsayers predict with a glee in their eyes, the present day camp fire around which we all gather once in a while to reiterate our shared culture, will now turn into a thousand, nay, a million separate and unrelated camp fires with no center to hold them together. With each hobby club, interest group, collection of tennis or jeans lovers having their own Home Page, that is - their own camp fire, alienation is likely to follow.

Implications for teacher education

It becomes pretty obvious that teaching cannot remain the top-down pouring of knowledge into otherwise passive students' minds. If we are to seriously consider constructivism with its cognitive implications, and the inter-personal nature of learning with its social and organizational implications, and if we are to allow technology to be a lever for this kind of shift, then the prototypical kind of the learning environment described above is inevitable. Team work, social appropriation of meaning rather than authority sanctioned "true" knowledge, interdisciplinary materials, opening up of curricula, constant improvisation, self-reliance of both teachers and students, and the like are sure to follow.

But this means that we are talking about a different kind of teacher. The new teacher is hardly ever going to have a detailed well worked out curriculum to follow; she is not going to be the classroom knowledgeable authority on everything; and she is not going to be the sole actor in the classroom. Instead, the teacher is going to be an autonomous, confident, widely knowledgeable professional, a team-player, and a flexible improviser.

How to you train a person to be such a teacher? One way (which is often taken) is to introduce the kinds of ideas and pedagogical innovations I have discussed piece by piece, nicely and quite unobtrusively into existing learning environment programs. These programs share very little with the novel ideas of constructivism and social learning and with the practices that follow from them. They will not be upset by a mild and innocuous invasion of the novel. But then also very little is going to happen. If the new ideas and practices are sufficiently harmless that they can be smoothly assimilated into existing teacher education practices, then they will be equally innocent of causing any serious change: the learning environment graduate will not be much different from the one who has been trained within the "old" paradigm.

The alternative is based on one of the most profound, if sad, principles of how teachers come to teach. It is the principle of perseverance: when push comes to shove, the teacher will teach the way he or she has been taught in the past while being a student in school. Thus, if we want teachers to change, they will have to experience as students themselves the novel learning environment. Specifically, we'll have to take the psychological principles and the technological affordances and apply them not only to kids in schools but to teacher trainees as well. After all, neither the principles nor the practices are limited to young kids. Good learning is an active and social constructive process regardless of age! This then means two things: (a) building teacher education around these principles, and (b) having the trainees actually experience construction of knowledge in a social context. In other words, do upon the teaching trainees that which you'd want them to do upon their students. If to this we'd add Dan Schon's idea of reflection to accompany and complement experiential learning, we might end up with a (for some not so novel) paradigm for teacher education.

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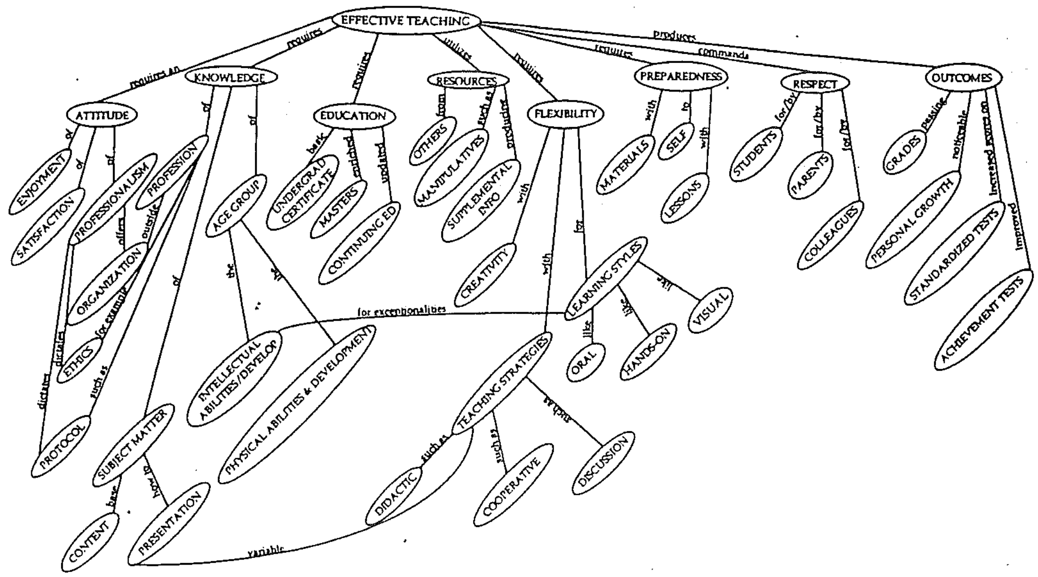

Figure 1. **Concept Map 1**
Note. Concept Map 1 was drawn at the beginning of the senior year.

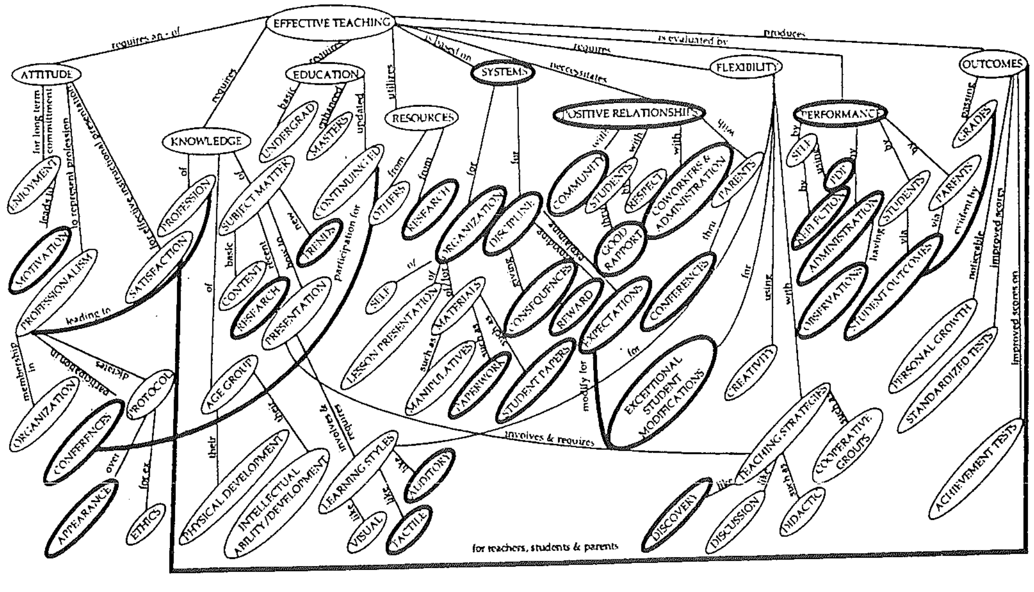

Figure 2. **Concept Map 3**
Note. Concept Map 3 was drawn during the middle of student teaching. Shaded concepts and crosslinks did not appear on the first concept map.

From: Jones, M. G., & Vesilind, E. M. (1996). Putting practice into theory: Changes in the organization of preservice teachers' pegagogical knowledge. American Educational Research Journal, 33, 91-117.

WG3.1 and WG3.5 International Working Conference Registration Form

To register for the IFIP WG 3.1 and WG 3.5 International Working Conference, ***Information Technology: Supporting Change Through Teacher Education*** to be held at Kiryat Anavim, Israel, June 30 - July 5, 1996, please complete and return this section to the Organising Committee. Please note that registration fees are $100 until December 31, 1995 and $120 thereafter. All rooms in the hotel are double rooms and accomodation fees (full board) are $500 per person for single occupancy and $350 per person for double occupancy. In order to reserve hotel accomodation please send $200 with your registration fee.

Title: (Prof, Dr, Mrs, Miss, Ms, Mr)____First Name________________Surname____________________

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Kiryat Anavim Kibbutz Hotel, is an established holiday resort and is located in the Jerusalem foothills, 15 minutes from Jerusalem and 30 minutes from the Ben-Gurion International airport. Residents can use all hotel facilities and participate in hikes and sightseeing in the immediate vicinity. In the hotel residents will find a unique pastoral atmosphere, homelike hospitality and cuisine, as well as modern well furnished rooms with private bath/shower and toilet.

WC96

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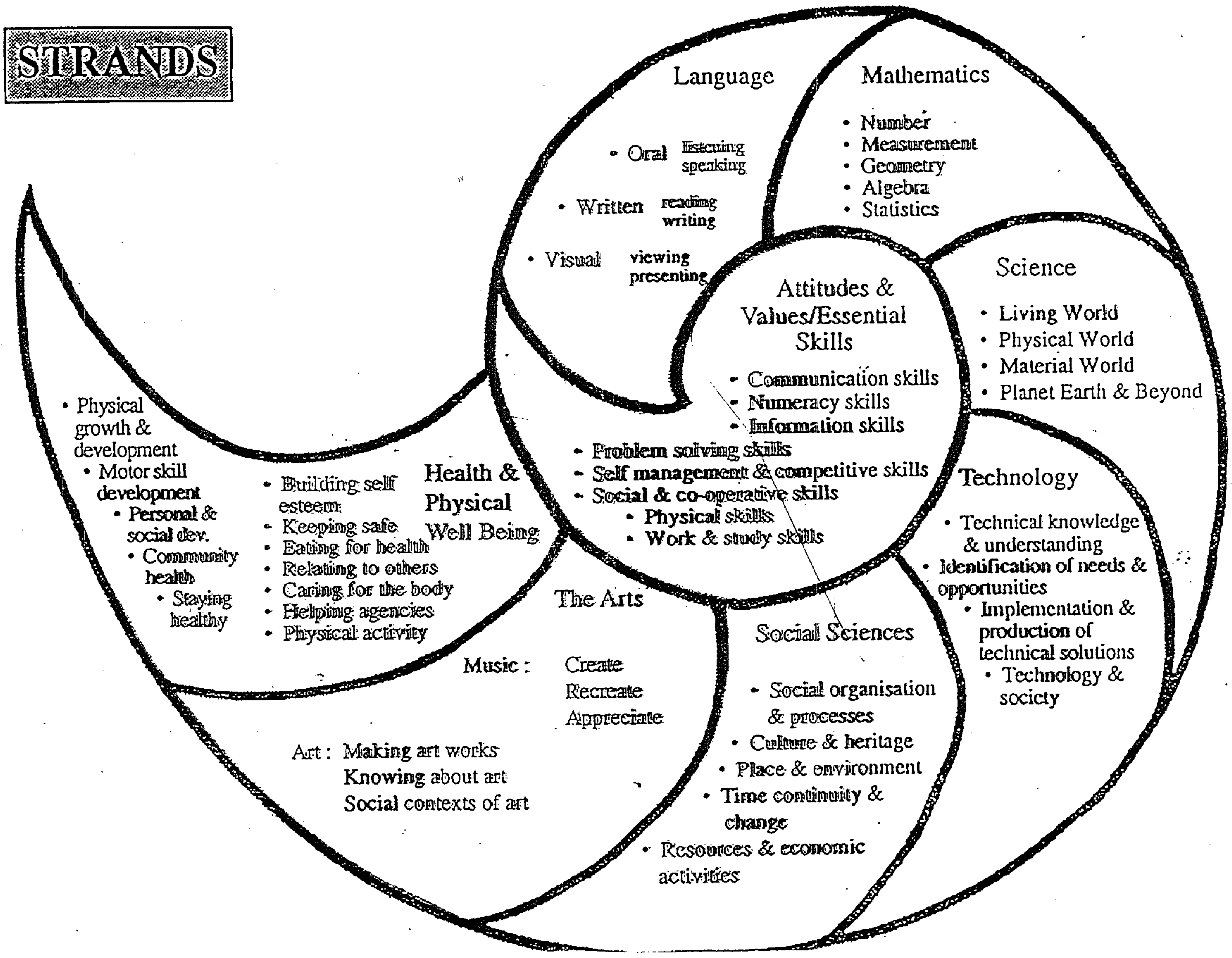

Teacher Development Model

1994 Schools apply for 1995 contract

Feb 1995 An introductory visit

Mar 1995 First Workshop

April - June In-school visits

June 1995 Second Workshop

July - Oct In-school visits

October Final workshop

November Final school visits

ESSENTIAL SKILLS are Cross Curricula:

Communication Skills

Physical Skills

Problem Solving Skills

Social & Co-operative Skills

Work & Study Skills

Self Management & Competitive Skills

Information Skills

specifically the processes of

finding & accessing information

selecting & storing information

sorting & searching information

publishing & disseminating information

WC96

IFIP Working Conference "Supporting Change through Teacher Education":
Report from Focus Groups 1 & 2 compiled by Paul Nicholson

How should we teach teachers to change?

Focus Group 1
Chair: Brent Robinson (UK) Rapporteur: Margaret Cox (UK)
Michael O'Duill (UK), Peter Hubwieser (G), Chen Qi (PRC), Herbert Loethe (G), Marta Turcsanyi-Szaba (H), Michal Yerushalmy (IL), Patricia Marzin (FR), Yvonne Buettner (CH), Jean Underwood (UK)
Focus Group 2
Co-chairs: Paul Nicholson (AUS), Michelle Selinger (UK)
EDITORS - PLEASE NOTE
somewhere on the way I have lost my complete list of group TWO participants! The one below is a PARTIAL list from memory. I will ask Michele to send you a list to insert if I dont find it in the next few days - Paul
Bruce Rigby (AUS), Raymond Morel (CH), John Oakley (AUS), Phil Nanlohey (AUS), Stefan Frederick (DL), Kay **** (NZ), Bernard Cornu (FR),

Background

This report is the third in a sequence examining the issues influencing the effective use of information technology (IT) in education. The first report (Watson & Tinsley, 1995) examined the issues around the integration of informatics in education. The report from the World Conference on Computers in Education then examined the theoretical basis of IT and effective implementation (Samways & van Weert, 1996). This last report continues the theme with a focus on the question "How should we teach teachers to change?" It examines this question from the perspectives of change theory and lessons we have gained from practice.

Introduction

Teachers are expected to change their practice in order to incorporate IT effectively in their teaching and learning. They are expected to be innovative in a system which frequently expects teachers to be resistant to personal or systemic change. Where change is actively promoted, it is expected to take place in an environment which differs vastly from industry and commerce where managers can spend up to 30% of their time in training for technological change within the organisation. Developing support for professional change requires that the external view of education is transformed so that teachers can be regarded as true professionals in the same way as, for example, doctors with an equal expectation of lifelong learning and significant ongoing professional development. The operating theatre of today is very different from that of a century ago. Can we say the same of today's classrooms (Papert, 1993)?

It is important to clarify the systemic imperatives that drive large scale change. For example, what is the rationale for change? Is it focused on the attainment of educational goals or is it driven by economic considerations? Because educational change is affected by the political climate, the goals frequently change, as does the notion of "what is appropriate" at any time. This can be a serious impediment to long term change, or even to ensuring success in the short term. A clear understanding of the nature and purpose of change is essential to breaking the cycle of ignorance (Underwood, 1996). Teacher education programs need to be based on the mechanisms of change, not just on the educational milestones commonly set by the policy makers or on the perceived immediate needs of teachers.

Change is inhibited because there is no clear conceptual model of the educational benefits of IT. This leads to alternative perspectives, sometimes unrealistic, about classroom practice and appropriate resource levels. There is also a common perception that professional development is not needed because it is assumed that normal classroom pedagogy can be transferred directly to the technological medium. Teacher change is gradual and requires a change of knowledge, teaching strategies and beliefs as well as the acquisition of IT skills (Fullan, 1991).

The Need for Models

To make effective change requires certain knowledge, skills and attitudes to be an effective change agent. Having clear visual and conceptual models can help teachers and others to understand and implement change, and to analyse their changing pedagogy over time. It is important to analyse the entities that change and to identify the intended versus. implemented aspects of change. There is a need to link change originating from research with developmental change arising from practice. Research evidence needs to be presented in a forum which is accessible to teachers, and visual models facilitate this. Also, models help in examining innovative processes and experiments already undertaken in pedagogy and outside education. (IT is not a special case.)
Pedagogical and didactic models.

Figure 1 The Oren model - pathways for classroom change with IT

The Oren model in figure 1 indicates pedagogical positions teachers adopt in relation to IT. Some teachers for example might be high IT users and teach in an open ended way and would therefore appear in the quadrant D. Change is perceived in such a way that teachers in B are often directed towards D, when a move to C or A might be more appropriate. The possible moves are listed in table 1.

Change Meaning B to D This is a major shift in two modes, it implies a shift in both pedagogy and in IT usage. It is too hard to make this concurrent shift in two variables at one time. There are therefore two different pathways in which more gradual change might occur. B to A This would represent a IT being used as a tool within a traditional classroom model, for example the use of a graph plotter instead of plotting graphs by hand. A to D This represents a change in pedagogy in which classroom activities move into more open ended, problem solving modes and exploration learning instead of completing the traditional classroom exercise B to C involves a shift towards problem solving and open ended activities in a traditional classroom. C to D involves the uptake of IT to enhance the activities in an open ended classroom.
Table 1: Transitions in the Oren change model

Note that it is not necessary that Position D always be attained - some teachers can remain in A and be successful teachers using IT.

Conditions for change
The change process is represented by a shift on this map and there are factors which drive this process. But before teachers can move across the map the change process needs a stimulus to occur.
The Kiryat model in Figure 1 depicts the common expectation that teachers at "B" - traditional classrooms with a conservative curriculum model and no use of IT, are expected to move directly to "D" (the grey arrow), where they are expected to become users of IT in an open-ended curriculum. This requires a change in two dimensions of the model - IT use and pedagogy. This may simply prove too difficult for some to be able to make the change. Perhaps a better way to conceptualise what is expected of teachers is to consider the pathways the model depicts.
For example, some teachers may simply want to make the transition B-A to incorporate IT into their traditional classroom setting, where it acts more as "tool" than a transformative agent. This transition of course is a valid one, and many teachers may wish to stay at that point. Equally, others may follow the transition A-D, where the IT facilitates a change in pedagogy based on pre-existing experience with IT in traditional environments. Similarly the transition B-C-D reflects a situation where a non-IT user adopts a more open curriculum and at some later stage recognises the potential that IT has in developing that type of curriculum to provide new types of learning experiences. The key point of the model is that simultaneous change in too many dimensions may be too hard, and so fail.
A further aspect of the model above is that it could also be used to map the use of IT in a curriculum, with teachers or schools mapping their activities over a year onto the model to

see in which areas they fall. This would potentially be a useful tool to help a reflective practitioner to consider their pedagogy.
Educational software embodies a model of learning while other "tool" packages require teachers to impose their own teaching style or model of student learning upon them. To maximise the potential of IT, teachers must look for a match between what IT can do and what they want to happen in educational terms within the classroom. Such an examination might very well prompt teachers to look for new ways of teaching and learning.
The following tools can help teachers and school systems to identify the conditions that need to be changed - exactly what their current practice is, what factors affect it, and what the change means in regard to those items.
The Kiryat model (Figure 2) is a mapping of time, place, group size as they relate to classroom practice. This three-dimensional model can help teachers to conceive of where there practice is located, and what things might be changed to move to a new place in the model. Like the Oren model, this could also be used as the basis of a chronological mapping of practice, so that the diversity of teaching models could be tracked over time.

Figure 2: The Kiryat pedagogical model

In this model, various kinds of educational settings are depicted. For example, the circle "A" in figure 1 represents a traditional classroom - all students together in the same place at the same time. Circle "B" represents a "distance-education" student - somewhere else, learning alone, at some other time. In the design of this model, it was assumed that mapping educational goals onto this pedagogical model would lead to further insights into the curriculum and delivery processes being examined as part of planned change processes.

In addition, there was seen to be a need to fully understand the responsibilities of the stakeholders in the change process corresponding to educational principle components - exactly who was going to do what, and why? The sample Anavim grid (Table 2) is an example of the type of analysis that is seen to be an essential component of analysing change processes. The grid's headings are to be altered by each user to suit their needs and are not mean to be definitive. The crosses indicate who assumes responibility for the elements of change in the left hand column.

Stakeholders/Partners/Actors
Domains Student Parent Teacher Principal IT Person Board Authority LEARNING -Basic skills -Learning Styles X X X X TEACHING -Professional development X X -Curriculum development X X X X -Program development X X X X -Materials development X IT resources X X X X -networking X X X X X X ORGANISATION -funding X X X -communication X X EXTERNAL -Community expectations X X X X X X -Employer expectations X -Vocational pre-requisites X -Policy Framework X X -Technological evolution X X X X X X X
Table 2: A sample Anavim grid for stakeholder analyis

Change Models

Teachers must also have a firm understanding of the nature of change and how to bring it about effectively. Change often arises because the current situation is problematic and uncomfortable. Tension and conflict may already exist. Certainly as change begins, it is likely that these uncomfortable states will occur (Schon, 1971). Teachers must be prepared to accept that change is uncomfortable: it will involve doubt and uncertainty, risk taking and conflict. Teachers and policy makers should understand the distinct phases of structured change. Change should begin with the identification of teacher needs. Teachers might have existing needs which IT can help satisfy. New needs may also be created by external agencies or by the existence of technology itself. The Concerns Based Adoption Model of Change or CBAM (Louacks and Hall, 1977) offers a structured way of conceiving the origins and process of change.

Not all needs can be satisfied with IT. The technology might not be appropriate or the barriers against using it might be too great. Realistic goal setting is therefore required. Problem solving change models help focus on the need to identify realistic and appropriate goals, paying attention also to potential barriers and catalysts of the intended change. Force field analysis techniques can be useful as a way of assessing the strength of opposition and obstructive barriers.

Attention must also be paid to the likely and expected implications and outcomes of innovation (Consequence Projection) and to the strength and desirability of these (Significance Evaluation). (For further discussion of these techniques see Eraut, 1991). Sometimes, the intended change is just not worth the effort to be expended. A successful change agent is one who also knows when not to attempt change.

The implementation phase requires a sound perception of who and what will be required to effect the change and where and when the intended actions will take place. While the end result of educational change must ultimately be new behaviour in the classroom, in order to get there teachers will require changes in their knowledge, skills and attitudes. The work of Joyce and Showers (1980), among others, offers a useful taxonomy of the types of support which may be offered to suit the particular demand. Monitoring and evaluation are essential components of any change effort. Goal setting should be accompanied by attention to the way in which the attainment of the goal can be assessed. Performance indicators offer one form of measurement. Observation techniques, surveys and other forms of data collection and analysis can be borrowed from research methodology for the purpose.

Who undertakes the evaluation and for what purpose are other important questions to consider. (For further discussion of this subject see the report of Focus Group 3 elsewhere in this book.) The evaluation process should be seen as a start as well as a conclusion to any change effort. Change should be a continuous cycle of improvement built upon the ability to be a reflective practitioner. Action research offers a good model of the iterative process involved (see Elliott, 1981).

Change requires recognition of the fact that it cannot take place in isolation and requires co-operation and collaboration with others. Other individuals, institutions and whole systems need to change if individuals are to change. Individuals therefore need to be effective organisational change agents too.

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Date: Tue, 19 Nov 1996 10:45:49 +0100
From: cornu@grenet.fr (Bernard Cornu)
Subject: Resume Israel
X-Sender: cornu@ccomm.grenet.fr
To: morel@uni2a.unige.ch (Raymond MOREL)
MIME-version: 1.0
Posted-Date: Tue, 19 Nov 96 10:45:49 +0100

Cher raymond,
Voici le bref resume du colloque d'Israel que nous avons fait avec Patricia.
Amities,
Bernard

Bernard Cornu
Patricia Marzin

Congrès IFIP
WG 3.1 - WG 3.5

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Supporting Change through Teacher Education"

Juin 1996 - Kiryat Anavim, Israël

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Quelques idées fondamentales ont structuré le colloque :

Les TIC produisent un profond changement social ; leur intégration dans l'enseignement ne peut se faire sans prendre en compte de manière fondamentale ce changement dans la société, dans la manière de penser.

Gail Marshall souligne que les TIC ne produisent un véritable effet nouveau que dans le cadre d'une approche constructiviste de l'apprentissage.

Brent Robinson s'appuie sur les théories du changement pour dire que la formation des enseignants doit prendre en compte le changement personnel et le changement institutionnel.

Paul Nicholson décrit les nouvelles compétences nécessaires à l'enseignant et leur place dans la formation, en particulier dans le cadre de "virtual teaching environments".

Les allemands ont défendu l'enseignement de l'informatique comme discipline.

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Les pays nordiques ont conduit de nombreuses expériences dans le domaine du télé-enseignement.

Bruce Rigby souligne les changements dans la façon de travailler des élèves, dans le rôle des enseignants, dans les objectifs de la formation des enseignants ("quality control").

Plusieurs exposés ont porté sur la description de curricula de formation, en notant l'évolution en 20 ans : disparition du hard et de la programmation, renforcement de la pratique et de l'intégration.

Networks, Internet : effets du travail en réseau sur la façon d'apprendre, d'accéder au savoir, de communiquer.

Deryn Watson a noté les évolutions des politiques et leur effet sur l'intégration des TIC dans l'enseignement en Grande-Bretagne.

Deux exposés ont marqué le congrès :

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A son avis selon qu'un enseignant ait une approche constructiviste ou béhavioriste, l'utilisation d'un logiciel de résolution de problème (par exemple) ne sera pas la même. L'enseignant ayant une approche béhavioriste va se servir de ce type de logiciel afin d'enseigner des contenus de façon plus rapide, mais sans changement par rapport aux contenus enseignés avant l'utilisation des TIC. L'enseignant ayant une approche constructiviste va enseignants des sujets différents qu'il avait des difficultés à enseigner avant l'utilisation des TIC.

Les analyses des effets des TIC sur l'apprentissage ont souvent été menées avec une approche béhavioriste. Il n'existe pas de travaux qui montrent que l'utilisation de tel ou tel logiciel par des élèves a changé leurs conceptions. Selon elle les logiciels mettent souvent les élèves en activité pour l'activité, mais en terme d'apprentissage les résultats sont pauvres.

L'intervention de Jim Ridgway avait pour titre "Vygotsky, informatics capability, and professional development". Il se réfère aux théories de Vygotsky pour expliquer comment les TIC doivent être intégrés dans la formation des enseignants. Il pense que le préalable est qu'il faut rapprocher l'enseignant de la société, qu'il faut banaliser la profession d'enseignant et en faire une profession comme une autre (ce qui n'est pas le cas actuellement). Selon les théories interactionistes de Vygotsky l'apprentissage est un acte guidé par l'environnement social. Le langage, la littérature, les sciences, les mathématiques ne sont pas seulement des objets que les gens ont ou font, ils définissent la personne de façon fondamentale, du point de vue de sa façon de penser, du pouvoir qu'elle peut exercer sur son environnement, et par rapport à son appartenance à une communauté. Pour lui l'informatique doit être intégrée aux habiletés intellectuelles des enseignants débutants, ce doit être quelque chose qui pénètre leur façon de penser comme le langage le fait, ou les maths ou les sciences.

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WC96

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Congrès IFIP WG 3.1 - WG 3.5

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Bernard Cornu, Patricia Marzin
IUFM de Grenoble

Parmi les soixante-dix participants, quatre français étaient présents dont deux présentaient une communication. En tant que directeur de l'IUFM de Grenoble, Bernard Cornu a fait un discours très général sur les nouvelles technologies et la formation des enseignants. Tout au long de la conférence, Rachel Cohen a animé les débats et elle a participé au groupe de travail sur l'évaluation. Eric Bruillard a présenté un texte, co-signé par Georges-Louis Baron et Alain Chaptal. En se fondant sur différentes études empiriques, celui-ci analyse les difficultés de transfert entre pratiques personnelles des enseignants et utilisations en classe avec des élèves.

Si les représentants anglo-saxons ont beaucoup parlé de "professional development", il semble que les modèles français, permettant depuis plusieurs années une articulation entre la formation et les pratiques sur le terrain et offrant une formation continue aux enseignants volontaires, ont des avantages certains, bien qu'ils ne semblent pas donner de meilleurs résultats. La comparaison des solutions préconisées dans différents pays est certainement très utile. Bridget Somekh a attiré l'attention sur la difficulté à utiliser des ressources, même avec les nouvelles technologies, pour faciliter l'apprentissage dans le contexte scolaire. Des chercheurs israéliens ont évoqué une courbe en U dans l'intégration des logiciels innovants dans l'éducation. Le processus d'intégration amène tout d'abord un effet négatif qui correspond à un déclin dans les performances et dans les attitudes suivi d'un effet positif après le dépassement des difficultés initiales et la reconstruction des activités pédagogiques par les enseignants. Un tel phénomène peut expliquer certaines résistances vis-à-vis des nouvelles technologies et la nécessité d'un accompagnement dans la durée.

Il ressort du congrès que beaucoup de chemin reste encore à parcourir pour intégrer les nouvelles technologies de l'information et de la communication dans les pratiques d'enseignement et ce, dans tous les pays. On découvre peu à peu des obstacles profonds et l'analyse du processus même d'intégration est un champ d'investigation intéressant et important. Les actes de la conférence, incluant les textes des présentations et les compte-rendu des groupes de travail devrait paraître au cours du premier trimestre 1997.

Eric BRUILLARD
IUFM de Créteil

WC96

IFIP International Conference

Information Technology:
Supporting Change Through Teacher Education

ISRAEL, 1996

Learning to bridge classroom and lab activities in math education

by

V.Auricchio, G.Dettori, S.Greco, E.Lemut

Institute for Applied Mathematics

C.N.R. - Genova - Italy

Premises:

- integrating labs in math curricula could be an important occasion for revisiting the official programs
- labs for math are widely diffused, but only a limited number of teachers use them systematically
- in many situations the labs use does not result really effective for improving math learning
- most of the teachers' training courses did not result effective to fruitfully make use of computers lab
- many experiences are developed by researchers, hence making teachers remain spectators

How Labs for Math are conceived?

- two opposite positions:
    - to raise computer abilities
      (--> math is considered only as a privileged field of application)
    - to improve teaching and learning of math
      (--> the natural conceptual relation with informatics is generally missed)

Teachers' training courses may fail because...

- they are planned to make the teachers familiar with the computer and some software packages, without deepening any of the two aspects
- they do not contribute to create a new "habit" in the teacher as concerns planning and menaging lab activities
- the interaction between teachers and trainers are limited to the training period and no further assistance is provided during actual school work

in this paper....

we discuss some guidelines for in-service teachers' training

after analysing:

- some lab characterisation, with particular attention to math education
- problems faced by teachers when introducing computers in math education
- different relations between class and lab activities in math education

Lab Activity Characterisation

- implies to become familiar with various ways of operating and reasoning
- can integrate and exploit the characteristics of software of different kinds
- affects the learning environment because it raises new mental images
- provides consistent feedback
- requires the reconstruction and control of schoolmates strategies (it does not allow students to merely "copy")
- changes the traditional "pedagogical triangle" into a "pedagogical tethraedron"

opinions on the actual computer role:

- a tool like a text book or a compass
- a real subject of interaction

a very particular tool whose potentialities stem from its interaction capabilities, and whose limits stem from its impossibility to ***autonomously*** *change the thread of the interaction*

Teacher's Problems in the Lab

preliminary problems

- to get rid of idiosyncrasies against the computers

- to eliminate the concern to see weakened their role

- to overcome the fear to use a tool which is possibly newer to them than to their students

- to accept the need to change their teaching habits

- to understand that using computers aims to a more effective teaching, not to make their work less tiring

- to reach a sufficient knowledge of the hardware and some software that will be used

- to learn the didactic implication of the fact that computer arithmetic is somehow different from traditional one

didactic planning problems

- to establish whether and how their didactic contract should be modified

- to recognize the crucial role of the representation systems underlying the interaction

- to individuate what concepts and procedures could be better introduced by using computers

- to evaluate which software is most suitable for topics to be taught

- to make a-priori analysis about what allows students to be to use a given tool so that they can really take advantages

teaching problems

(they can be tackled a priori only in a general way)

- to understand when students are in condition to use a given tool so that they can really take advantages
- to take into account that time control should be more accurate than in traditional teaching:
  - limited numbers of hours
  - students work at different paces
- to organise individual and group work:
  - limited numbers of computers
  - didactic choices (individual work, in pairs work, collective work, fixed groups,....)
- to control the work of all students (it's more difficult because of possible different technical problems at the same time)
- to help students to learn (it's more complex, since the teacher needs to understand not only difficulties and obstacles related to maths, but also those related to the logic operation of computers)
- to evaluate student's works (it's more difficult, because most software currently in use does not keep track of all performed steps, while in traditional tests the students themselves can be required to record the steps of their work and reasoning)

Relationships between Class and Lab

class and lab as separate modules

(some opportunities of cognitive growth are missed)

class and lab as somehow connected modules

- *lab as a service to class work*

  (students get the impression that new concepts and theorems can be introduced only by a theoretical approach)

- *lab as starting phase of class work*

  (students can get the message that all mathematical knowledge is obtained by generalising particular cases, and can be led to underestimate the importance and the need of a theoretical approach to math concepts)

class and lab as environments with equal importance (the advantages of both the above mentioned approaches can be achieved, since their potentialities are not in conflict)

...In both of them......

- to carry out directive activities aiming to build a shared knowledge
- to solve problems autonomously or in groups
- to compare ideas by common discussions
- to compare different points of view and strategies, either arising from class activities or from lab

ESEMPIO 1

- equations are solved in the class by formal methods
- in the lab graphical software is used to study function intersections
- the teacher does not call the student's attention on the fact that an equation can be interpreted as intersection of two functions so that a graphical approach can be used to solve equations

---------> a possibility of gaining a general view and a better master of the involved concepts is missed.

ESEMPIO 2

- the concept of function is introduced in class
- graphics of a function are also introduced and realized pen-and-paper
- in lab students reconstruct the previous graphics
- the influence of the lab activity is probably depending on the kind of software in use and on the level of mastery of the subject by the pupils

ESEMPIO 3

In an industry that produces needles, the fixed annual costs, not depending on the number of produced needles, are 300.000 $. The material cost for producing a single needle is 2 cents. Each needle is sold for 17 cents. How many needles should be produced and sold in a year in order to have an active balance?

needles

	A	B	C
1	fixed annual costs(dollars		
2	300000		
3	unit. material cost (cents)		
4	2		
5	unitary sale price (cents)		
6	17		
7			
8	n. of needles	total costs	total income
9	1	=$A$2+$A$4*A9/100	=$A$6*A9/100
10	100	=$A$2+$A$4*A10/100	=$A$6*A10/100
11	1000	=$A$2+$A$4*A11/100	=$A$6*A11/100
12	10000	=$A$2+$A$4*A12/100	=$A$6*A12/100
13	100000	=$A$2+$A$4*A13/100	=$A$6*A13/100
14	1000000	=$A$2+$A$4*A14/100	=$A$6*A14/100
15	1500000	=$A$2+$A$4*A15/100	=$A$6*A15/100
16	2000000	=$A$2+$A$4*A16/100	=$A$6*A16/100
17	2500000	=$A$2+$A$4*A17/100	=$A$6*A17/100
18	3000000	=$A$2+$A$4*A18/100	=$A$6*A18/100

needl

	A	B	C
1	fixed annual costs(dollars)		
2	300000		
3	unit. material cost (cents)		
4	2		
5	unitary sale price (cents)		
6	17		
7			
8	n. of needles	total costs	total income
9	1	300000,02	0,17
10	100	300002	17
11	1000	300020	170
12	10000	300200	1700
13	100000	302000	17000
14	1000000	320000	170000
15	1500000	330000	255000
16	**2000000**	**340000**	**340000**
17	2500000	350000	425000
18	3000000	360000	510000

- concept of funzione, variable and parameter

ESEMPIO 4

The theatre of a country town has 100 seats, divided into front section and rear section. The price of front seats is 8$, that of rear seats is 6$. When all seats are sold, the total income is 650$. How many front seats and rear seats are there in the theatre?

	A	B	C	D
1	1 sector	2 sector	seats	income
2	10	90	100	620
3	20	80	100	640
4	30	70	100	660
5	40	60	100	680
6	50	50	100	700
7	60	40	100	720
8	70	30	100	740
9	80	20	100	760
10	90	10	100	780
11	100	0	100	800
12	25	75	100	650
13				

theatre.1

	A	B	C	D
1	1 section	2 section	seats	income
2	10	90	=A2+B2	=8*A2+6*B2
3	20	80	=A3+B3	=8*A3+6*B3
4	30	70	=A4+B4	=8*A4+6*B4
5	=A4+10	=B4-10	=A5+B5	=8*A5+6*B5
6	=A5+10	=B5-10	=A6+B6	=8*A6+6*B6
7	=A6+10	=B6-10	=A7+B7	=8*A7+6*B7
8	=A7+10	=B7-10	=A8+B8	=8*A8+6*B8
9	=A8+10	=B8-10	=A9+B9	=8*A9+6*B9
10	=A9+10	=B9-10	=A10+B10	=8*A10+6*B10
11	=A10+10	=B10-10	=A11+B11	=8*A11+6*B11
12	25	75	=A12+B12	=8*A12+6*B12
13				

$$X+Y=100$$

$$8X+6Y=650$$

by algebraic manipulation ... the solution as $X=25$, $Y=75$

being unable to make formal proofs, it is difficult to argue that the found solution is the only one possible, while the algebraic solution gives this certitude

The theatre of a country town has 100 seats, divided into font, middle and rear seats. Front seats cost 10$, middle ones cost 7$ and rear ones cost 5$. When all seats are sold, the income is 700$. How many front, middle, and rear seats are there in the theatre?

theatre.gen

	A	B	C	D	E
1	front seats	middle seats	rear seats	seats (total)	income
2	10	20	70	100	590
3	20	30	50	100	660
4	**30**	**25**	**45**	**100**	**700**
5	40	35	25	100	770
6	50	50	0	100	850
7					
8	10	75	15	100	700
9	20	50	30	100	700
10	24	40	36	100	700
11					

- false generalisation of the previous
- it is difficult to choose suitable values by trials, but it is not evident where the difficulty comes from
- it is clear that one of the three values is determined by the other two in order to make their sum 100, but this does not help to find suitable values to try in order to quickly reach a solution, and certainly does not make clear that in this case there are many possible solutions
- an algebraic resolution shows that the two problems are structurally different...

Math Teachers' Training

from the "contents" point of view...

- to learn interacting with an operating system and with the syntax and the logic of different software, in order to build effective *mental images* of the objects in use and of the communication and representation systems they use

- to focus on *prototypes* of didactic interventions deeply exploiting the advantages computers can offer :

  - discussing a same mathematical concept under different points of view (it usually leads to a deeper understanding and a better master of concepts)

  - changing the presentation order of some concepts, based on their relative degree of difficulty

  - focusing on resolution strategies rather than on performing calculations (it can improve problem solving activities)

  - emphasising the meaning of math concepts before being able to formally handle them

  - motivating students to a more active role, not only because they are required "to do things by themselves", but also because they feel motivated to ask more questions.
    This deeper involvement can also give the occasion for some cognitive considerations:
    - exploring conjectures (it can lead to distinguishing conjectures from demonstrations)
    - solving problems by trial-and-error (it can emphasise the power of formal methods)
    - discovering rules by analysing the output of some software (it can make easier to remember them and to understand their meaning)

... training Courses as environments for learning to make four kind of choices:

which topics?
which software?
which use of the software?
which relationship class-lab?

The <u>choice of topics</u> to tackle depends both on the analysis of difficulties usually met by students and on the software available for that purpose

In case more than one <u>software</u> is available on a given topic, the following should be guiding <u>criteria</u> to discuss and perform a choice:

- **simplicity** : it means a *friendly interface*, but does not mean that a software should solve problems without requiring cognitive effort and work from the student

- **robustness** : it means that errors in input data will not cause to input all data again or to restart the program

- **richness** : it means choosing software packages with significant features (not merely "many")

- **complementariety**: it means using different software for different purposes (expliciting, where possible, the reasons of their choices) (not only one, not too many)

- **"global" and "local" didactic aims** (the last ones are strictly related to the current students' abilities and knowledge)

from the "methodological" point of view......

...as answers to:

- the three groups of *problems* teachers have
- the teachers' *conceptions* about relationship class-lab
- the scarce *effectiveness* of previous training proposals

preliminary problems (except technical knowledge) are essentially psychological or cultural and can be overcome just addressing the remaining groups of problems, provided that the teachers become aware of their existence

the **other two kinds of problems** require:

- to give *models* expliciting the philosophy underneath a proposal

- to give *criteria* for analysing potentialities and applicability of packages aimed to well definied didactical goals, rather than to focus on their use

Teachers Training , after an initial intensive period, should be organised in the form of working groups, strictly connected to some research team in math education.

Intensive courses and working groups should give the teachers direct experience of using a lab on the topic they are going to treat.

In this context, teachers have to become leading actors not spectators of the innovation

Systematic link among problems depending on:

available software, cognitive aspects, didactic aspects, current literature, actual school

WC96 K2

Vygotsky, Informatics Capability, and Professional Development

(1) Vygotsky – why our task is hard

Jim Ridgway

(2) Politics – why it is easy

(3) Levels of the curriculum

INTENDED IT

IMPLEMENTED IT

ATTAINED IT

(4) Approaches to Professional Development

(5) Hard Questions

(6) Vygotsky – why our task is important

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IT - THE CENTRE OF A CULTURAL VORTEX

- radical social change in terms of patterns of employment and methods of communication (e.g. Downes on peer tutoring at home)

- profound effect on the cultural practices associated with every academic discipline over the last 10 years (e.g. Zehavi, 1996)

Intellectual tools are not just things that people 'have' or 'do', they DEFINE the person

- in terms of their minds

- in terms of the power they can exert over their environments

- in terms of their community membership

2 Vygotsky
Physical / Mental tools analogy
learning costs : but produces gains
social act
radically reorganise mental structures

	LOWER	HIGHER
ORIGINS	Inherited	Via Learning
STRUCTURE	Unmediated	Mediated by signs and other tools (eg reading & writing)
FUNCTIONS	Involuntary	Voluntarily controlled
RELATIONSHIP TO OTHER FUNCTIONS	Isolated	Connected with other functions in a system (ie no modules)

Vygotsky's Distinction between Lower and Higher Mental Functions

key concept - increasing integration of functions as development progresses

c.f. Informatics Capability - something which permeates thinking in the same way that language does, and that mathematics and science ought to

10:30-10:45 Report on SITE Conference - Oren

10:45:12:00 Session 6: Integration - Oren

Chairperson - *Paul Nicholson*
A dichotomy of purpose: The effect on teachers of government initiatives in IT
Deryn M. Watson
From personal use to classroom use: Implications for teacher education in France
Georges-Louis Baron, Eric Bruillard and Alain Chaptal
A new approach in teaching information technologies: Shifting emphasis from technology to information
P. Hubwieser, M. Broy and W. Brauer
Teacher educators: A case study of integrating information technology into teacher education
Qi Chen

12:00 Lunch

13:00 Depart for Conference Tour

Thursday July 4th 1996

09:00-10:30 Session 7: Integrating Change Through Teacher Education - Oren

Chairperson - *Bridget Somekh*
The integration of IT into teachers' decision-making
Steve Kennewell
A Case Study: A New Zealand model for teacher development in information technology
Kay J. Rye
Breaking the cycle of ignorance: Information Technology and the professional development of teachers
Jean D.M. Underwood
An adventure in integrating educational computing within teacher education
Phil Nanlohy

11:00-12:30 Focus Group Session 4

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit, Group 4 - Dafna

12:30-14:00 Lunch

14:00-15:30 Session 8: Pedagogy and Methodology - Oren

Chairperson - *Deryn Watson*
Towards effective learning with new technology resources: The role of teacher education in reconceptualising the relationship between task setting and student learning in IT-rich classrooms
Bridget Somekh
Teacher professional development in a technology immersion school
Anne McDougall and Jennifer Betts
Research on telematics for teacher education
Antonio J. Osorio
IT capability: Is our definition wide of the mark?
David Benzie

15:30-16:00 Coffee Break

16:00-17:30 WG3.1 & WG3.5 Meetings

Working Group 3.1 - Brosh, Working Group 3.5 - Gefen

19:00 Dinner and Social Evening

Friday July 5th 1996

9:30-10:30 Keynote Address - Oren

Chairperson - *Toni Downes*
Learning in wonderland: When are computers worth the trouble?
Gavriel Salomon

10:30-11:00 Coffee Break

11:00-12:30 Session 9a: Networking and ODL to Support Teacher Education - Brosh

Chairperson - *Brent Robinson*
The PIT-project: A teacher networking approach for broad-scale use of ICT
Pieter Hogenbirk
Learning to teach at a distance: Exploring the role of electronic communication
Michelle Selinger
Supporting professional development of math teachers through telecommunication
Ruth Reiz and Nitsa Movshovitz-Hadar
Distance learning: A new concept in university teaching in Israel
Baruch Offir

11:00-12:30 Session 9b: The Teaching of Informatics as a Subject - Gefen

Chairperson - *David Passig*
Informatics education as a new discipline
Joyce Currie Little
Issues in the preparation of teachers of programming for children
John Oakley and Anne McDougall
Teaching the subject informatics in schools: Aspects of education in this field
Steffen Friedrich

12:30-14:00 Lunch

14:00-15:30 Closing Session - Oren

Chairperson - *David Benzie*
Focus Group Reports
Panel Discussion
Official Closing of Conference

The Organising Committee extends sincere thanks to our sponsors who facilitated the convening of this conference

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INFORMATION TECHNOLOGY: SUPPORTING CHANGE THROUGH TEACHER EDUCATION
KIRYAT ANAVIM, ISRAEL, JUNE 30 - JULY 5 1996

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SCHOOL OF EDUCATION, BAR-ILAN UNIVERSITY

International Conference
Information Technology: Suppporting Change Through Teacher Education
Kiryat Anavim, Israel, 30th June - 5th July 1996

Conference Programme

Sunday June 30th 1996

14:00 **Registration**
17:30 **Cocktail Reception**
19:00 **Opening Ceremony - Oren**

Chairperson - *Yaacov Katz*
* Musical Interlude - *Aharon Gurov*, Composer
* Welcome - *Yaacov Katz*, Chair, Organising Committee and Bar-Ilan University
* Greetings from IFIP - *Bernard Cornu*, Chair TC3 WG3.1
* Greeting from Working Group Sponsors - *Anton Knierzinger*, Chair TC3 WG3.5
* Greetings from UNESCO - *David Harari*, Sec-Gen, Israeli Commission for UNESCO
* Musical Interlude - *Aharon Gurov*, Composer
* Welcome - *David Benzie*, Chair, Programme Committee
* Keynote Lecture "Telecommunications and Technology in Education Towards the Year 2000" - *Shahaf Gal*, Director, Computers in Education, Centre for Educational Technology, Israel
* Training for IT in traditional and futuristic schools: Part 1 - *Alnaaz Kassam*
* Musical Interlude - *Aharon Gurov*, Composer

20:30 **Dinner**

Monday July 1st 1996

09:00-10:30 **Session 1: Change and Innovation - Oren**

Chairperson - *Anton Knierzinger*
Time for change: Critical issues for teacher educators
Gail Marshall
Getting ready to change: The place of change theory in the information technology education of teachers
Brent Robinson
The U-curve process that trainee teachers experience in integrating computers in the curriculum
Zemira Mevarech and Livi Lanir
Converging technologies in teacher education: Key issues, key competencies
Paul Nicholson and George Duckett

10:30-11:00 **Coffee Break**

11:00-12:30 **Session 2: Mathematics Education - Oren**

Chairperson - *Gail Marshall*
Using videotaped lessons to analyze changes in teachers' teaching practices of mathematics
Menucha Weiss
Computer integration in the mathematics study of pre-service teacher education: Experiences with Project CIMS
Herbert M. Loethe
Learning to bridge classroom and lab activities in math education
Vincenzo Auricchio, Giuliana Dettori, Simonetta Greco and Enrica Lemut
Integrating graphing technology into teacher education: A case study of an algebra program for prospective secondary school mathematics teachers
Beverly J. Ferrucci and Jack A. Carter

12:30-14:00 **Lunch**

14:00-15:30 **Focus Groups Session 1**

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit,
Group 4 - Dafna

16:00-17:00 **Session 3a: National Projects and Strategies - Brosh**

Chairperson - *Anne McDougall*
The centrality of affective variables in the implementation of a national strategy for teacher and pupil IT suitability in elementary schools
Yaacov J. Katz
Present role of informatics teachers in view of applications
Marta Turcsanyi-Szabo
Advisory centre for new technologies : An addition to teacher training
Wolfgang Weber
The TTACOS Project : Laying the foundation for national technology standards for students in the United States
Harriet G. Taylor and Lajeane G. Thomas

16:00-17:30 **Session 3b: Developing Science Based IT Use - Gefen**

Chairperson - *Baruch Offir*
Software evaluation as a focus for teacher education
David Squires
The electronic spreadsheet and cognitive skills in inquiry oriented biology
Amos Dreyfus, Benjamin Feinstein and Janet Talmon
Computer science education based on fundamental ideas
Andreas Schwill
What training do teachers require to facilitate pupils' self-expression with multimedia?
Hiroyuka Tanaka

19:00 **Dinner**

Tuesday July 2nd 1996

09:00-10:00 **Keynote Address - Oren**

Chairperson - *Bernard Cornu*
Vygotsky, informatics capability, and professional development
Jim Ridgway

10:00-11:00 **Coffee Break and Poster Sessions**

11:00-12:30 **Session 4a: Taking learning theory into account - Brosh**

Chairperson - *Margaret Cox*
Understanding our instrument of representation
Micheal Ó'Duill
Communication - Learning - IT Applied examples
Lisbeth Appelberg
Education IT seminars to support teachers' use of IT to enhance learning of curricular topics
Sindre Rosvik
The use of practical experiences and models to prepare teacher trainees to use technology effectively in their teaching
Harriet G Taylor

11:00-12:30 **Session 4b: Social Implications - Gefen**

Chairperson - *Rachel Cohen*
Identification of the changes in attitude and pedagogical practices needed to enable teachers to use IT in the school curriculum
Margaret J. Cox
Networking educational change
Bruce Rigby
An Israeli model of a Networked Teachers' Training Center (NTTC) for implementation of Information Technology (IT) in curriculum development
David Passig
Patters of reform: Teachers' thinking about students' thinking in computer intensive guided inquiry
Michal Yerusahalmy and Shosh Gilad

12:30-14:00 **Lunch**

14:00-15:30 **Focus Group Session 2**

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit,
Group 4 - Dafna

15:30-16:00 **Coffee Break**

16:00-17:30 **Session 5: The Role of the Teacher Within the Changing School Context - Oren Hall**

Chairperson - *Raymond Morel*
Teachers and teacher education facing information and communication technologies
Bernard Cornu
Training for IT use in traditional and futuristic schools
Alnaaz Kassam and Ron Ragsdale
In-service teacher education: A way to integrating IT into secondary level curricula
Yvonne Buettner
The computer as a toy and tool in the home: Implications for teacher education
Toni Downes

19:00 **Conference Dinner and Entertainment**

Wednesday July 3rd 1996

09:00-10:00 **Focus Group Session 3**

Group 1 - Brosh, Group 2 - Gefen, Group 3 - Zayit,
Group 4 - Dafna

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What training do teachers require to facilitate pupils' self-expression with multimedia?

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Abstract

The purpose of this paper is to describe what expertise teachers should acquire to facilitate pupils' expression with multimedia. The central idea behind the argument is that multimedia is a creative tool for children. Also the principle in multimedia learning in the near future is expected to be "Learning by Producing". In such a context of creative learning pupils are recognised as multimedia producers. In order to achieve this situation teachers need to know how to become learning supporters, curriculum developers and multimedia co-ordinators, not just instructors. The necessity for teachers to know the typology of multimedia expression, features of multimedia expression and program evaluation is also discussed with some suggestions.

Keywords

Multimedia, self-expression, multi-mode expression, teacher education

1 MULTIMEDIA PRODUCTION BY CHILDREN

Before addressing the aspects of expertise teachers need to acquire in order to facilitate pupils' multimedia expression it would be very important to describe a new image of children learning, namely, children as multimedia producers and also what literacy they are expected to obtain in the process of producing multimedia products.

end.

1.1 Children as multimedia producers

In IT education there has been a slow but steady shift from CAI (computer assisted instruction) to MACP (multimedia assisted communication and production) (Jacobs, 1992; Tanaka, 1995). This means that multimedia is becoming not only a teachers' instructional tool but also a creative tool for children. With the help of many user friendly software packages children are now using multimedia to express their ideas and the information they obtain during their studies. Thus it has become possible for children to experience the role of multimedia producers (Turner and Dipinto, 1992; Kenneth et al., 1994; Tanaka, 1995).

In addition, the collaboration between children is very important because multimedia production requires students to take diverse roles, for example, a writer, a painter, a video editor, an audio mixer, computer programmer and so on (McMahon, 1990; Crook, 1994).

For these reasons teachers need to acquire expertise which is different from traditional methodologies of instruction. These are discussed in the following paragraphs.

1.2 Multi-mode expression

Multi-mode expression is a comprehensive way of self-expression which integrates sound, pictures, videos and text. A good example of this is a musical. A musical incorporates music, singing, scenario, choreography, dancing, stage lighting, stage set and so on. Thus it can be said that multi-mode expression as actualised in a musical or a drama has much similarity with multimedia expression (Trowsdale, 1995). When multi-mode expression is done with multimedia, it results in multimedia products in the form of an electric slide show or an animation.

The potentials of multi-mode expression are very difficult to develop because of the subject barriers in the current school curriculum. But these potentials seems to be important in terms of self-actualisation and talent development in a society where a visually persuasive and entertaining presentation is more and more required.

When multimedia production (a typical way of multi-mode expression) is introduced into the classroom, students are expected to acquire multimedia literacy in the process of producing multimedia programs.

1.3 Multimedia literacy

Table 1 shows a tentative set of multimedia literacy items. These ten literacy items can also become educational objectives in the instructional planning.

Table 1 Ten items of multimedia literacy (Tanaka, 1995)

Multimedia literacy requires an ability in the following items:

1. To understand the characteristics of multimedia, the various modes of information and their combination patterns.
2. To have a basic command of multimedia
3. To select appropriate media and to collect various pieces of information and find the relations between this information using those media
4. To operate data input and information retrieval with a variety of computer peripherals
5. To acquire learning methods and computer literacy through simulated experience with Hypermedia
6. To give a multimedia presentation making good use of the features of each medium
7. To convey multimedia products made with various computer peripherals to others by computer telecommunication
8. To produce a handmade TV program using a video camera, a video editing system, a sound effecter, a sound mixer, a multimedia computer and so on
9. To make presentation materials with an interactive video system or Hypermedia
10. To create multimedia products which integrate knowledge, images and emotions

2 CROSS-CURRICULAR MODEL OF MULTIMEDIA LEARNING

In most in-service training courses for the IT use offered by the local boards of education the main topics would tend to focus technological aspects of IT education more than pedagogical considerations for it. However, considering that IT co-ordinators are now being recruited in several technologically advanced countries like the United States, the United Kingdom and Japan, the classroom teachers' role could be changed from that of a technician to that of a pedagogical facilitator in the process of developing the IT curriculum and learning projects (North, 1991; Owston, 1995).

2.1 Isomorphic structure and cross-curricular model

Recently several books advocating cross-curricular practice have been published responding to the National Curriculum, which suggests five cross-curricular topics in the school curriculum (Webb, 1996; Radnor, 1994; Morrison, 1994). Before this Anderson (1991) had pointed out the importance of IT education as a cross-curricular element in terms of the availability of IT to all pupils and the possibility of improving the quality of learning through enhancing common information skills.

Similarly Fox (1996) discussed some effective ways to incorporate media education (one form of IT education) as cross-curricular catalyst into the school curriculum. Also analysing twenty three case studies on innovative educational projects in science, mathematics and technology Black and Atkin (1996) reported that there had been some arguments for the curriculum connection in their discussion of summarising their analysis. Thus the need to promote IT education as a cross-curricular theme has been gradually recognised.

However there has been little literature so far which discussed the potential similarity between multimedia learning and cross-curricular activities. In figure 1 such a similarity between the two is illustrated.

The similarity stems from the feature of educational multi-mode expression which is a common activity to both multimedia learning and cross-curricular activities because multi-mode expression needs both contents to include and means to produce with. Such a combination of the contents and means of multi-mode expression is a typical feature of cross-curricular activities. Thus when pupils perform multimedia production, a cross-curricular learning context could be helpful to them through providing pupils with both the aspects of expression which are integral elements of multimedia production.

This cross-curricular model illustrating the isomorphic structure of multi-mode expression would also be useful to teachers to develop an integrated learning unit for pupils' multimedia production through combining different subjects.

2.2 Learning unit model

In order to foster the quality of learning activities and multimedia products, a guideline for the sequence of productive activities is necessary. After examining the learning unit models adopted in the two classroom implementations (Tanaka, 1995), several common features were found and a cross-curricular unit model was constructed according to these features.

The five common features are as follows:

1. The model includes a comprehensive sequence of activities, i.e. an appreciation of various multimedia products, image construction of multimedia products, image enrichment by analysis of previous products and research outcomes, creation of scenario and design blueprint, production of parts, assembly of parts and a final stage, i.e. presentation, performance and appreciation.
2. At the fifth stage 'Production of parts' various expression modes, e.g. sounds, pictures, stories are integrated to produce moving images.
3. The first activity stage 'Appreciation of various multimedia products' simulates students' interest and the third stage 'Image enrichment' provides them with good examples of multi-mode expression.
4. The third stage is inserted to enrich the motif or theme with empirical data for students.
5. This model accommodates collaborative production and role assignment.

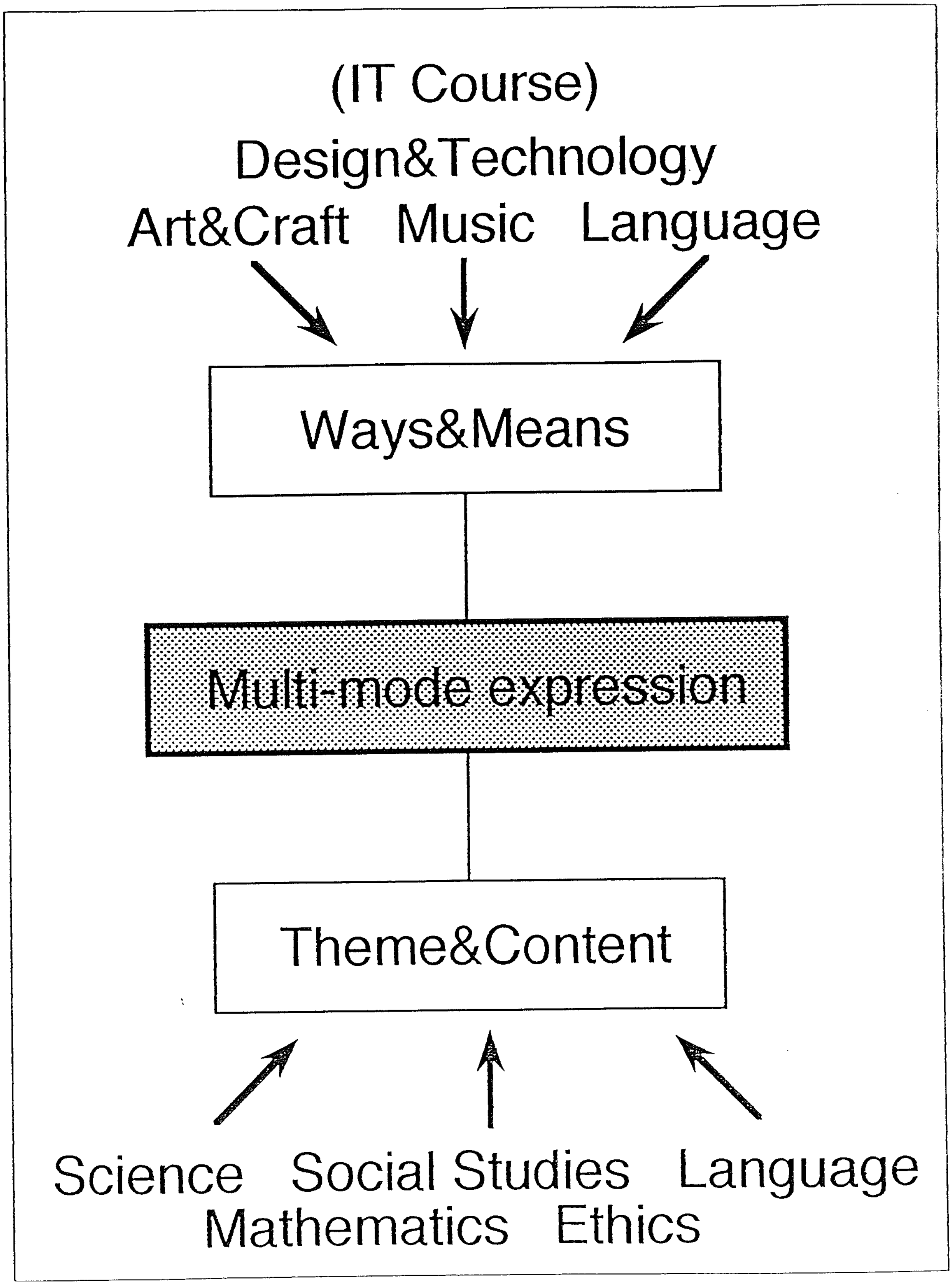

Figure 1 Cross-curricular model for multi-mode expression (Tanaka, 1995).

Figure 2 illustrates a cross-curricular learning unit model developed in this process. Naturally the model is based on the idea of combining the investigation phase which supports the contents of expression and also the production phase which supports the means of expression. This idea of combination is not original in the recent literature of multimedia learning, but it was already discussed by Innocenti and Ferraris (1988), who made a combination model of the instructional use of a database by showing the necessary linkage between the database creation phase and the investigation phase.

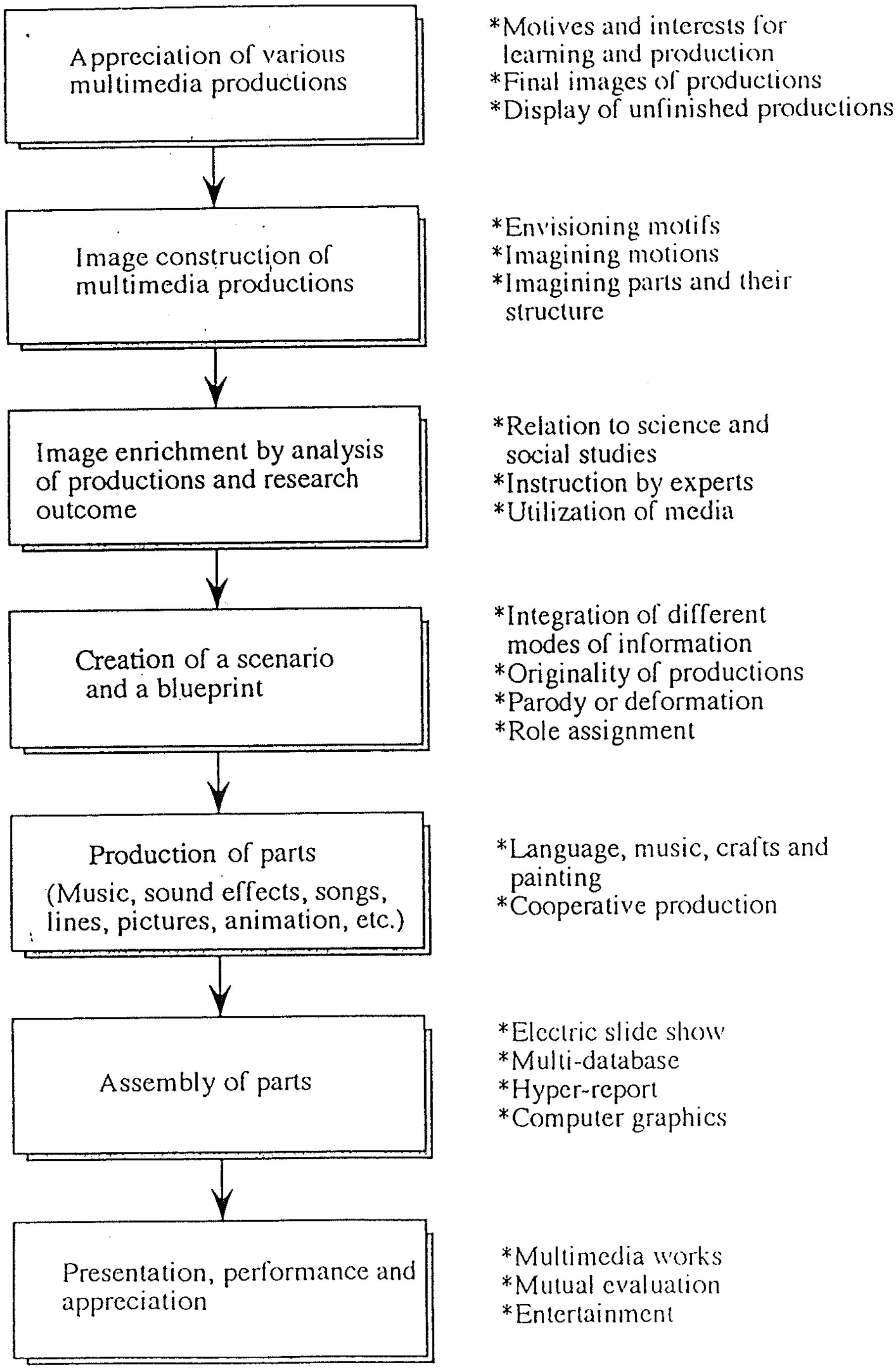

Figure 2 Learning unit model for multi-mode expression

2.3 Typical multimedia learning projects

The provision of pedagogical ideas about typical multimedia projects would make it easier for class teachers to acquire expertise in developing an integrated learning unit with cross-curricular activities for multimedia expression. Here are some examples of project ideas which could function as scaffolding for the effective curriculum development.

Let's produce a CD-ROM encyclopaedia
This project could include both investigation about the topics which pupils have in mind and multimedia expression with CD-ROM facilities. These topics might be related to one or some of the several subjects like language, social studies, science, music and art. Pupils' multimedia production would result in a variety of multimedia CD-ROM titles like a multimedia slide-show, a home town database, a botanical database and a computer art gallery respectively.

Let's open our children's TV station
As described earlier in this paper the production and delivery of TV programs are a typical cross- curricular multimedia work. When children select a drama program as a production task, the combination of a language class (in charge of producing scenario), a social studies class (ethics and related laws of broadcasting) and a art and design class (multimedia production) would be very useful. In contrast when they select a news program, the integration could be between language, social studies, art and design, science, etc.

Let's produce an Internet newspaper on the WWW
Nowadays multimedia production in this information society is rapidly expanding into an international telecommunication world. A tremendous amount of information is being exchanged through Internet. Therefore it could be considered as meaningful for pupils to experience cross-curricular activities related to multimedia newspaper production and to obtain communication skills which could be applied to their future career or everyday community services.

3 FACILITATING ROLES OF TEACHERS

Pedagogical considerations at the level of curriculum development and project construction have been discussed so far. Then focusing on these two points specifically from the aspect of teachers' roles will be another important task to clarify what expertise teaches require.

3.1 Learning supporter

Considering that multimedia is not only a teacher's tool for efficient instruction but also a learner's tool for creative learning, it is important for teachers to note that their role is no longer that of an instructor but more that of a supporter for learners.

The objectives of a teacher as a supporter could be categorised into the following ten points.

1. To praise what pupils have done well in order to activate their motivation towards further learning
2. To provide them with good examples of products and research findings
3. To offer alternatives for the learning themes and the methodologies
4. To provide pupils with opportunities to utilise a variety of learning materials and multimedia
5. To prepare open space as a flexible learning environment in which to foster diverse activities
6. To prepare learning aids such as a guidebook, an activity sheet, an orientation leaflet or a promotion video
7. To care for pupils' learning difficulties and answer their questions
8. To make appointments with institutions and human resources outside the school to enrich pupils with as much direct experience as possible
9. To describe the sequence of learning activities
10. To give advice which fosters a collaborative atmosphere in the working group

3.2 Curriculum developer

Some teachers in practice might think that it would be a good idea to wait for new curriculum resources to be developed by researchers and publishers. But what is more valuable for professional development of teachers is that they experience a workshop to develop curriculum by themselves. It will inevitably profits their creativity and curriculum knowledge on IT education. The role of a curriculum developer facilitating pupils' multimedia expression would include the three aspects described below.

Curriculum development for basic training of media literacy

When children produce multimedia products, their lack of basic media literacy is likely to result in products of poor quality. Multimedia production requires them to have such basic media skills as taking videos and photos, computer painting and drawing and sound recording. Therefore it is desirable for children to go through the IT curriculum from these basics to the advanced course of multimedia production. But this doesn't necessarily mean that the curriculum sequence has to be made so rigidly as to loose a spiral structure across several grade groups.

Development of a cross-curricular learning unit

As has just explained in one of the previous sections, two aspects of multimedia production need elaboration, namely, the content phase and the methodology phase. This requires school-based development of a cross-curricular learning unit to satisfy the specific needs of children.

Emergent curriculum development
In a context like theme learning or topic learning, the curriculum will need some redesigning or adjustments should be made to meet the needs of on-going learning situations. This particularly applies to multimedia learning. For that matter it is not enough for teachers just to follow the instruction of given curriculum resources. It is important for them to learn how they could effectively change the course of study.

3.3 Multimedia co-ordinator

In multimedia learning it is also important for teachers to equip pupils' learning environments with multimedia rather than just to use the media for the delivery of information to their pupils. The idea behind this is that pupils should be encouraged to take advantage of multimedia on their own. What is indispensable in relation to this idea is a 'media-mix' approach which encourages pupils to think of and put into practice meaningful combinations of different types of media. Typical factors which teachers would need to consider are as follows:

Preparing media-corners space
When pupils are engaged in topic learning or multi-mode expression, the supply of abundant materials is indispensable. There should be a variety of materials and media available for the pupils.

Media-corners space is an information environment where pupils can retrieve many different materials visiting several corners at will, i.e. a video corner, a computer corner, a book and encyclopaedia corner. Pupils are supposed to achieve the learning objectives they set for themselves in advance with these abundant materials.

Setting up a multimedia studio
To actualise the creative feature of pupils' self-expression with multimedia just preparing media-corners space is not enough. In fact a more creative work space is necessary for pupils to make multimedia products and to communicate using multimedia.

Thus it may well be worthwhile to consider the possibility of setting up a multimedia studio in schools just like the ones where professional media people produce their own multimedia titles. Hopefully such a studio would include some multimedia computers and peripherals like a colour scanner, a colour printer, a MO disk drive, a CD-ROM writer and so on. In addition to that it would also need equipment like a video editing system, an Internet server and network system, a video projector, a satellite TV system and so on.

Offering opportunities to use an intelligent library
Renovating a traditional library into an intelligent one is another way of producing information enriched schools. Such an intelligent library consists of video viewing booths, computer booths, computer based information retrieval systems, Internet servers and a multimedia software library.

The intelligent library is no longer a place with structured stocks of books only rather it should turn itself into an intellectually creative base for stocking multimedia materials and exchanging information with the whole world.

Providing co-operative keypals and human resources for networking
Networking with multimedia is a new way of communication. Recently the integration of Internet and related facilities into classrooms has been getting more and more attention. Learning with and from unfamiliar people, for example, pupils in different countries, professional people in specific fields and people of different ages could be very effective in extending the scope of pupils' mind and also in increasing their interpersonal communication skills.

But it is always difficult for pupils to find people who co-operate on a regular basis. Thus teachers will have to play another important role in making connections with keypals on the net or local volunteers in the school district. After establishing the connections, it is again the role of the teachers to act as a learning supporter as described above in order to encourage collaborative learning.

4 SPECIFIC KNOWLEDGE ABOUT MULTIMEDIA PRODUCTION

Furthermore it is another requirement for teachers to have some specific knowledge about multimedia production. With this knowledge teachers could guide and evaluate pupils' multimedia products and presentations.

4.1 Educational typology of multimedia expression

At first teachers need to know what types of multimedia expression can be done by their pupils. Typical multimedia expressions by pupils would be categorised as follows:

Multimedia production
This type is a traditional way of multimedia expression which means that pupils make multimedia products on a multimedia computer through combining images, sounds and text. There are some sub-categories such as a multimedia database, a multimedia report and an electric slide-show.

Multimedia presentation
Though making a multimedia product described above is an activity which involves only the expression inside a computer, this aims at showing others the products they have made by retrieving the data outside of the computer. A distinguishing feature of this type is the provision of visual materials rather than paper handouts and speech. For that purpose video clips and background music have been used so far. But with multimedia it would be possible to give a much more impressive and easy-to-understand presentation by combining these materials.

Multimedia debate

It may well be claimed that the multimedia expressions illustrated so far tend to be just one way communication. In order to solve a problem like this it is important for teachers to activate mutual communication and to enable their pupils to exchange information with multimedia. Thus it would be worthwhile for the teachers as well as the pupils to hold a debate and manipulate persuasive materials in the multimedia computer in this process.

Multimedia telecommunication

This last but not least is a promising methodology which is expected to achieve a tremendous technological advance in the near future, namely, multimedia telecommunication. The biggest advantage of this type is that it enables mutual expression between learners in remote areas by reducing geographical limitations and time differences which have up to now impeded communication.

4.2 Features of multimedia expression

Teachers need to have an overall understanding of the features of multimedia expression to facilitate their pupils understanding. This understanding should cover the seven points described below.

1. Expressing how you have reflected your personality and the originality of your investigation on the program
2. Combining various modes of information, i.e. multimedia materials
3. Adding interactivity to the program
4. Designing an information structure which is easy for users to understand
5. Designing an interface which facilitates information retrieval
6. Combining logical expression and emotional expression
7. Reflecting the merits of different roles within a group to achieve collaborative production

4.3 Viewpoints of program evaluation

It is more desirable for teachers to encourage their pupils to evaluate the multimedia products they have made and also the presentation they made by themselves. In multimedia learning self-evaluation and mutual-evaluation among pupils is much more important than evaluation by their teacher because the former helps them to acquire the knowledge and skills necessary to become learners as independent producers.

Therefore teachers are required to know the viewpoints of evaluation for multimedia expression. They are the same as the ones listed above. Teachers need to make room for program appreciation by their pupils in a given learning unit. This will inevitably be one of the requirements for multimedia learning in the curriculum development .

4.4 Creativity and spontaneity necessary for multimedia production

In order for teachers to evaluate pupils' productive activities with multimedia several symptoms of creativity and spontaneity which pupils would show during their multimedia production will be helpful.

1. Sharing of different skills needed in multimedia production
2. Construction of a role structure and role assignment
3. Needs assessment aimed at the audience
4. Collaborative information gathering beyond the National Curriculum
5. Mutual teaching and learning

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An adventure in integrating Educational Computing within Teacher Education

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Abstract

As the study of Information Technology (IT) in initial teacher education courses has developed, more emphasis has been placed on educational computing within curriculum areas and on the use of computer-based resources in children's learning. Teacher education institutions have provided instruction through discrete educational computing subjects, through the permeation of these studies into curriculum subjects and through mixes of these two approaches. Use has also been made of telecommunications, practicum and school based subjects. This case study describes the use of CD-ROM adventure software to permeate IT into initial teacher education, the prior classroom trials of the learning strategies being taught and the students' responses to this experiment.

Keywords:

elementary education, teacher education, CD-ROM, games, information technology, integration.

1 INTRODUCTION

The historical development of Information Technology in Teacher Education (ITTE) began with discrete computer literacy subjects, then discrete educational computing subjects and moved on to the permeation of these studies into other curriculum subjects and into practicum and school based subjects (Robinson, 1996, Oliver, 1994, Heppell, 1993, Wright, 1993, Pratt, 1993). Discrete subjects are close to the traditional university model of subject specialist teaching but Information Technology (IT) studies have the benefit of linking these understandings to the student teachers' future work role. Wright (1993) discussed the case for separate Information Technology subjects to develop the computer literacy of student teachers. He believes the "challenge is to educate for a future in a technology-centred information age - the opportunity is to apply technology to revolutionise the process of education".

An alternate approach has been termed an integrated or permeated approach. Here educational computing is taught within curriculum-focused subjects. Pratt (1993) cautioned that "Permeation cannot succeed without staff expertise but staff will not gain expertise unless they are required to teach IT as part of their course". Oliver (1994) argues that, like school teachers, teacher education lecturers and teacher education students need to experience models of IT use in their own learning before such technologies will be adopted for use with the children the student teachers will teach. Robertson (1996) supports Oliver's view that permeated IT should be designed in such a way as to provide more than a token integration of IT into a few subjects. He suggests that "coherence and progression pose greater challenges for the permeated approach".

Downes (1993) surveyed a cohort of final year student teachers from Western Sydney about their experiences with IT during a block practicum. They reported minimal use of IT in the classrooms in which they had been working. Half the group had experienced a discrete "computers in education" subject prior to the practicum and half the group would complete this course after their school experience. There was no significant difference in IT usage between these two groups. Where IT use had been reported it was the teaching practice of the class teacher that was the main determinant.

These findings suggest that it is classroom teachers using computers who are best placed to provide examples of good practice for student teachers and teacher education lecturers. Sherwood (1993, pp172-176) reported the views of Australian teachers who were experienced in using IT in their working lives. Almost 76% replied that the use of computers in their classroom had made a difference to teaching methods. These teachers reported that "the most significant change .. has been the move from teacher-centred to student-centred classrooms". The problems identified by Sherwood were in part: inadequate training both at preservice and in-service phases: lack of teacher educators with direct experience of educational computing; limited resources and finances.

2 PERMEATION OF ITTE AT THE UNIVERSITY OF WESTERN SYDNEY

Following a course review in 1991 the primary teacher education program at the University of Western Sydney (UWS) in Macarthur underwent major changes. This review recast the structure of the undergraduate degree into a more integrated model. As a result there was no longer a discrete compulsory educational computing subject in the core program. A decision was made to integrate educational computing into other appropriate curriculum subjects. Specialist educational computing lecturers within the faculty volunteered to be part of the teaching teams of these subjects. In this way they were able to assist in the design of integrated tutorial activities and assignment tasks. By 1995 the degree programme had evolved to a stage where there were four subjects from a total of eighteen designed to include educational computing

The permeation model being trialled at UWS, Macarthur Faculty of Education involves the integration of educational computing as a methodology in curriculum areas through provision of computer based tutorials in appropriate subject units within the degree course.

"We are trying to:

- improve quality of teacher training to improve educational outcomes for the children our students will teach,
- reflect good practice in schools,
- broaden lecturers' skills and understandings,
- reflect the philosophy of Bachelor of Teaching." (Nanlohy 1994)

3 SCHOOL TRIALS OF ITTE STRATEGIES.

It has been the practice of the specialist IT lecturers at UWS to conduct research and trials of IT-based learning strategies in classrooms. In this way they learn from school teachers and their students in order to teach their students about being effective users of IT. In the present case study this has been achieved by cultivating opportunities for trialling of exemplary software in senior primary classes. The exchange of skills and information benefits both the school and the university. The school has the services of the lecturer to assist with its staff development. The university benefits because one of its staff can obtain recent and relevant experience within their field of expertise. The nature of the relationships in this arrangements are different from the usual relationships in teaching practice. The student teacher does not meet the school teacher or the students. The lecturer is not placed in the role of supervisor or adviser but rather is a learner first and a teacher second. Heppell (1993, p. 233) believes that the "current generation of children are literally the first children of the information age". This type of school based trial provides opportunities for teacher education lecturers to learn about classroom and home use of IT from children whose experience of literature and of communication technologies is different from those of adults. The lecturer is able to experiment with appropriate IT classroom software and strategies as shown in Figure 1.

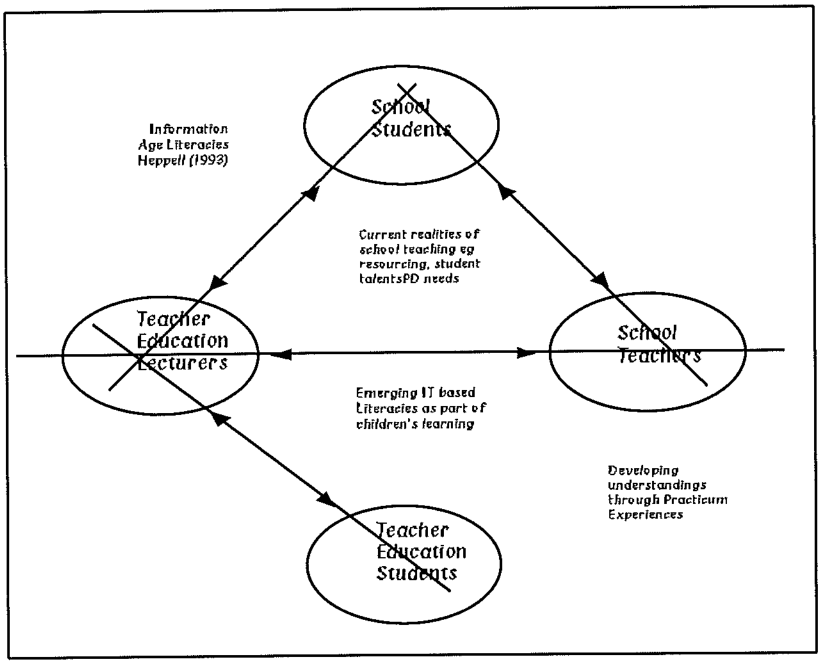

Figure 1 Relationships between Teacher Education Stakeholders

Heppell (1993) suggests that teachers and teacher educators need to understand the emerging capabilities of the 'information generation'. Teacher educators should "become more immersed in the entertainment and edutainment media that are increasingly common currency in young children's day-to-day language and lives". Negroponte (1995) suggests that the model for learning in the future might be seen in the way children learn to use "simulation tools (like the popular SimCity) and more information rich games".

4 TRIALLING THE ADVENTURE WITH PRIMARY STUDENTS

In the trial that led to changes in the UWS teacher education course, the CD-ROM adventure game "Mist" was used to stimulate purposeful writing with two groups of senior primary students. "Mist" is a prominent example of CD-ROM adventure software. Clicking the mouse in a given direction allows the user to appear to "walk" through a world depicted with finely rendered graphics. Movement is smooth and the point of view is that of "first person participant."

Why use the "Mist" CD-ROM adventure?

This adventure program is a popular game that is an example of an emerging class of mass media text. This program melds mathematics and literacy in an investigation that unfolds a hidden mythical realm. It is useful in a classroom setting because the program provides significant cognitive challenge, has clear links to aspects of state curriculums and provides an experiential learning environment

The "Mist" adventure has a relatively non-violent scenario. There is emotional violence inherent in the struggle between the male protagonists, Atrus and his sons Sirrus and Achenar. The main female character, Catherine, the mother of this warring family, is cast in a passive role. However "Mist" is most successfully completed by students in pairs or small groups who solve its puzzles through discussion and collaboration. This may be why this adventure is attractive for girls who in the main have stayed away from the "drop dead" variety of computer games. Dale Spender suggests that girls who reject the violent games that feature death and competition are showing good sense. She points out that girls "are interested in personal relationships, in the ongoing story of existence." (1995 p.187).

Teaching plan for the first classroom trial

The first trial took place in an inner-urban Sydney school. The teacher was keen to offer her academically gifted students the opportunity to create personal narratives of the mystery text form. She suggested ten groups of three, with a girl and two boys in each group. The author visited initially the class one afternoon each week to lead whole class activities, and later to conduct writing conferences with each group. The groups had one hour each week to use the "Mist" program.

In weeks 1 to 3 "Mist" was introduced to the class through demonstrations and discussions, and by the end of this period they had reached the stage of individual writing. During the following 4 weeks writing conferences were held in the withdrawal room off the classroom where the computer was housed. Observation notes were kept of the conferences and the group game play. In order to help the students develop their story, questions were asked by the author on the plot and structure of their narrative, how they were to plan the next stage and how they were arranging to work together.

The two most common observations made of the children during this trial described a high level of competition between groups and the disharmony within groups. The gender balance of the adventuring groups (all had two boys and one girl) and the behaviour of the boys meant that these otherwise intelligent, confident and articulate girls were marginalised during their time on the computer, often physically. Efforts to encourage sharing were only partially successful in that only "old solutions" were exchanged in the class discussions. The girls were often left to complete writing tasks after the weekly writing conference. With the exception of two groups, the children's writing was generally at or below their usual standard. The two groups that did write in a co-operative way completed sophisticated texts of a standard well above their previous competent standard.

To get the students' views on the trial, they were asked to complete two feedback sheets. In discussions about the roles played within the groups, the dominant boys explained that they ignored the roles and took control of the game because of their impatience with the other team members. Quick success with the problems of the program was seen as justification for behaviour they acknowledged as inappropriate. The same group expressed a disappointment in the non-lethal nature of the adventure.

Second Trial in a Country School

Some of the issues addressed in the design of the second classroom trial (which was carried out in a rural central school in a farming area in NSW, where the class had a high level of access to technology) were:

- a stronger focus on "Mist" as a text to shape the content of the student's writing and on the writing and drawing processes used by the program's authors,
- role definitions with clear responsibilities to other group members described and practised as the adventure was introduced to small groups,
- early encouragement of a co-operative environment with regular sharing sessions and creation of "clue cards" as cryptic hints for their peers,
- writing tasks both at the adventure and back at desks described and monitored,
- the "Mist" Story 1 and 2 sheets were retained to provide a first draft structure for the children's' narrative and recount texts and to provide feedback on the students' experiences with the program.

This trial had a much more positive set of outcomes. While the younger members of the cross grade classroom lost interest in the adventure, the more senior members were eager to continue. In interviews recorded two months after their trial finished, the children were able to recall in detail the events of their adventure. They had definite opinions on the positive value of the experience for the writing tasks that were involved, but were less impressed with a rigid implementation of the group roles and recording of the events of their adventuring. They reported that the rotation of duties would sometimes be abandoned after the group members had settled into preferred roles. When the girls in the interview group were asked about the lack of active female characters in the adventure scenario they responded that this did not matter so much because they "liked the way the game was played". When questioned on this point they said that they liked the collaborative nature of the decision making required to play the game and the detail and depth of the stories embedded in the adventure.

5 THE UNIVERSITY TRIAL

For the first semester intake of teacher education students in 1995, initial contact with educational computing was part of a compulsory subject called "Foundations of Literacy and Maths". This subject was delivered during tutorials lasting a total of four hours each week for 13 weeks. The tutorials were divided into two hours of 'Introduction to Children's Literacy' and two hours of 'Introduction to Elementary Mathematics'. Educational computing activities were used in these tutorials to illustrate the principles and classroom strategies being discussed. An assessment task worth 20% of the subject grade was designed to draw on what the students had learnt during both aspects of the subject. In addition the subject was intended to satisfy the university-wide compulsory "computing competencies" (UWS, Macarthur, 1995, Calendar p. 137). The assignment was intended to demonstrate good teaching practice suitable for using this type of software as a part of literacy learning in an elementary classroom.

Aided by lecturers and written support material, the students were asked to spend at least ten hours outside tutorial time exploring the same program used with the trial schools. They were asked to use this experience to create a variety of written products that reflected their experiences within the program. Of the 154 students who completed the assignment, work samples were collected from 135 (88%) who were divided into 66 groups.

The university students found that they were initially frustrated by the ambiguity of the adventure but given time and some success became enthusiastic about the inspiration it provided for their writing. A high proportion of the cohort (45 out of 66 groups who returned the survey) specifically mentioned variations of the word "frustrated" in describing their experience with the adventure. The cohort also reported that as they became more comfortable with the adventuring they began to enjoy the experience and got a heightened level of reward perhaps because of the difficulties at the outset:

"*Frustrated, Relieved, Distressed, Excited, Sense of achievement, Enjoyable*" (Group 33)

"*Honestly it was very frustrating, however very enjoyable and extremely challenging*" (Group 25)

They were impressed by the graphics technology of the adventure and the inclusiveness of the interface. The students found the small group structure to be very supportive, a way of sharing the workload, and of being more successful in the adventure. This was a useful insight into the nature of group tasks in a university setting.

"*Working in pairs was more rewarding, one played one wrote. If one missed information the other might pick it up* " (Group 39)

There was a contrast between the university students' and the school students' approach to these experiences. The school students plunged enthusiastically into the game and engaged deeply in the adventure to solve its puzzles. The university students came reluctantly to the technology and many played only as much of the game as was needed to complete the assignments. There was a small group of teacher education students who organised a "Mist Game Day" after the assignments were done because they wanted to be free to play the game without the compulsion of assessment tasks. Where the school students found the writing tasks a chore, that got in the way of their enjoyment of the "game", the teacher education students found delight in writing the journals and the stories because these were familiar tasks and they were well prepared by their experiences in the adventure.

6 PERMEATION OF ITTE AT THE UNIVERSITY OF WESTERN SYDNEY

There are some lessons from this use of school trialled IT strategies for the design of university level teaching and learning in the permeated model. They may be summarised with the following points.

- The trial at UWS, Macarthur pointed to the reluctance of teacher education students to 'engage" with computer programs beyond utilitarian purposes like word processing. If permeation is to happen it has to be at the level of integration with curriculum and not as a clip-on application like "word process this assignment."
- The provision of detailed support didn't work. A better way might be to provide the lecturers in the teaching team with "in class coaching" as a professional development strategy. In the terms of Joyce, Weil and Showers (1992) this would help "build communities of professional educators" (p. 381). The primary students didn't need it support.

- The lessons from the primary students' trials are;
  allow for the fun
  don't be too prescriptive in the processes you expect the small group to use
  expect that the school students will be your teacher and be open to their suggestions for improving the use of IT in their classrooms.
- Within a teacher education faculty the implementation of a permeation strategy must be lead by an evangelist who has the support of the leadership of the faculty and who is skilled in supporting adult learners. Such an evangelist has a key role to play in the design of courses, subjects, lecturers and tutorials.

Concluding Comment

It has become a truism that human society is moving into an information age. The implications of the development of information processing technologies for society are manifold (Spender 1995, Negorponte 1995, Ong, 1982). Spender posits the demise of print as the main medium for information transfer and suggests that the nature of learning and the current support structures for learning will change. She suggests that the "concept of a (university) degree will become rapidly and increasingly inappropriate". She believes that the qualifications offered by degrees is "based on the premise that you could be trained once and that was it. These days, there is widespread recognition that learning is an ongoing process". Teacher educators are in a privileged position to respond to these imperatives. They are able to offer experiences to their students that will help them in turn prepare their students for the changing world.

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Research on telematics for teacher education

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Abstract

This paper draws on research being conducted to find out how telematics, as an educational tool or resource, can be used to enhance the professional development of teachers. After a short literature review, the role of telematics in the context of a teacher education course is analysed. Qualitative data supports illustrations of the value of various types of telematics applications and, finally, a conclusion is presented.

Keywords

Educational telematics, telecommunications, teacher education, change in education, flexible learning, case study

1 INTRODUCTION

Telematics and the perspective of the availability of the Information SuperHighways for schools and the educational community generally, are currently under active discussion, raising exciting debates in a number of areas. In the changing times that society and education are experiencing, it raises important issues relating to education and in particular to teacher education.

Telematics is a hybrid word increasingly being used to describe the combined use of telecommunications and information technology. Terminology such as electronic communications or communication and information technology are also often used, as is the case of the word telecommunications. However, the important things to stress are the possibility of communication provision, disregard of location or distance, that such technology

Telematics applications and services are one more challenge for teachers and probably a good opportunity to research how teacher education and teacher educators can promote teachers' continuous professional development. This constitutes the background of my research, being conducted to find out how telematics, as an educational tool or resource, can be used to enhance the professional development of teachers.

The research project consists of a multiple case study of telematics usage by student teachers in Exeter (UK) and in-service teachers in Portugal, and uses various methods of data collection including short questionnaires, interviews, electronic mail (e-mail) and computer conferencing messages, observation of on-line and face to face activities, and field notes. Data were analysed following a qualitative approach.

The paper focus on the Exeter case study of using telematics in initial teacher education by student teachers and tutors involved in a postgraduate certificate in education (PGCE) course. It starts with a short literature review and an overview of the teacher education model of the University of Exeter. An analysis of the role of telematics in supporting learning how to teach follows and, subsequently, different types of telematics services and their usefulness for teacher education are illustrated.

2 TELEMATICS: A NEW CHALLENGE FOR TEACHERS

Telematics were already present in our lives in a number of daily routines but until very recently schools using telematics applications and services were the exception rather than the rule. However, children and students are increasingly networking, if not at school, at home and in their leisure time. Comparing the 'explosion that was the Internet' with the Klondyke gold rush 100 years ago, Heppell (1996) predicts that 'by the end of 1996 a substantial number of students will be connected' to the Internet one way or another.

This state of affairs suggests that past calls for a new type of teacher (Gwyn, 1988) are still up-to-date. It also implies the need to address issues arising by the changing role of the teacher and the need to research and develop the introduction of communication and information technologies in initial and in-service teacher education.

Research conducted to study the use of telematics for teacher education highlight the potential of the technology and very often raises various issues for further research and development. The following two examples involved student teachers in experiences with the use of telematics applications.

The virtual case competition was piloted by the University of Virginia in the spring of 1994 and included two other American Universities, one Canadian and also a British team from Exeter. Each team had to study a case posted to a mailing list as described by Kent, Herbert and McNergney (1995) who stressed the 'value of technology to those who would educate teachers using case methods.' With the virtual case competition they discovered that 'it might be possible to use telecommunications to stretch far beyond what is possible to do in live settings.'

History student teachers at the University of Ulster (Austin, 1995) used e-mail to develop European awareness as they were given 'an immediate point of comparison in the ways that their own subject was being taught in other country.' In addition, the student teachers had an opportunity to deal with the 'kind of controversial issues they could expect to come across in the classroom on teaching practice' because the activity they were involved in was an exchange with 16 year old Norwegian high school pupils. Roger Austin also highlights the importance of giving student teachers the opportunity to develop their technical skills. In this case, being able to use electronic mail enabled the student teachers not only to tackle IT 'as one of the cross-curricular themes but also [to employ it] as a practical tool for joint work within a wider Europe.'

Current telematics applications and continuous technological developments such as he future Information SuperHighway offer teacher education an interesting challenge that all involved have to respond to. The following case study is a contribution for that process.

3 TEACHER EDUCATION AT THE UNIVERSITY OF EXETER

Initial teacher education is considered by Golby (1994) 'centrally about practical skills but equally about the knowledge, understanding and values that lie behind them.' Recent changes in the government guidelines introduced the requirement of a greater proportion of the process of teacher education in England and Wales to be conducted in schools, with schools and teachers playing a larger role in training the students to teach. These measures gave rise to various concerns. Golby mentions that there were fears that a fuller participation in teacher education would create additional workloads for teachers and schools and Jennings (1994) points out that this larger involvement of schools and teachers implies an apprenticeship model of student learning.

Providing student teachers with opportunities to learn how to teach, at a time when 66% of the time ought to be spent at school, becomes even more difficult when some assume that initial training of teachers is a straightforward task. Assuming from the outset that teaching is an intellectual and complex activity, at Exeter it was deliberately integrated practical teaching with thinking about teaching by providing the conditions, situations and assistance for principled learning to take place. This 'deliberate approach to learning to teach' (Harvard, 1994) aims to equip students with a method that they can take away and which they can continue to use in their further professional development. This is a method that sees 'the process of learning as argument'.

The process of learning in practice at Exeter includes not only moments of teaching practice in schools, but also moments of break with the practice, when student teachers analyse episodes of teaching, assisted by written agendas and following a criteria for argument, with the assistance of specialists (tutor, co-tutor and University tutor), often in supervisory conferences. The course is organised in three terms, being the first one University based and the remaining terms 2 and 3 based in schools.

4 THE ROLE OF TELEMATICS IN SUPPORTING LEARNING HOW TO TEACH

After a brief review of various experiences with telematics for teacher education and of the teacher education context at Exeter, let us consider what telematics can offer both student teachers and teacher educators. In the Exeter context, there are four areas where telematics applications can be used:

- to support communication among people;
- to provide access to information resources;
- to support teaching and learning activities;
- to provide new teaching methods and resources.

4.1 Supporting communication among people

There are a number of communication channels and communication needs among the variety of people involved in a teacher education program. The following list is not exhaustive. It is only an indication of the kind of possible interactions, where telematics applications can have an important role:

- social interaction between students;
- co-ordination interaction among University staff (academics, administrative, technical);
- dissemination of information about a calendar or program of events i.e. dates and locations of seminar days;
- dissemination of information about Guild of Students issues;
- co-ordination of dates between tutors and students;
- dissemination of general information;
- co-ordination of interaction between University tutors and school subject and co-tutors;
- sharing of experiences, concerns, anxieties, findings;
- management of library loans and reservations;
- support to the mentor training scheme;
- availability of relevant teaching resources;
- provision of non-confidential information about people.

4.2 Providing access to information resources

For their assessment, Exeter PGCE students have to complete nine assessment points, which means approximately 18500 words or equivalent. Easy remote access to information resources either from the library or from elsewhere through CD-ROM, on-line databases, gopher, ftp or WWW is important.

4.3 Supporting teaching and learning activities

Telematics can provide support for new, flexible, on-line teaching and learning teacher education activities, both during the University based and School based work. Examples are:

- face to face seminars with on-line 'hands-on' activities;
- on-line seminars, e.g. a on-line moderated discussion about special education needs;
- preparation of University assignments, e.g. tutor sending comments to a draft version of an assignment;
- organisation of supervisory conferences, e.g. sending a file with an agenda of an episode of teaching to a tutor, prior to a supervisory conference;
- asynchronous supervisory conferences;
- synchronous supervisory conferences, e.g. discussing a video footage of an episode of teaching over a video conferencing session.

4.4 Providing new teaching methods and resources

Telematics services also provide new teaching resources and simultaneously bring about the need for adaptation in the way teaching is performed and for which student teachers have to be prepared these days. A very short illustration of some new interesting educational activities follows:

- e-mail among different denominational schools, e.g. the 'Education for Mutual Understanding' program in Northern Ireland (Cunningham, 1992);
- 'pen pal' exchanges, e.g. the 'Logo Pen Pal' conference where students shared Logo programs instead of letters (Mageau, 1990);
- newspaper days, e.g. the periodic event on UK Campus 2000;
- electronic data collection and transmission, e.g. the 'Globe' international partnership for global learning and observations to benefit the environment.

5 TYPES OF TELEMATICS SERVICES FOR TEACHER EDUCATION

There are various ways of classifying the types of existing telematics services and I do not pretend to add one more. Nevertheless, I find useful to organise the services available for the Exeter case in the following groups:

- electronic mail for individual communication;
- computer conferencing for group communication;
- electronic resourcing;
- computer desktop and video conferencing.

E-mail and computer conferencing are applications of the broader group of computer mediated communication and both can be used in a number of models of communication. In the project, however, e-mail was mostly used for individual communication and computer conferencing was used for group communication mostly in face to face seminars with an on-line activity.

Electronic resourcing includes a number of services and applications that provide information support necessary in a learning (or research) environment. Computer desktop and video conferencing are more recent applications that require more computer power and a broader communication band (ISDN2 in the Exeter case).

In this section, brief illustrations are given on how electronic communications were used to support teaching and learning in initial teacher education.

5.1 Electronic mail for individual communication

For a senior member of staff at the University 'the advantage of e-mail is that [students] can communicate with anyone [and] we encourage them to communicate with each other, we encourage them to communicate for social purposes.' Other purposes for the use of e-mail were also identified by an administrative member of staff who explained how e-mail could be used for delivery of information amongst the various people participating in the teacher education courses: 'information about school placements, course material, careers questionnaire, you know, all sorts of things...'

Either to contribute for the development of a social dimension or to serve as a means of information delivery, the use of e-mail was not widespread amongst the students, and particularly when they were in their placement schools. However, evidence collected shows that e-mail was used and has potential for communication exchange in a teacher education context for:

- communication between students, within the University and with colleagues and friends elsewhere;

- communication between tutor and student, for various sorts of purposes, including request-provision of information, assignment supervision, advice and development of 'practical argument';
- communication among tutors, either those at the University or the school tutors, for information sharing and co-ordination messages.

5.2 Computer conferencing for group communication

Computer conferencing has been used in teacher education at Exeter for some time and has employed Exeter local news groups, which provided the 'forum' for new activities and the opportunity to:

- learn IT and telematics 'skills' such as e-mail and computer conference, modem installation and dial up connection;
- discuss the future evolution of IT in schools;
- discuss, meaningfully and in context, educational change issues.

The analysis of posted messages reveals that most of the on-line discussion took place during face to face sessions. This fact indicates some inexperienced use of electronic communications, which is understandable amongst beginners. Despite some difficulties such as weak preparation of less technically skilled students, one tutor pointed out: 'If that relies on teachers having imagination to understand the technology enough to develop [it], then I would see it as being vital in terms of where teaching is going, in the next ten years or so.'

5.3 Electronic resourcing

With student teachers spending more time in schools there are considerable changes in their means of access to bibliographic and educational resources, very often due to distance reasons.

Research conducted among Exeter PGCE students, to look at the 'possibilities afforded by the electronic library' (Myhill and Jennings, in press) developed the idea of 'resourcing distance learning in combination with other features such as postal loans'. The importance of resource provision from schools is highlighted as are the resources offered by the university library. In addition, the feasibility of electronic access to information services is established.

This possibility is important because the new information age is increasingly making available educational resources for a wide range of areas. These resources are pursued by student teachers: a technician described PGCE students' queries in an IT room as 'a large majority of it was to do with the teaching, [they] wanted to find out information [using the web] for their teaching. Possibly using it as a resource [] to prepare their lessons.. Possibly as well as books...'

5.4 Computer desktop and video conferencing

The use of computer desktop conferencing for initial teacher education at Exeter followed various stages that can be organised in the following phases:

- small groups teaching practice through desktop conferencing;
- school based teacher education through desktop conferencing;
- school based teacher education through video conferencing.

Small groups teaching practice through desktop conferencing

Student teachers used desktop conferencing (DTC) for a teaching session with a small group of 4 pupils. The student teachers were using a workstation at the University and the children were in their school. The exercise was part of initial experiences to research the educational potential of electronic communications using ISDN. For an introduction to the facilities offered by the DTC software, student teachers used an 'ice breaker' activity where the completion of riddles by the students at the school would allow both the establishment of a working (teaching and learning) relationship and the adaptation to the features of the software (Davis, 1994), prior to Mathematics teaching practice.

School based teacher education through desktop conferencing

After the previous experiences showing educational potential of DTC for teacher education, the system was used to support school based teacher education. At an early stage the training of the University tutors and the students on how to use the system was conducted at the University. Subsequently, when the students were already in their school placements, the system was used both for assignment supervision and for supervisory conferences. A tutor describes the use of such technology as 'a much more formal occasion' by comparison with the use of e-mail. She thought that the asynchronous nature of the communication, requiring the 'set up [of] a time and a place and the student to be there' meant that the occasion was 'a very professional time.' She added that the student 'had to do a lot of thinking to prepare for it and therefore the quality of the dialogue during that time was at much higher level than sometimes when I just go and visit the school.'

School based teacher education through video conferencing

With developments in the transmission of video over ISDN, the DTC software was enhanced with the video conferencing facility and new experiences were planned to make use of them to support school based teacher education. Again, there was a period of adaptation for tutors and students to the video conferencing systems. This took place in term 1 of the academic year (95/96) and was followed by supervisory video conferences, where tutors at the University discussed students' agendas describing episodes of teaching and followed the criteria for argument to promote reflection and, therefore help students to develop their professional skills/capabilities.

6 CONCLUSION

This paper covers a range of telematics applications that can be used in a number of occasions and roles to support teacher education. Telematics applications have excellent potential for a more flexible teaching and learning approach, which is increasingly being required from teacher education institutions. Such a potential is strengthened by the availability of different applications, from text communication through e-mail, to multimedia communications via, for example, computer videoconferencing.

To transfer the potential into practice, however, is not a straight forward task and raises issues that need detailed and thorough further analysis. Simultaneously, it seems important that the teacher education community develops its awareness of the possibilities offered by these technological developments, in order to be able to participate actively in the process of, comprehensively, making the necessary adaptations in the technology and in the teaching and learning design and performance.

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8.1

Towards effective learning with new technology resources: the role of teacher education in reconceptualising the relationship between task setting and student learning in technology-rich classrooms

Bridget Somekh

Scottish Council for Research in Education

1996

Aims of the presentation :

- to explore why it is difficult to use resources to support learning in classrooms;

- to suggest an approach to teacher education which might help teachers to use new technology resources better.

Key features of the classroom

One:

- a confined space with 30 plus people
- a site for exercise of power
  - legitimate authority
  - peer culture
  - formal control and obedience / resistance
  - micro-political struggle

Therefore: poses problems of organisation and control

Key features of the classroom

Two:

- different prior learning and ability of the students (in all cases)
- each student requires appropriate feed-back

Therefore: poses problems in setting and supporting appropriate learning tasks

Key features of the classroom

Because learning takes place in the head and cannot be directly observed, there is a problem in trying to infer that learning has taken place.

Three:

- an ethos of assessment
- an ethos of competition

As a result of all three key features: although learnng is the explicit objective, implicitly it is often not the prime objective of either teacher or students

Day-to-day, teachers :

- plan how to achieve learning goals
- carry out their plans
- monitor the outcomes

Teachers transform learning goals into activities with outcomes that can be assessed.

- Classroom context demands that pupils are organised / controlled
- Learning demands that pupils are on-task

Chalk and talk methods achieve both goals (given a transmission model of teaching and learning)

The teacher's role in task-setting is crucial to learning

Doyle's work shows that:

- learning tasks always involve ambiguity and risk - i.e. cognitive dissonance & exploration are essential
- students negotiate tasks with teachers to reduce ambiguity / risk - 'exchange behaviour for grades'

Therefore: many tasks are 'busy' tasks not learning tasks. Teachers unwittingly collude with students to reduce cognitive challenge (and this is justified as flexibility and sensitivity to students' needs).

New technology resources are best used when they become part of a three-way partnership in task-setting with the teacher and the students.

Software (through its designers) can set a task explicitly.

Teachers either design tasks that make use of software tools; or set framing tasks to integrate the software tasks with on-going work.

Students should share in setting their own learning tasks; but need to understand that learning is about exploration and must involve ambiguity and risk.

Reflective practice in teacher education

Reflective practice requires teachers to critically appraise their practice day-to-day.

- Much research supports this approach
- It is well-established in teacher education - at least in aspiration

But teachers (as learners) negotiate learning tasks too!

Most reflective practice focuses on classroom organisation and teacher-student or student-student interaction.

Using new technology resources effectively

Transform teacher education by:

- re-focusing reflective practice on student learning;
- conceptualising new technology resources as part of a three-way process of task-setting (by teacher, student and software).

Teacher education needs to:

- present a cognitive model of learning capable of being investigated by teachers in the classroom context;
- make this the central focus in teaching reflective practice.

Features of the suggested cognitive model

We should support learners:

- in moving into their zone of proximal development
- in building new concepts into their existing mental schema;
- in developing ability to transform ideas and concepts from one symbol system to another
- in developing ability to proceduralise problem-solving
- by encouraging discussion
- by providing 'situated' learning contexts
- by developing their abilities in meta-cognition

"can old dogs teach new tricks"

Key note. Shahaf Gal.

Gavriel Salomon

K3

Destined vs. Designed Learning.

Taylor mini

Dilemma Destined / Designed.

a) mastering vs. mystery | concepts vs what is the concept. models vs forms of prison... How things works vs ...

b) Knowledge vs knowing.

c) Innovation vs Innovating | activating, Experiencing, putting to use | putting to use, Designing forms, gauging performance / meaning.

Messing About

David Hawkins (Kindergarden Revisited)

Uses of IT in education.

1. Learning Environment
2. Software Development
3. School Culture

→ ~~Learning of knowing of concept.~~

POSSIBLE SCHOOL CULTURE encouraging situated learning

- Doubtfulness
- Organizational Inquiry
- Organizational Design for learning.

Comment former les enseignants à cette rupture?

Hubwieser 6.3

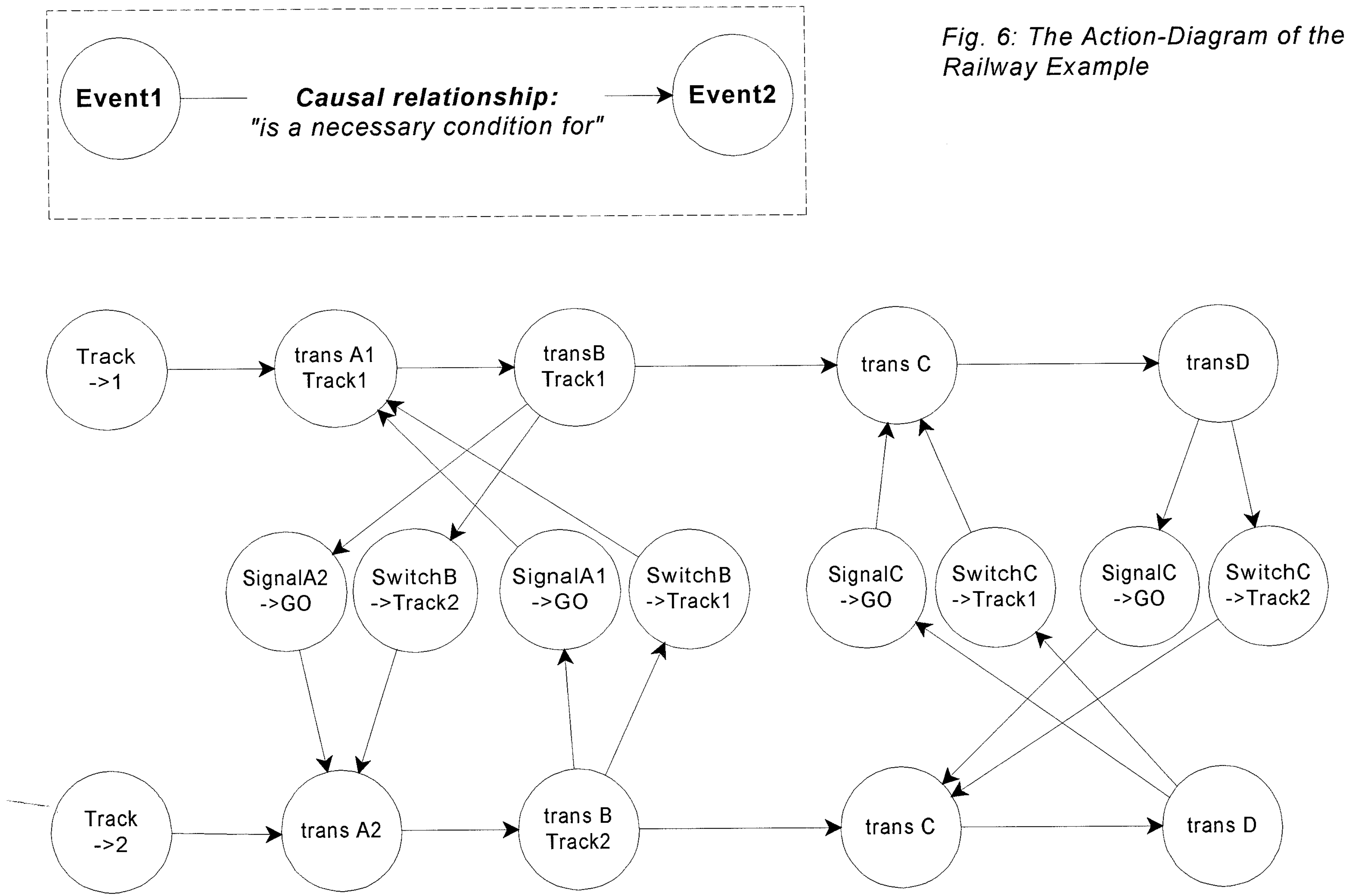
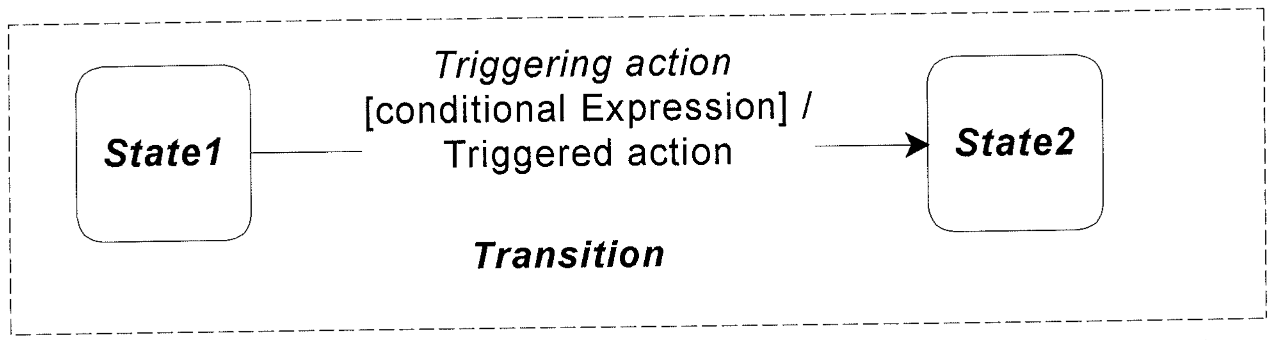


Fig. 6: The Action-Diagram of the Railway Example



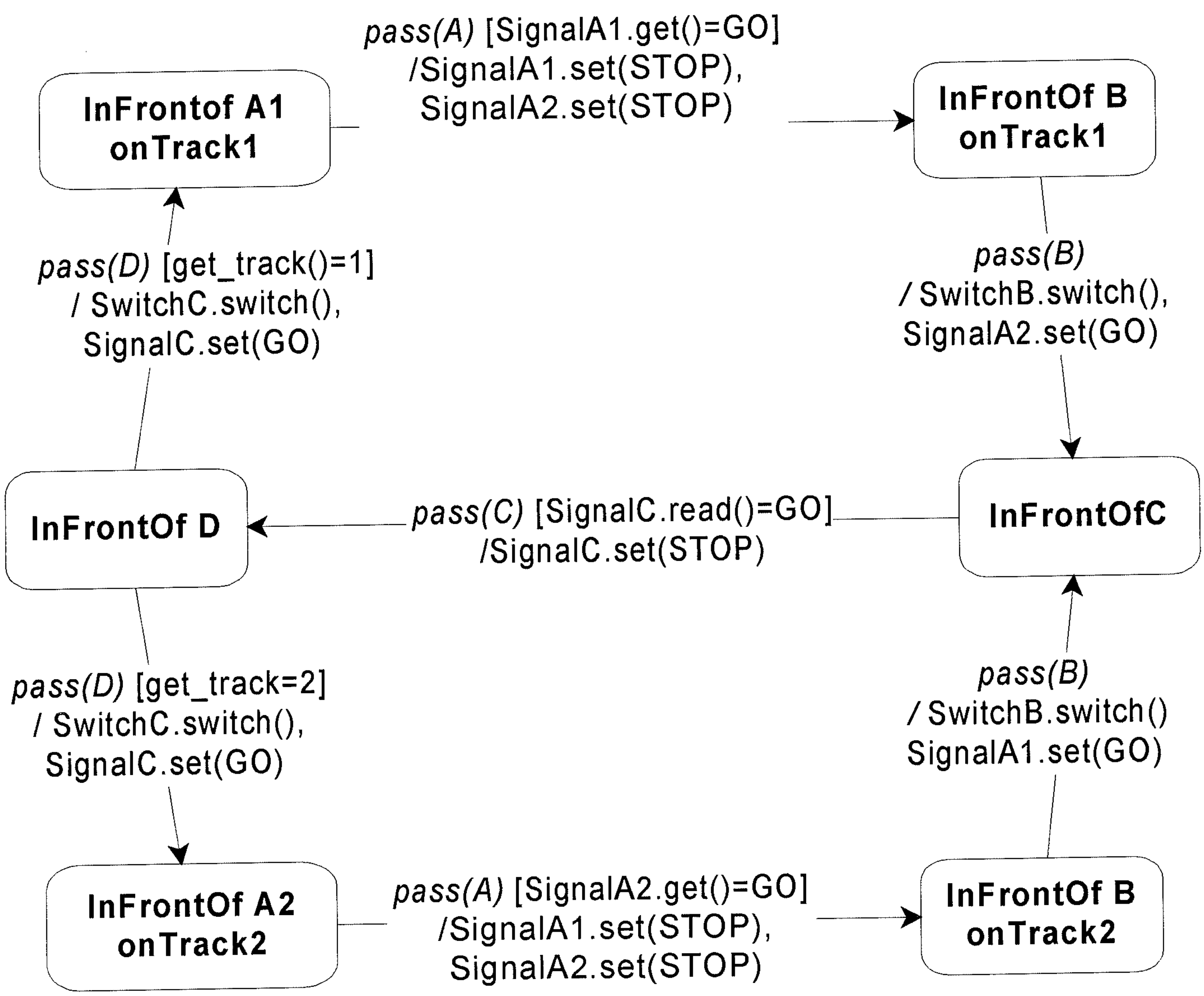


Fig. 4: The State-Transistion-Chart of the Class Train

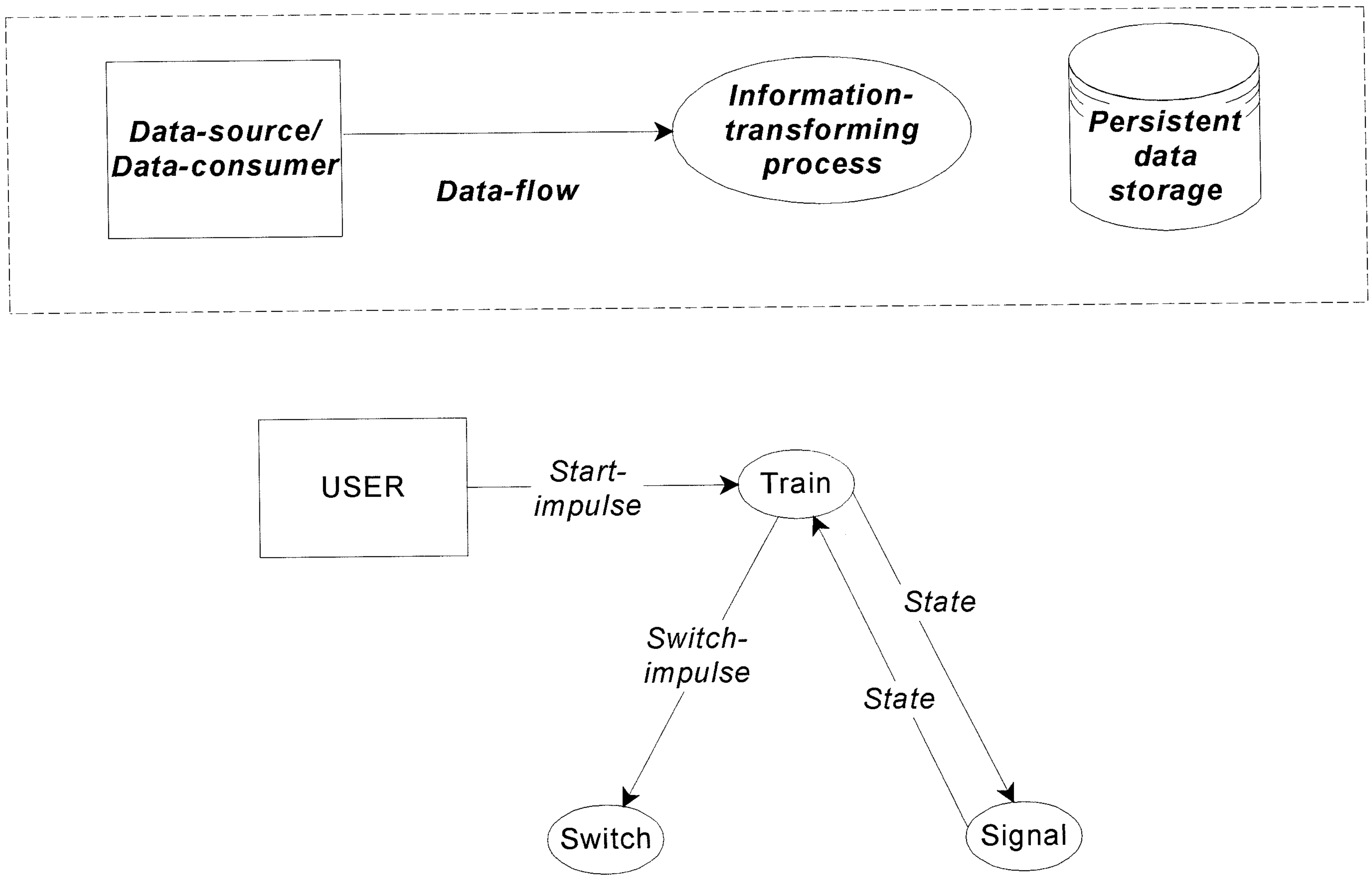
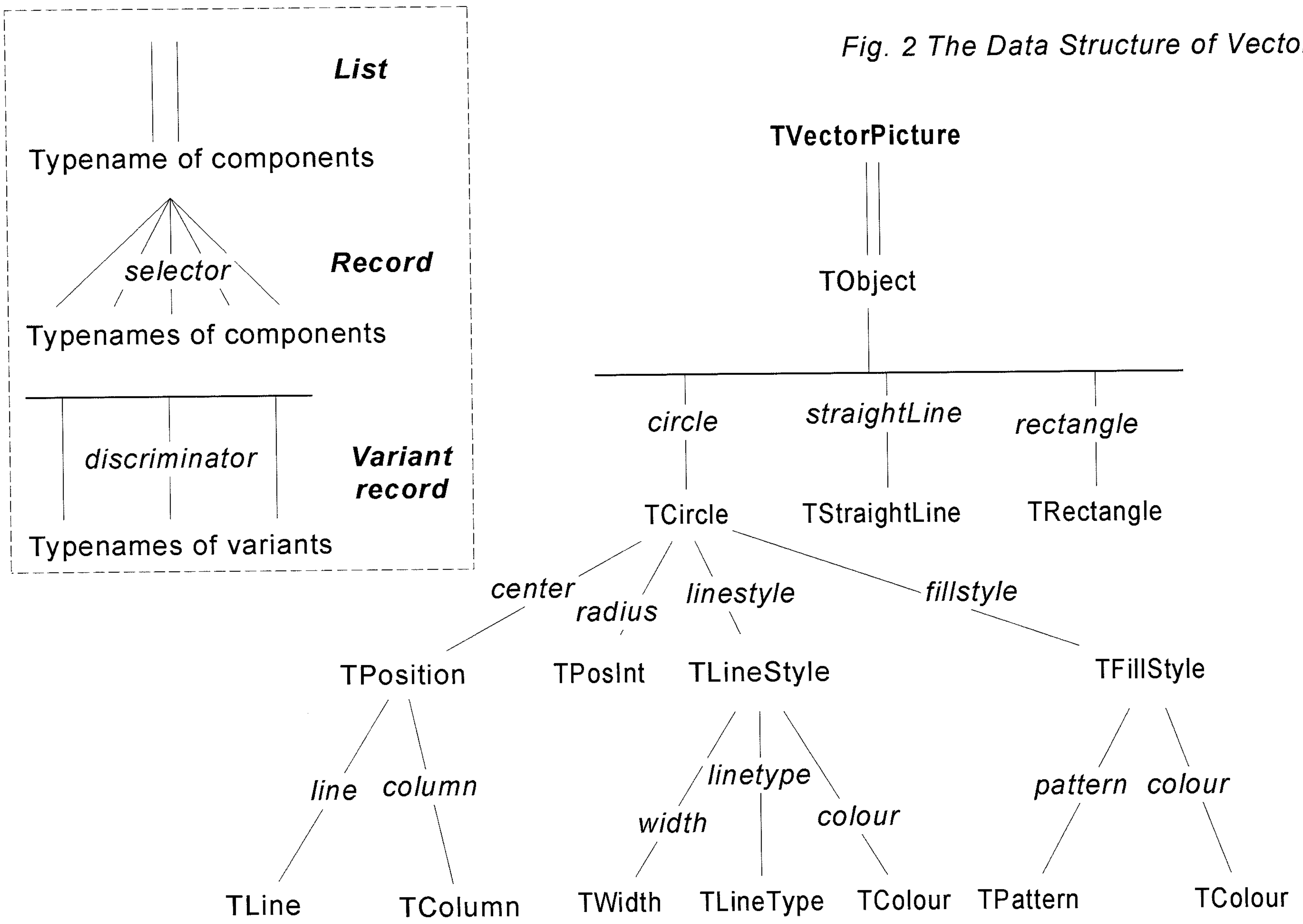


Fig. 5: Data-flow Chart of the Railway Example

Fig. 2 The Data Structure of Vector-Graphics



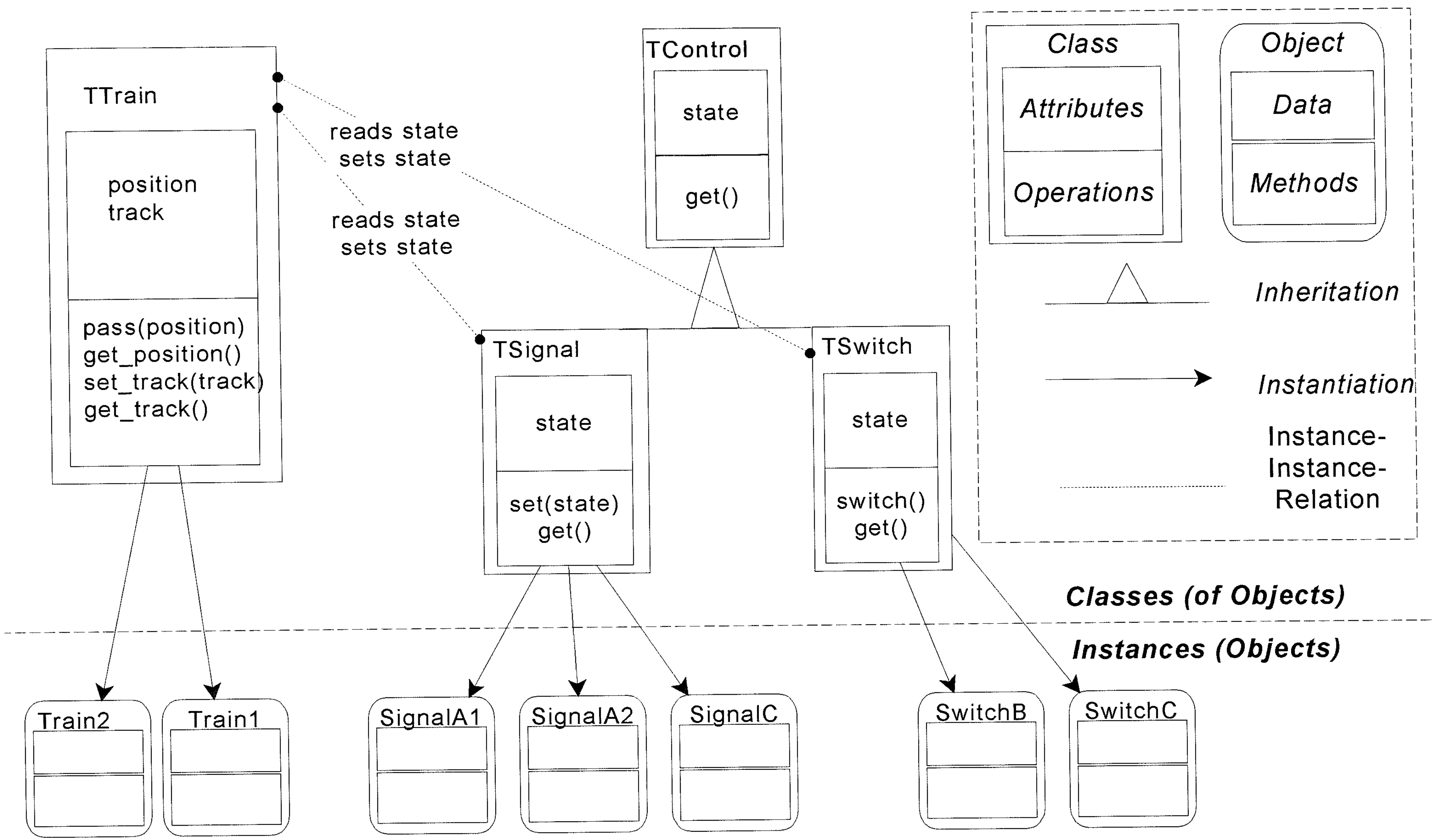


Fig. 3: The Object Chart of the Railway Example

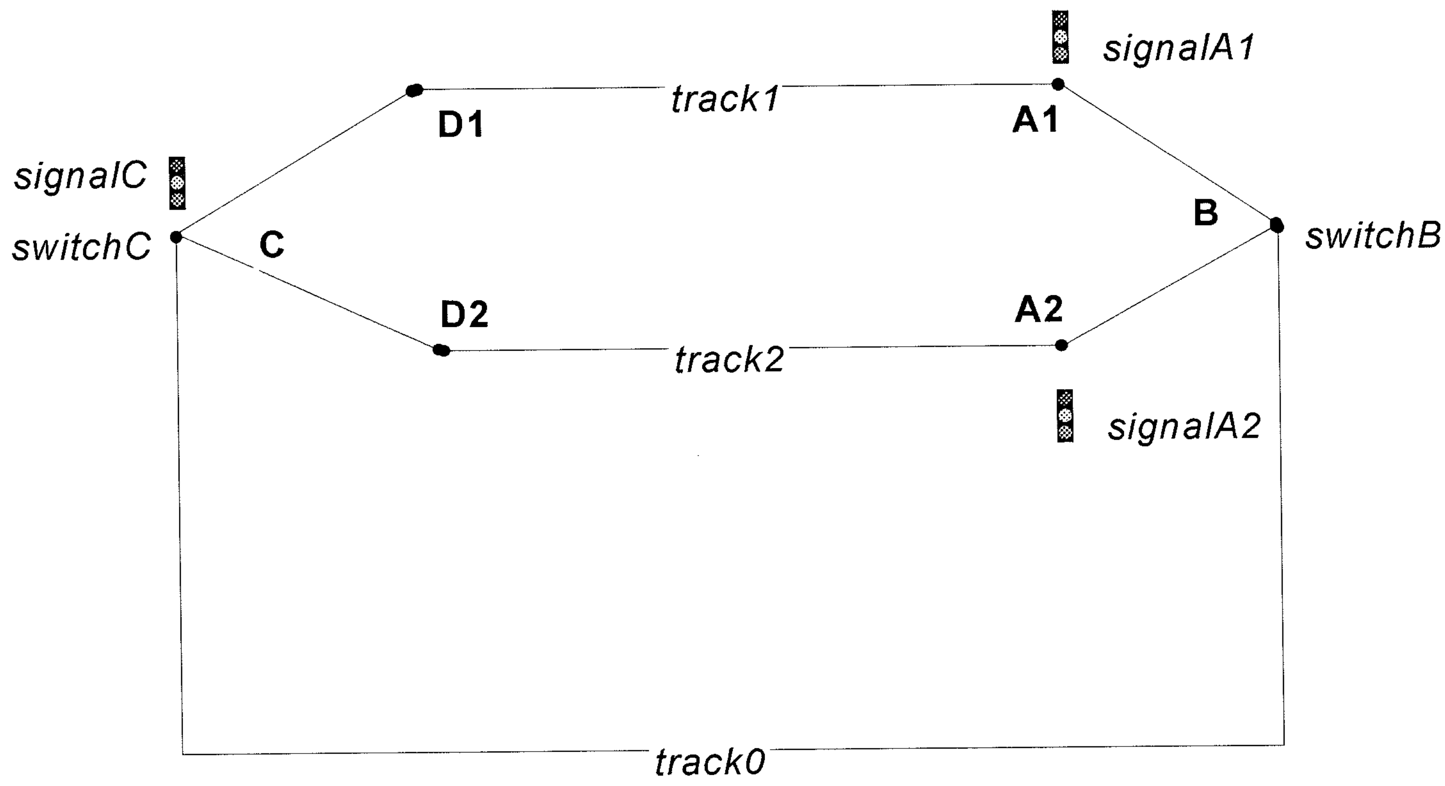


Fig.1 The Railway Track Chart

Enhancing New Media

- **Internet-Access**
  - Internet-node for 24 schools at Rosenheim
  - Experimental field

- **Design of an internet-based information system**
  - Distributed data: national, regional, local servers
  - Search engines
  - Proxies
  - Generating system for HTML-structures

- **Constructing CASE-Tools**
  - Producing program-code immediately from high-level descriptions

The Teacher Education Programme (2)

- **The Compact Course of Study**
  - Two year lasting in-service education
    - * 21 teachers in the current course
    - * 38 following in autumn
    - * Parallel programme at the FAU Erlangen-Nürnberg
  - According to the curriculum mentioned above
  - Additional practical training in program-verification
  - Using the university-vacations between the semesters
  - Participants enjoy a reduction of their weekly teaching load

The Teacher Education Programme (1)

- **A new Curriculum for Teacher Education**

  - Only besides two other disciplines

  - Duration of three years

  - Introductory lectures cover

    * Automata and state machines
    * Formal languages
    * Functional and algorithmic programming languages
    * Algorithms and data structures
    * Theory of complextity and calculability
    * Machine architecture and operating systems
    * Building of interpreters and compilers
    * Distributed systems and their communication

  - Special classes include

    * Data-base systems
    * Data structures
    * Software-development
    * Operating systems
    * Networking
    * Teaching IT

The Methodical Approach (1)

- **Stressing modeling techniques**
  - Data Models: Static structure, Object diagrams
  - Dynamic model: State machines
  - Functional model: Dataflow diagrams
  - Causal model: Action diagrams

- **The methodical steps**
  - Problem introduction
  - Informal description
  - Formal modeling
  - Realization / Implementation
  - Review

- **Media support**
  - Access to global networks
  - Internal LAN
  - Standard-Software
  - CASE-tools

The Methodical Approach (1)

- **Information is the central concept**

    * Representation of information
    * Interpretation of representations
    * Structuring informations
    * Information processing techniques
    * Information transport
    * Assessment of representations

- **The software-development process is a guideline**

    - Object oriented development and design

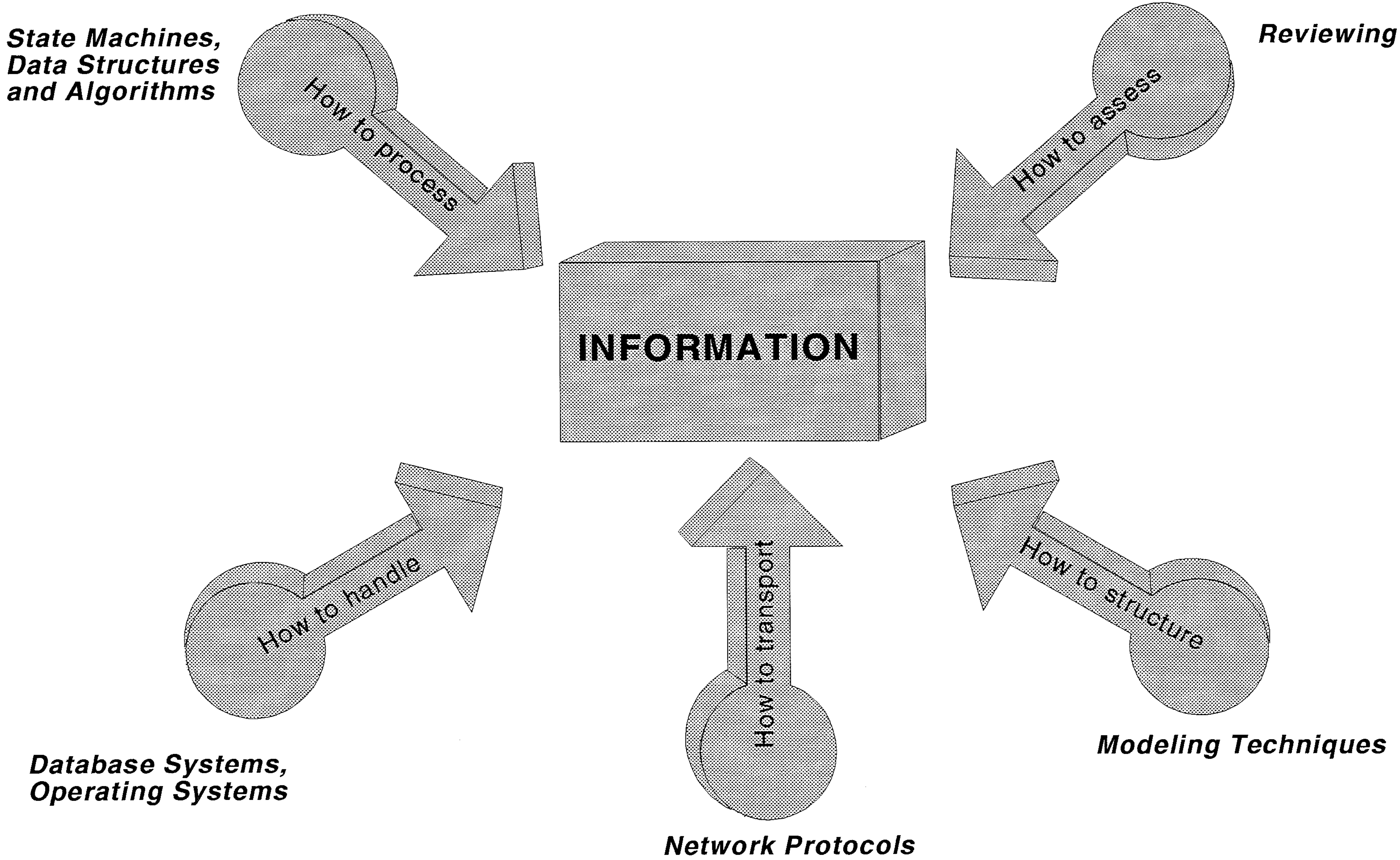
    - Proceeding from abstract to specific views

- **Abstracting from Specific Details of Hard- and Software**

    - Abstract views help to understand a variety of systems

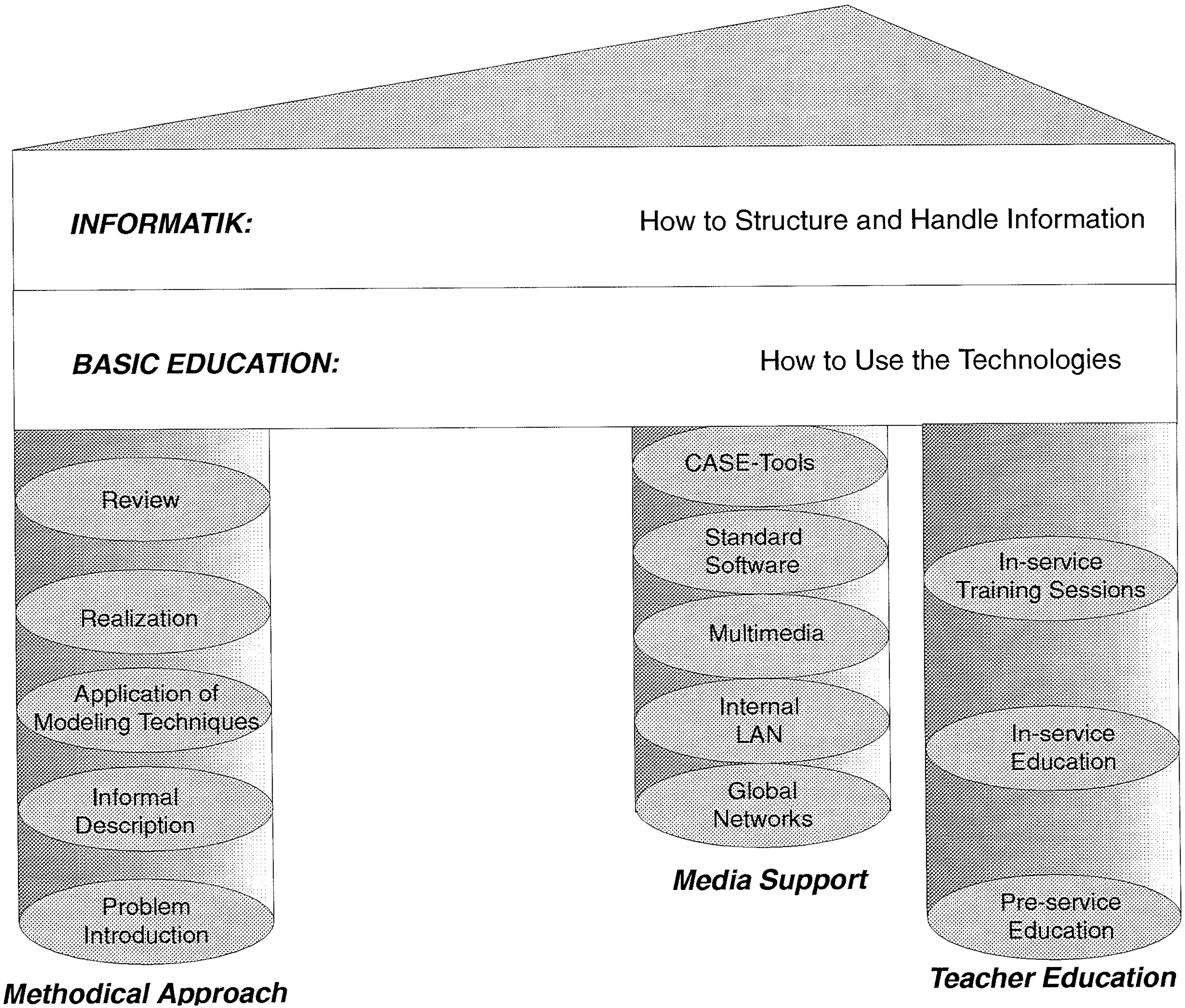
    - Time dependent specifics are not teachable

Poster 2:The Information Centered Approach



Technische Universität München: P. Hubwieser, M.Broy, M.Brauer

Poster 1: Supporting Change in IT-Education



A New Approach in Teaching Information Technologies: Shifting Emphasis from Technology to Information

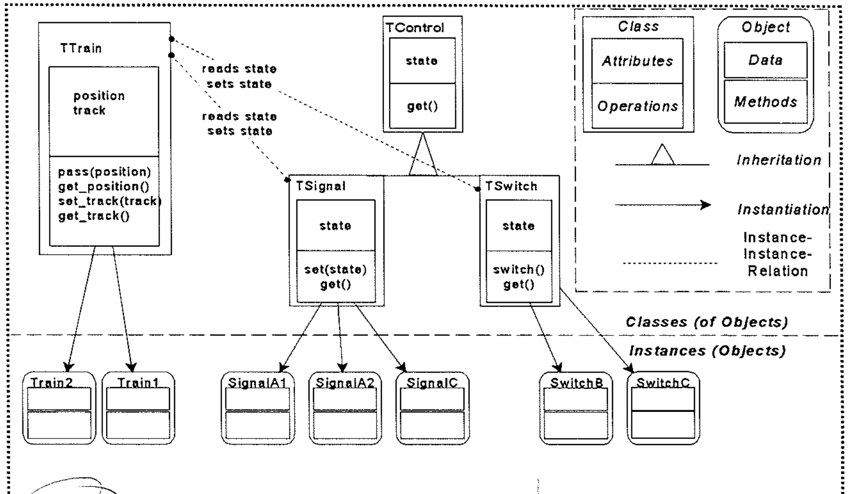
P Hubwieser M Broy W Brauer

Motivation

- **No obligatory IT-education in Bavarian secondary schools**

- **Basic IT-instructions only within other regular lessons**

- **IT-studies are not compulsory in Teacher-education**



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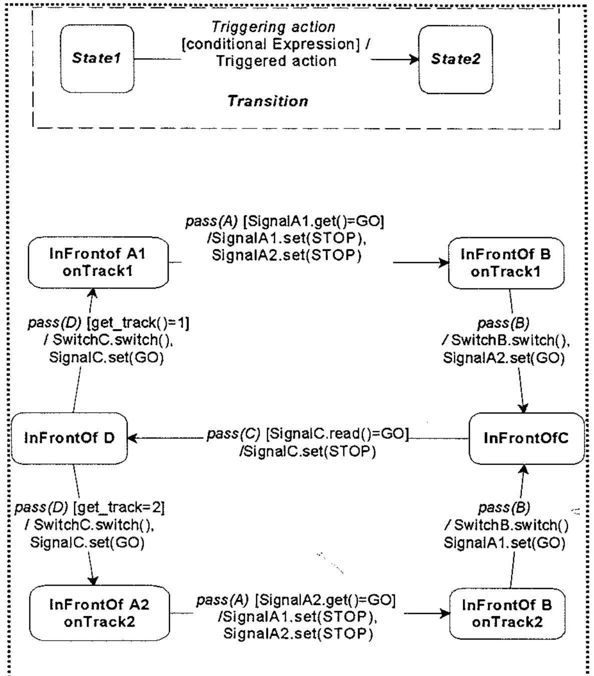

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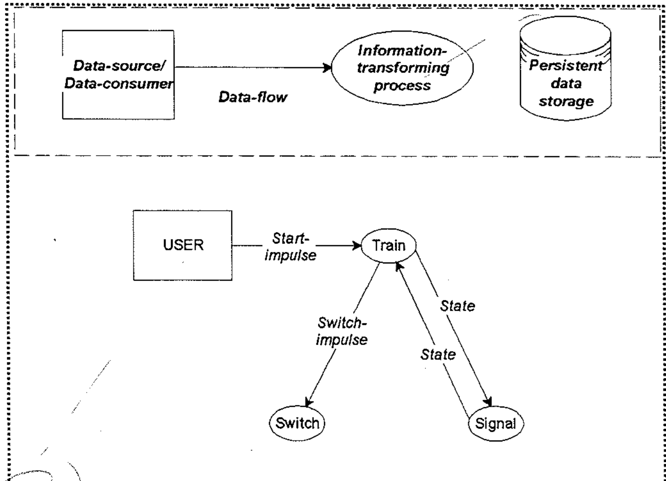

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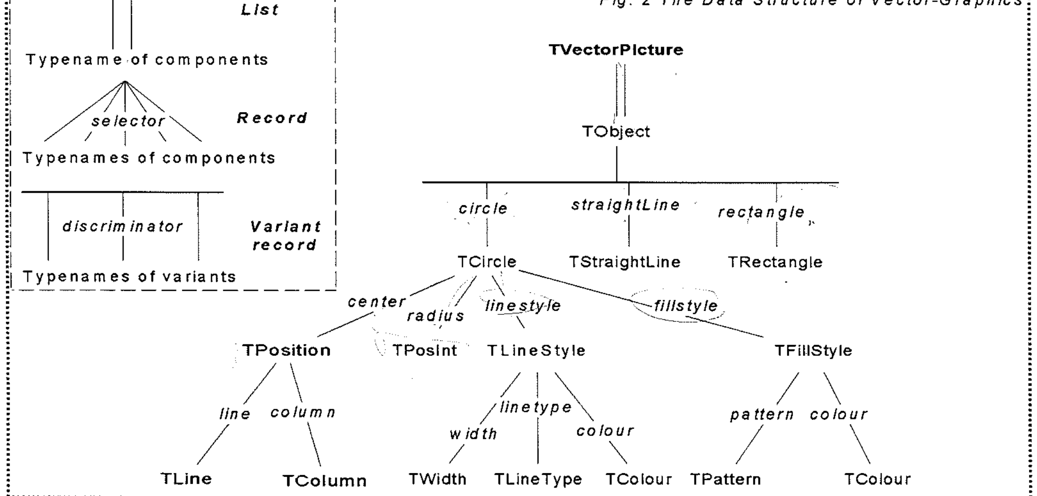
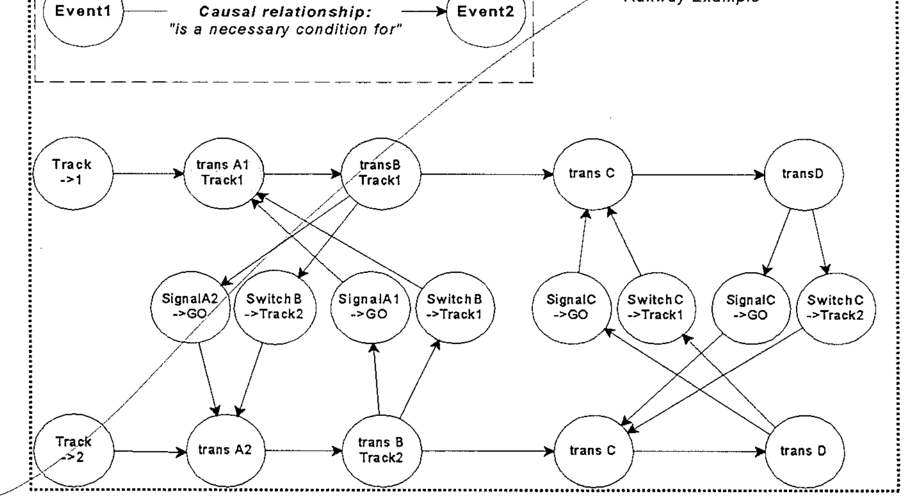


Fig. 6: The Action-Diagram of the Railway Example



Fernerkundung

Satelliten, Bildanalyse, Software, Einsatz in Aus= und Fortbildung

WC96

7.4.

An adventure in integrating Educational Computing within Teacher Education

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Abstract

As the study of Information Technology (IT) in initial teacher education courses has developed more emphasis has been placed on educational computing within curriculum areas and on the use of computer based resources in childrens' learning. Teacher education institutions have provided instruction through discrete educational computing subjects, through the permeation of these studies into curriculum subjects and through mixes of these two approaches (Robinson, 1996, Oliver, 1994, Pratt, 1993). Use has also been made of telecommunication, practicum and school based subjects. This case study describes the use of CD-Rom adventure software to permeate IT into initial teacher education, the prior classroom trials of the learning strategies being taught and the students' responses to this experiment.

The software, learning strategies and the assignment tasks were previously trailed in classroom settings with Primary students from an inner urban Sydney school and a New South Wales rural school. The results of these trials were used to guide the design of a first semester teacher education subject and a set of related assignment tasks. Data was collected through written surveys, work samples, field notes and audio interviews. A comparison is made between the responses of the teacher education students and the students from the trial school to the software and the learning strategies. The different ways in which these two cohorts of students worked with small group partners, engaged with a CD Rom adventure program and undertook the assigned writing tasks are compared.

Keywords

Initial teacher training, Primary education , Information technology, Integration, Multimedia, CD–Rom games, Classroom trials.

1. INTRODUCTION

The historical development of Information Technology in Teacher Education (ITTE) began with discrete computer literacy subjects, then discrete educational computing subjects and moved on to the permeation of these studies into other curriculum subjects and into practicum and school based subjects. (Robinson, 1996, Oliver, 1994, Heppell, 1993, Wright, 1993, Pratt, 1993) Discrete subjects are close to the traditional university model of subject specialist teaching but permeated Information Technology (IT) studies have the benefit of linking these understandings to the student teachers' future work role.

Wright (1993) discussed the case for separate Information Technology subjects to develop the computer literacy of student teachers. He believes the "challenge is to educate for a future in a technology centred information age - the opportunity is to apply technology to revolutionize the process of education." (p. 37) He described a compulsory subject in place in the teacher education course at the University of Alberta which stressed a computer literacy approach including the local school context, historical development, hardware components, operation systems and courseware evaluation, morals and ethics, computer applications and access to information and telecommunications. (p. 46)

An alternate approach has been termed an integrated or permeated approach. Under this organisation educational computing is taught within curriculum focused subjects. Pratt (1993) cautioned that "Permeation cannot succeed without staff expertise but staff will not gain expertise unless they are required to teach IT as part of their course." (p. 57) He believes that when IT lecturers worked together with subject lecturers at Warwick University an "evolving permeation" resulted and that this process has raised the level of IT expertise among the academic faculty. Oliver (1994) argues that like school teachers, teacher education lecturers and teacher education students need to experience models of IT use in their own learning before such technologies will be adopted for use with the school children the student teachers will teach. He states that "there is a need to integrate computer technologies into teacher education programs rather than to include IT courses a discrete entities." (p. 141)

Robertson (1996) supports Oliver's view that permeated IT should be designed in such a way as to provide more than a token integration of IT into a few subjects. He suggests that "coherence and progression pose greater challenges for the permeated approach." (p. 3) The coherence of student teacher's learning about IT requires them to gain a breadth of understanding through experience of the main relevant software types across the curriculum areas. A mapping of the students' experiences with IT is necessary if there is to be a progression of "theoretical understandings, pedagogical and technical skills" (p. 3) as they develop a depth of understanding through their studies of IT in education.

Downes (1993) surveyed a cohort of final year student teachers from Western Sydney about their experiences with IT during a block practicum. They reported minimal use of IT in the classrooms in which they had been working. Half the group had experienced a discrete "computers in education " subject prior to the practicum and half the group would complete this course after their school experience. There was no significant difference in IT usage between these two groups. Where IT use had been reported it was the teaching practice of the class teacher that was the main determinant.

These findings suggest that it is computer using classroom teachers and their students who are best placed to provide examples of good practice for student teachers and teacher education lecturers. Sherwood (1993) reported the views of Australian teachers who were experienced in using IT in their working lives. The survey she conducted sought to "determine whether the integration of the computer had made a difference to teaching methods" (p. 172) Had the advantages of using IT been significant enough motivate the teachers to overcome the problems they had identified? Almost 76% replied that the use of computers in their classroom had made such a difference. These teachers reported that "the most significant change .. has been the move from teacher centred to student-centred classrooms" (p. 172) The problems identified by Sherwood were in part;

- inadequate training both at preservice and inservice phases, (p. 173)
- lack of teacher educators with direct experience of educational computing, (p. 176)
- limited resources and finances. (p. 173)

2. PERMEATION OF ITTE AT UWS, MACARTHUR

Following a course review in 1991 the Primary teacher education program at the University of Western Sydney, Macarthur underwent major changes. This review recast the structure of the undergraduate degree into a more integrated model. As a result there was no longer a discrete compulsory educational computing subject in the core program. A decision was made to integrate educational computing into other appropriate curriculum subjects. Specialist educational computing lecturers within the faculty volunteered to be part of the teaching teams of these subjects. In this way they were able to assist in the design of integrated tutorial activities and assignment tasks. By 1995 the degree program has evolved to a stage where there were four subjects from a total of eighteen designed to include educational computing. A number of other subjects timetabled guest lecturers to give an IT perspective to the subject focus area. The integration of educational computing into teacher education was seen as consistent with a general philosophy of content area integration that was a feature of the new degree.

The permeation model being trailed at UWS, Macarthur Faculty of Education involves the integration of educational computing as a methodology in curriculum areas through provision of computer based tutorials in appropriate subject units within the degree course. "We are trying to:

- improve quality of teacher training to improve educational outcomes for the children our students will teach,
- reflect good practice in schools,
- broaden lecturers' skills and understandings,
- reflect the philosophy of Bachelor of Teaching." (Nanlohy 1994)

3. SCHOOL TRIALS OF ITTE STRATEGIES.

It has been the practice of the specialist IT lecturers at UWS, Macarthur to conduct research and trials of IT based learning strategies in classrooms. The intention has been to learn from school teachers and their students and refine what we know in order to teach our students about being effective users of IT. In the example discussed in the present case study this has been achieved by cultivating opportunities for trialing of exemplary software in senior primary classes. The exchange of skills and information benefits both the school and the university. The school has the services of the IT specialist lecturer to assist with its staff development and educational programs free of charge. The university benefits because one of its staff can obtain recent and relevant experience within their field of expertise.

One of the features of these arrangement is that the focus of the lecturer's activities is determined by the educational needs of the students in that school. What will be done is negotiated with the class teacher who usually makes a choice from the range of activities the lecturer has to offer. It is a process that allows the lecturer to refine their own practice and ultimately to learn from the children their students will teach.

The nature of the relationships in this arrangements are different from the usual relationships in teaching practice. The student teacher does not meet the school teacher or the students. The lecturer is not placed in the role of supervisor or adviser but rather is a learner first and a teacher second. Heppell (1993) believes that the "current generation of children are literally the first children of the information age" (p. 233) This type of school based trial provides opportunities for teacher education lecturers to learn about classroom and home use of IT from children whose experience of literature and of communication technologies is different from those of adults. The lecturer is able to experiment with appropriate IT classroom software and strategies. (Figure 1)

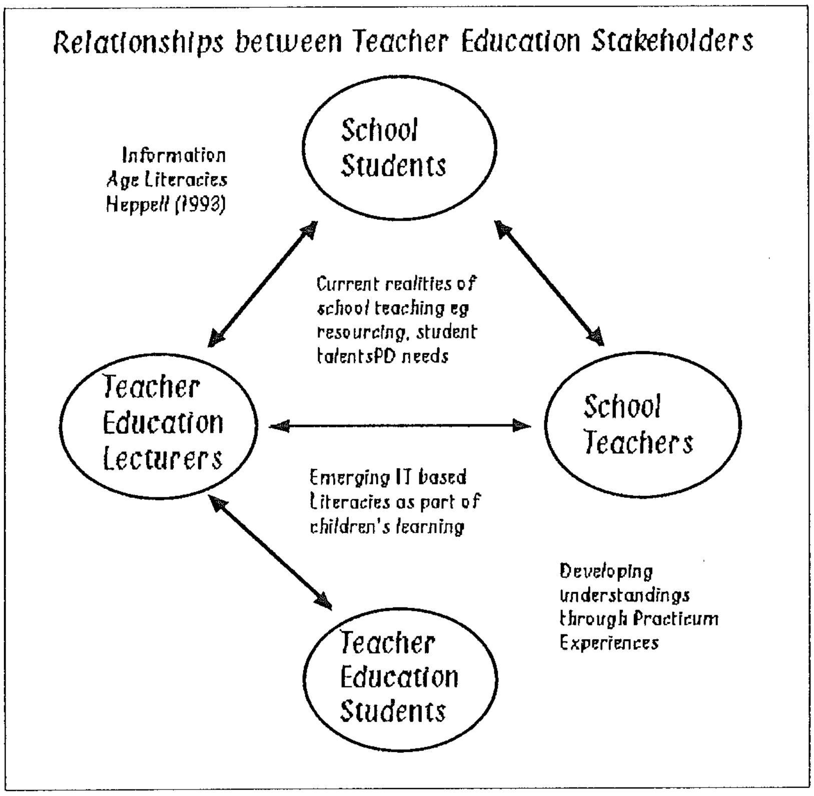

Figure 1

Heppell (1993) suggests an agenda for action in teacher education. First teachers and teacher educators need to understand the emerging capabilities of the 'information generation'. Next teacher educators should "become more immersed in the entertainment and edutainment media that are increasingly common currency in young children's day-to-day language and lives." (p. 236) Teacher educators should guide policy makers and should be involved in "proactive development that makes change happen at the classroom level and in the home.." (p. 236) Negroponte (1995) suggests that the model for learning in the future might be seen in the way children learn to use "simulation tools (like the popular SimCity) and more information rich games" (p. 207)

4. TRIALING THE ADVENTURE WITH PRIMARY STUDENTS

In the trial that led to changes in the UWS, Macarthur teacher education course the CD-Rom adventure game Myst was used to stimulate creative writing with two groups of senior primary students. Myst is a prominent example of CD-Rom adventure software. Clicking the mouse in a given direction the allows the user to appear to "walk" through a world depicted with finely rendered graphics. Movement is smooth and the point of view is that of "first person participant."

Why use the Myst CD-Rom adventure?

This adventure program is a popular game that is an example of an emerging class of mass media text. This program melds mathematics and literacy in an investigation that unfolds a hidden mythical realm. It is useful in a classroom setting because the program, provides significant cognitive challenge, has clear links to aspects of state curriculums and provides an experiential learning environment. The program provides;

- The intricate puzzles in Myst are underlaid by a complex narrative. Literary, mathematical, technological and social understandings must be exercised to collate the clues and find the solutions.
- Myst demonstrates many written, spoken text types or genres. The puzzles within Myst are embedded in these texts, the virtual landscapes and artefacts. Engagement with the adventure and with other students will stimulate the creation of expressive written and speech texts.
- The feeling of "being there" allows an active engagement with the story and leads the students to deeper processing of the texts within Myst. Myst can be used to support the English, Science and Technology and Human Society and Environment syllabus areas

The Myst adventure has a relatively non-violent scenario. There is emotional violence inherent in the struggle between the male protagonists, Atrus and his sons Sirrus and Achenar. The main female character, Catherine, the mother of this warring family, is cast in a passive role. However Myst is most successfully completed by students in pairs or small groups who solve its puzzles through discussion and collaboration. This may be why this adventure is attractive for girls who in the main have stayed away from the "drop dead" variety of computer games. Dale Spender suggests that girls who reject the violent games that feature death and competition are showing good sense. She points out that girls "are interested in personal relationships, in the ongoing story of existence." (1995 p.187)

4.1 Teaching Plan for the first classroom trial

The first trial took place in an inner urban Sydney school. The teacher was keen to offer her academically gifted students the opportunity to create personal recounts and narratives of the mystery text form. She suggested ten groups of three with a girl and two boys in each group. The author visited the class one afternoon each week to first lead the whole class activities and later to conduct writers conference with the groups of three. The groups had one hour each week to use the Myst program.

Week 1 to Week 3

Myst introduced to the class:

- operation and movement within the adventure demonstrated;
- discussion of group member's rotating roles, Mover (with mouse), Writer (in journal), Thinker (decision making and suggestions);
- discussion of mystery stories and the role of clues within those stories and of group's Myst journals stressing the importance of writing and drawing.

Recount of the discoveries made so far:

- discussion of the story structure using a "concept web" and about sharing information between groups to reduce the highly competitive atmosphere that had developed.

Developing descriptive texts:

- discussion of the significant locations discovered by the students;
- joint construction by groups of a detailed descriptive text about a Myst location;
- individual writing of descriptive texts suitable for the orientation stage of an imaginative narrative and discussion about how to hide clues to a mystery in a descriptive text.

Week 4 and the 3 subsequent weeks

Writing conferences were held with each writing group in the withdrawal room off the classroom. This room also housed the computer and so observations could be made of groups using the adventure. Observation notes were kept of the conferences and the group game play. Each group's conference was begun with a reading of what they had written in their journal since the previous conference. The author asked a common set questions and initiated a discussion of the processes the students were using to develop their story. The first two questions concerned the plot and structure of their narrative . The second two questions asked the students to plan the next stage of the story and to describe how they planned to work together on the task.

Results of the first trial

To get the students' view on the trial they were asked to complete two feed back sheets. Nanlohy (1995a) The first, called Myst Story 1, assessed whether the groups had been able to successfully use the program. They were asked to describe a location, a problem they had discovered at that location and the clues they needed to solve the problem. In answering the questions on this sheet the students were drafting the parts of a narrative termed Orientation, Complication and Resolution.

The second sheet, called predicably Myst Story 2, sought to get a sense of the student's experience while completing the adventure. They were asked "How did you **feel** while you were trying to solve the Myst puzzles? They were asked to talk about:

- "Exploring the Myst program with your group;
- The story you helped to write;
- The role of the class visitor." (Nanlohy 1995a, Appendix A)

The two most common observations made of the children during this trial described a high level of competition between groups and the disharmony within groups. The gender balance of the adventuring groups (all had two boys and one girl) and the behaviour of the boys meant that these otherwise intelligent, confident and articulate girls were marginalised during time on computer, often physically. Efforts to encourage sharing were only partially successful in that only "old solutions" were traded in the class discussions. The girls were often left to complete writing tasks after the weekly writing conference. With the exception of two groups, the childrens' writing was generally at or below their usual standard. The two groups that did write in a cooperative way completed sophisticated texts of a well standard above their previous competent standard.

In discussions about the roles played within the groups the dominant boys explained that they ignored the roles and took control of the game because of their impatience with the other team members. Quick success with the problems of the program was seen as justification for behaviour they acknowledged as inappropriate. The same group expressed a disappointment in the non-lethal nature of the adventure. The children universally enjoyed the detailed and realistic nature of the world created citing the graphic environment and the difficult puzzles as examples of what motivated them to engage so deeply with the adventure..

Lessons of the first trial

The first trial helped to shape the second. The program had been shown to be useful in stimulating a wide range of literacy learning outcomes. The problems arose from the structure and management of the adventuring groups. Some of the issues addressed in the design of the second classroom trial were:

- a stronger focus on Myst as a text to shape the content of the student's writing and on the writing and drawing processes used by the program's authors,
- role definitions with clear responsibilities to other group members described and practiced as the adventure was introduced to small groups,
- early encouragement of a cooperative environment with timetabled weekly sharing sessions and student creation of "clue cards" as cryptic hints for their peers and an opportunity to resolve any conflict was built into seat work time,
- writing tasks both at the adventure and back at desks more clearly described and monitored,
- the Myst Story 1 and 2 sheets were retained to provide a first draft structure for the childrens' narrative and recount texts and to provide feedback on the students experiences with the program.

4.2 Second Trial in a Country School

This Year 4, 5 & 6 class is in a rural central school in a farming area in NSW. The class has a high level of access to technology and operates with a cooperative learning philosophy. This large class of mainstream students were grouped in a two teacher double classroom. The class tradition of cooperative learning meant the groups of students were chosen randomly. This allocation method meant that students from across the three grades might be working together. The groups could be of single or of mixed gender. The trial began in the second term of the 1995 school year.

Teaching Plan

The author initiated the trial and then left it with the classroom teachers. He introduced the teachers to the program and the intended learning outcomes were discussed at some length. The aim was to provide students with a chance to write for a number of purposes demonstrating the genres or text types of recount, procedure and imaginative narrative. A display space was created to provide a focus for the publication of the student's writing. A large print of the map from the Myst island library was the centre piece of this display.

Introducing the adventure to the students

In the space of a few days one or two groups at a time were introduced to Myst. The author showed the Making of Myst Quicktime movie. This recount was intended to show that the people who wrote the adventure used the same processes that the students were going to use. Roles within each group of three were outlined, the activities to be completed before, during and after each session with the adventure were discussed. The logistics of loading and saving were practiced.

Introducing Myst

- The Making of Myst (big) movie was played and the process of the creation of the adventure was discussed. The brothers discussed their ideas, wrote storylines, drew illustrations and maps and discarded a lot of material.

Group roles and responsibilities

- Pilot - Controls the mouse but does not act till there is group agreement.
- Journalist - Writes notes for the group's recount of each session.
- Artist / Cartographer - Draws the diagrams, maps or illustrations for the recount.

Establishing group processes

Before the session with the adventure

- Finish the previous recount text and submit this to the class teacher.
- Publish as part of a class Myst journal specific to each location.
- Discuss what is to be done in the next session.

During the session with the adventure

- Agree on roles which are to be rotated each turn.
- Make plans for exploration and discuss predictions of what will need to be recorded.
- Assist other group members e/g the journalist with construct recount notes.

After the session with the adventure

- Discuss the major events and any puzzles and/or solutions discovered.
- Redraft the recount text and submit to teacher.
- Contribute to the class publications as requested by teacher.
- Discuss plans for the next turn with the adventure specifying the information needed to solve the current puzzle.
- Resolve any disagreements.

Continuing the adventure

- First weekly class sharing meeting was run by the author and the class teachers.
- Students reported on their first experiences.
- Students predicted what the exploration would be like and some recounts were read out and information shared.
- A chart of group tasks (as above) was added to a large wall map of Myst island.
- A blank exercise book similar to the blank journal the authors provide with the Myst package was given to each group.
- The purpose of "location specific" journals were discussed with the students.
- A roster for group use of the program was finalised and displayed.

Results of the second trial

The students completed the Myst Sheets 1 and 2, work samples were collected and a several groups of students were interviewed The interviews were transcribed and used to determine the students reaction to the adventure and the writing tasks they were asked to complete.

This trial had a much more positive set of outcomes. While the younger members of the three grade classroom lost interest in the adventure the more senior members were able to continue. They were able to construct the three types of text with minimal help from the classroom teachers. In interviews recorded two months after their trial finished the children were able to recall in detail the string of events that their adventuring in the adventure had created. They had definite opinions on the positive value of the experience for the writing tasks that were involved. They were less impressed with a rigid implementation of the group roles and recording of the events of their adventuring. They reported that the rotation of duties would sometimes be abandoned after the group members had settled into preferred roles. They complained that the requirement to stop, consult, reflect and write in the journal was too cumbersome and got in the way of finding effective solution to the puzzles in the adventure. When the girls in the interview group were asked about the lack of active female characters in the adventure scenario they responded that this didn't matter so much because they "liked the way the game was played". When questioned on this point they said that they liked the collaborative nature of the decision making required to play the game and the detail and depth of the stories embedded in the adventure. Generally the children had used their experiences in the adventure to write imaginative narrative that were of the usual high standard for this class.

Lessons of the second trial

The value of the program as a stimulus for literacy learning, the small group structure and confirmation of cooperative group functioning were demonstrated in the second trial. The elements of both school trials that were build into the university trial include:

- Use of the Myst as a learning environment that engaged primary students,
- The small group roles were effective and manageable,
- The program was a stimulus for a range of writing tasks (Journal, "Clue Cards", Myst Sheets 1&2 and a imaginative),
- The wall display as a focus for publishing students' writing and as the first big clue in the production of Clue Cards,
- The use of Myst for these learning purposes had the credibility of being trialed in different types of school settings.

5 THE UNIVERSITY TRIAL

For the 1995 first semester intake of teacher education students initial contact with educational computing was part of a compulsory subject called "Foundations of Literacy and Maths". This subject was delivered during tutorials lasting an total of four hours a week for 13 weeks. The tutorials were divided into two hours of Introduction to Childrens' Literacy and two hours of Introduction to Elementary Mathematics. Educational computing activities were used in these tutorials to illustrate the principles and classroom strategies being discussed. An assessment task worth 20% of the subject grade was designed to draw on what the students had learnt during both aspects of the subject. In addition the subject was intended to satisfy the university wide compulsory "computing competencies" (UWS, Macarthur 1995 Calendar p. 137) The assignment was intended to demonstrate good teaching practice suitable for using this type of software as a part of literacy learning in an elementary classroom.

Teaching Plan

Aided by lecturers and written support material, the students were asked to spend at least ten hours outside tutorial time exploring a popular CD-Rom based adventure program that emphasised problem solving within a narrative. They were asked to use this experience to create a variety of written products that reflected their experiences within the program. Of the 154 students who completed the assignment work samples were collected from 135 (88%) who were divided into 66 groups.

Only one lecturer on the Foundations of Literacy and Maths team was an IT specialist. Other lecturers had an some classroom experience of educational computing and were supportive of the assignment. The subject had previously had a pattern of a one hour lecture, one hour "computing across the curriculum" tutorial and two hours shared literacy and maths tutorial per week for 13 weeks. In 1995 the subject moved into a pattern of two hours tutorial for each of literacy and maths with no lecture or discrete computing tutorial. The use of this program was in part a response to the changed pattern of the subject.

The lecturers attended an inservice session on the program and were introduced to playing this CD-Rom adventure. For most it was the first time they had used a CD-Rom of this type. The inservice covered the links to their subject area and the school curriculums, the tutorial script and slideshow presentation and the nature of the assignment tasks. Not all lecturers were able to attend this inservice.

The students were introduced to the program through the tutorial. Additional time in tutorials was later requested by the students and provided as the deadline for the assignment came closer. A significant amount of support material was provided to the students. This was initially done because the adventure was being used as part of an assignment task. It was reasoned that students who did not have an enjoyment of computer game playing should not be disadvantaged. Solving the Myst puzzles was not part of their assignment and so the solutions were provided both as a hints program and a paper based "click by click" walk through of one section of the adventure.

Support material for the lecturing staff and students included

- Myst tutorial presentation as a Claris Works slideshow
- Myst Tutorial and Computer Based Text tutorial script
- Myst Assignment Outline and part of the subject outline and as OHP transparencies.

Support material for students included

- Myst Hints Hypercard Stack by Simon Poisson
- The Journal of Myst, a hints factual text by Andrew Jessup and a group of students form the first trial school
- Johnny and Bud, a imaginative narrative by Mathew, Bronywn and BHJ also form the first trial school
- Myst Tour of the Stoneship Age as a "mouse click by mouse click" walk through of the minimal journey through the adventure needed to complete the assignment.
- Myst Prompt Sheets
    - Myst Story 1 - Narrative draft
    - Myst Story 2 - Personal recount
    - Myst Story Starter - Narrative draft

Results of the University Trial

The students were asked to complete the Myst Sheets 1 and 2 as part of their assignment. These have been collected and analysed for common comments and responses to the experience as a whole. As in the trial schools work samples have been collected and compared.

The university students found that they were initially frustrated by the ambiguity of the adventure but given time and some success became enthusiastic about the inspiration it provided for their writing. A high proportion of the cohort (45 out of 66 groups who returned the survey) specifically mentioned variations the word "frustrated" in describing their experience with the adventure. The cohort also reported that as they became more comfortable with the adventuring they began to enjoy the experience and got a heightened level of reward perhaps because of their difficult beginnings.

> "Frustrated, Relieved, Distressed, Excited, Sense of achievement, Enjoyable" (Group 33)

> "Honestly it was very frustrating, however very enjoyable and extremely challenging" (Group 25)

They were impressed by the graphics technology of the adventure and the inclusiveness of the interface. The students found the small group structure to be very supportive, a way of sharing the workload and of being more successful in the adventure. This was a useful insight to the nature of group tasks in a university setting.

> "Working in pairs was more rewarding, one played one wrote. If one missed information the other might pick it up" (Group 39)

There was a contrast between the university students and the school students approach to these experiences. The school students plunged enthusiastically into the game and engaged deeply in the adventure to solve its puzzles. The university students came reluctantly to the technology and many played only as much of the game they needed to complete the assignments. There was a small group of teacher education students who organised a "Myst Game Day" after the assignments were done because they wanted to be free to play the game without the compulsion of assessment tasks. Where the school students found the writing tasks a chore that got in the way of their enjoyment of the "game" the teacher education students found delight in writing the journals and the stories because these were familiar tasks and they were well prepared by their experiences in the adventure.

6 PERMEATION OF ITTE AT UWS, MACARTHUR

There are some lessons from this use of school trialed IT strategies for the design of university level teaching and learning in the permeated model. They may be summarised with the following points.

- The trial at UWS, Macarthur pointed to the reluctance of teacher education students to 'engage" with computer programs beyond utilitarian purposes like word processing - This is a problem for future practice because real integration into learning (what we are trying to demonstrate) comes best with higher order programs such as adventures and simulations hence the choice of Myst as a future style of simulation and adventure. If permeation is to happen it has to be at the level of integration with curriculum and not as a clip-on application like "word process this assignment."
- The provision of detailed support didn't work and won't work if the university students won't use what is provided. A better way of signalling the existence of such support to teacher education students might be to provide the lecturers in the teaching team with "in class coaching" as a professional development strategy. In the terms of Joyce, Weil and Showers (1992) this would help "build communities of professional educators" (p. 381) who were able to develop effective use of IT in their classrooms. The primary students didn't need it support.
- There were problems with the design of the assignment. It was too complex with many small tasks to make up the whole experience. It was meant to demonstrate that a set of tasks can be linked in a classroom as a way of providing momentum to students work. The university students saw them with "secondary students' eyes" as hurdles in a race to finish an assignment.
- The lessons from the primary students' trials are;
  - allow for the fun
  - don't be too prescriptive in the processes you expect the small group to use
  - expect that the school students will be your teacher and be open to their suggestions for improving the use of IT in their classrooms.
- Within a teacher education faculty the implementation of a permeation strategy must be lead by an evangelist who has the support of the leadership of the faculty and who is skilled in supporting adult learners. Such an evangelist has a key role to play in the design of courses, subjects, lecturers and tutorials. Some of the practical support for lecturers who are novice users of educational computing there may be in the form of;

- detailed scripts of the tutorial activities
- prepared resource collections eg. OHP's, software, handouts of students activities & other print resources.
- phone support during preparation phase
- team discussions of outcomes of tutorials

6.1 Evidence of permeation at UWS, Macarthur

During 1995 there was a change in the approach of many lecturers to the way they used It in theory, teaching and the subjects for which they were responsible. Some evidence emerged that the permeation process was beginning to work. Something akin to Pratt's (1993) evolving permeation was developing among the staff. The signs include;

- The establishment of an IT committee within the faculty structure.
- This voluntary committee attracts membership from across disciplines within the faculty
- The permeation model is inherent in the terms of reference drawn up by this committee and endorsed by a general meeting of faculty staff
- Educational computing experience in now included in the Desirable criteria for most new lecturer positions advertised by the faculty
- More research applications of a cross curricula nature
- Permeation within subjects continues in the absence of the evangelist and specialist staff

Concluding Comment

It has become a truism that human society is moving into an Information age. The implications of the development of information processing technologies for society are manifold. (Spender 1995, Negorponte 1995, Ong, 1982) Spender posits the demise of print as the main medium for information transfer and suggests that the nature of learning and the current support structures for learning will change. She suggests that the "concept of a (university) degree will become rapidly and increasingly inappropriate." ... She believes that the qualifications offered by degrees is "based on the premise that you could be trained once and that was it. These days, there is wide spread recognition that learning is an ongoing process." (p. 138) Teacher educators are in a privileged position to responding to these imperatives. They are able to offer experiences to their students that will help them in turn prepare their students for the changing world.

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Co-operative Learning and Computers at Batlow

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Abstract

Over the past four years an innovation in teaching and learning has been quietly developing in a school on the western slopes of the Snowy Mountains. Batlow Technology Central School has sought additional funding to provide a high level of access to laptop computers for its primary students.

One of the outcomes of the introduction of technology into the primary classes has been a challenge to the long established teaching practices within those classes. (NBEET 1994) The teachers of those classes to have had to redefine their roles in light of the changed learning patterns of their students. (Braggett et al, 1993, Nanlohy and McLean 1994) This paper reports on the views of the teachers about how the saturation of their classes with technology has changed their teaching and their students learning.

A brief history

Beginning with a Year 3 class in 1992 the school has provided a computer for each student in the laptop project. In 1993 the project was expanded to two classes who were organised as a two teacher double class that drew students from Years 4 and 5. In 1994 a second double class was established for students from Years 2, 3 and 4 while the original double class now had children from Years 4, 5 and 6. In 1995 a similar class has been established in the secondary department. This class has all the year 7 and year 8 students and is called Stage 4.

As the numbers of children in the laptop classes has expanded so to has the number of laptop computers been increased. This has not been a purchase of one computer for each student. The available resources have been increased but are shared between classes so that when the computers are being used each students has a their own machine.

This is an important point of difference between the Batlow Laptop project and computer saturation experiments in other schools. (Dwyer et al 1991, Dwyer 1994, Grimmett 1992) The experience of two SUNRISE project schools might serve to illustrate. At the Methodist Ladies College at Kew in Melbourne all students buy or lease a computer of which they have personal ownership. (Grasso & Fallshaw 1993, Loader & Nevile 1993) At Coombabah school in Queensland the computers were provided to the participating students but they were encouraged to take them home and use them away from the school environment as well. (Betts 1992)

Evaluations of the Batlow project students' performance in basic skill areas (McLean 1994a & b) and attitude towards computers and competence in Logo programming (Braggett et al, 1993) are similar to these found in the Coombabah project (Rowe 1993). The Batlow students' basic skills have been maintained within the usual levels for children of these ages (McLean 1994a) and their computing competencies, particularly their typing skills and Logo programming skills have developed along similar lines to the Coombabah school students.

The present investigation

In November 1994 another step in the continuing evaluation of the school's Laptop project was completed. A researcher from outside the school combined with a teacher in the Laptop project to attempt to develop a better understanding of the influence on the technology on the teaching and learning styles within the classes. The researcher was given free access to the physical environs and decision making forums of the school and spent three days talking to students, teachers and some of the parents. The researcher was also able to spend time teaching in one of the project classes.

Two main evaluation strategies were used. Firstly, the Learning Preferences Scale - Students (LPSS) was administered for a second time in six months. The first placement of LPSS was held in the last weeks of Term Two 1994 (Nanlohy & McLean 1994). The second evaluation strategy involved recording extended interviews based on a set of questions negotiated with the project leaders. One set of interviews were conducted with three teachers involved with the Laptop project. An informal interview was held with one other project teacher. Another set of interviews, with modified questions, was conducted with individuals who were stakeholders in the project but who were not teaching in a laptop class. These interviewees were, the principal of the school, a parent of children in the laptop classes who was also active in the life of the school and a teacher from the secondary department of the school.

The limitations of this research

This paper is based on the observations and interpretations of the authors alone. It is therefore anecdotal in nature and relies on the LPSS survey, field notes and recordings made during the visit to the school. It also draws on evidence collected during three short visits over a two year period and on documentation produced as part of the Laptop project evaluation (McLean 1993, 1994, McLean, Mouat & Betts 1993). The in-school experience of the authors is confined to the Stage 2 and 3 classes. Further analysis of the LPSS instrument results and of the interviews with stakeholders may refine or modify the following observations.

Identification of issues

The two main issues raised by the discussions with the teachers at this stage of the project (November 1994) were the value of these technologies in children's learning and the evolution of a cooperative learning culture within the project. These issues are not easily separated in the day to day running of the project classrooms. Several teachers indicated that the technology was embedded within the learning culture and practices of the classes they taught. They believed that the children's learning would be hampered if the technology was withdrawn.

An additional issue relating to the progression of Year 6 children from the project into the secondary department developed during the November visit. A key staff meeting in which this issue was discussed was attended by the authors who then sought comment on this next phase in the school's Laptop program from a set of interviewees not involved in teaching in the primary classes. This may be a fruitful area for future investigation.

The issues to be discussed in this paper are:

- The use of laptop computers in children's learning at school.
- The developing cooperative learning culture in the Laptop classes.
- The inter-relationship between cooperative learning and personal Laptop use.

Use of Laptop Computers - Some Classroom Observations

The use of laptop computers has evolved into a pattern of individual use followed by shared use. Individual use was limited to a small number of programs. The program most often seen was LogoWriter which was used as a word processing and a programming environment. The authors observed a structured typing lesson with a dedicated typing program. Some small use was made of the integrated application Microsoft Works. The children also had available to them "games "such as arcade style maths drill programs which were owned by individual students and not supplied by the school.

In the editing stage of a project of class work students were seen sharing one computer, usually to assist discussion in pairs or trios. Teachers commented on the value of the computer screens as public work spaces and suggested that the students were comfortable with sharing their work in this way.

When challenged with the assertion that they were limiting children's use of technology by using a small number of programs, the interviewed teachers responded by pointing to the diversity of class experiences enjoyed by the children and to the work samples they had produced. They suggested that these few programs worked in concert to provide a tool that was easily mastered by the children yet was flexible and open ended in its application. A collection of children's work samples in the 2nd Laptop project report (McLean 1994a) shows a wide integration of these few programs into Key Learning Areas.

Three levels of use of the technology have been observed by one of the teachers in the Laptop classes. The least active group tended to use the computers to produce a limited range of final products. The computers were used as typewriters and as drawing tools. This group may be termed Integrators as they have successfully integrated the use of the laptops into their class work. A second group, who may be called Adopters, were able to extend their learning through the personal use of the technology. They edited drafts of writing and used Logo procedures supplied by others to solve mathematical problems or to demonstrate research in other KLA's. They had adopted the technology as a personal tool. The most advanced group may be referred to as Amplifiers. This group were exemplified by those students who invented new Logo procedures that could be applied to a number of problems and who could explain the use of their inventions to others. These levels are similar to the four levels of use observed by Rowe (1993 p 167-170) in her study of the Coombabah SUNRISE project.

A Cooperative Learning Culture

Several comments were made to the effect that it would no longer matter if the laptops were taken away from the teachers. If they were placed in a class with low access to technology they would continue to use the cooperative learning techniques they had learnt in the Laptop project classes. Teachers saw themselves as purposefully pursuing a program of cooperative learning in their classrooms and in their personal professional development.

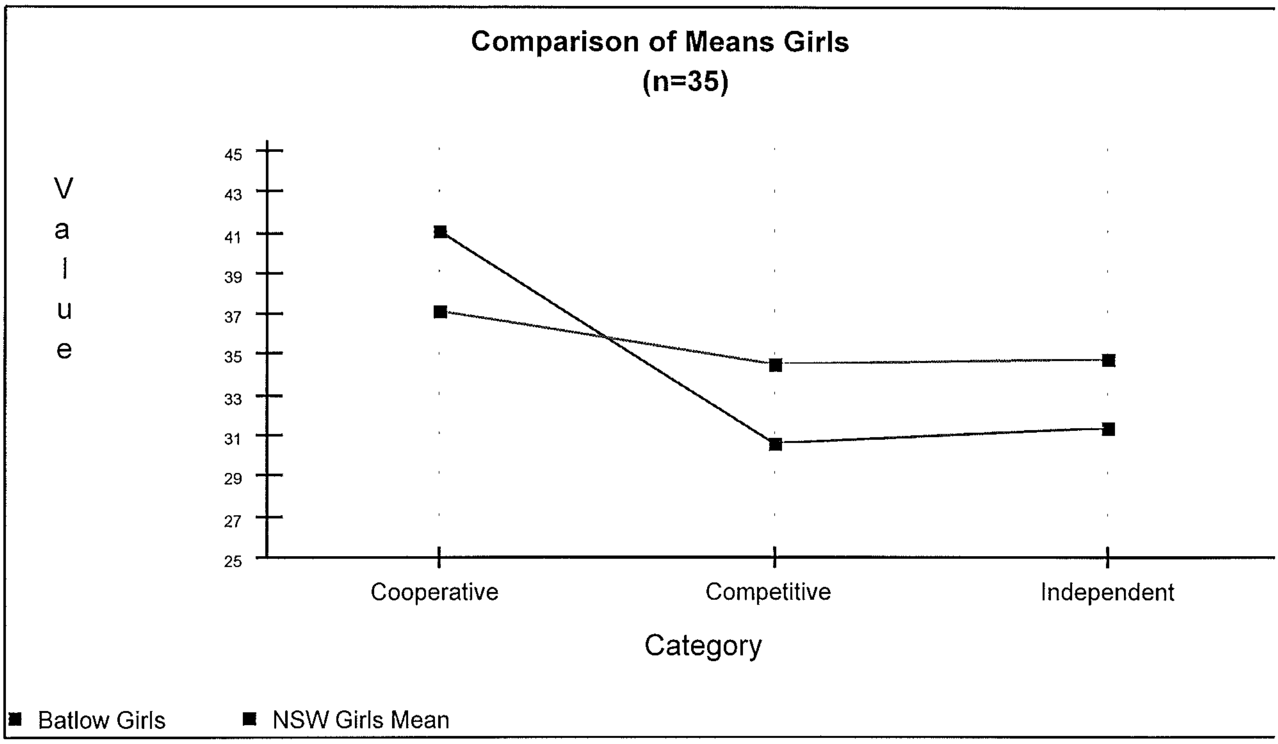
There has been a significant professional development program in the schools that has supported the adoption of cooperative learning (Nanlohy and McLean 1994). One of the interviewed teachers described how cooperative learning seemed to fill a gap created by the introduction of the Laptops and the schools new status as a Technology Central School. A friend of this teacher had completed a "train the trainer" course in co-operative learning and was looking for an opportunity to run a school based inservice course. This person was asked to lead a staff development day at Batlow. Several mentions were made of the importance of a recent four day inservice in cooperative learning that a number of teachers attended in Wagga. The replication of such inservice was mentioned by one teacher as an important prerequisite to the introduction of the Laptop program into the secondary department.

The interviewed teachers mentioned the importance they attached to the collegial support that they had given each other during the project. The regular after school gatherings called "Co-Operative Learning Team" or "COLT" meetings had grown to at times include most of the primary staff and a growing number of secondary teachers. However the after school timing was a difficulty for some. Mention was made in a number of interviews that many teachers who lived in nearby towns travelled in car pools and that this limited freedom to stay and participate in the COLT meetings.

Anecdotally the students of Batlow are seen as being more cooperative and helpful than other students of their region. It was reported that teachers visiting the school with local sports teams or as casual teachers had commented upon the high level of cooperative behaviour of the Batlow students.

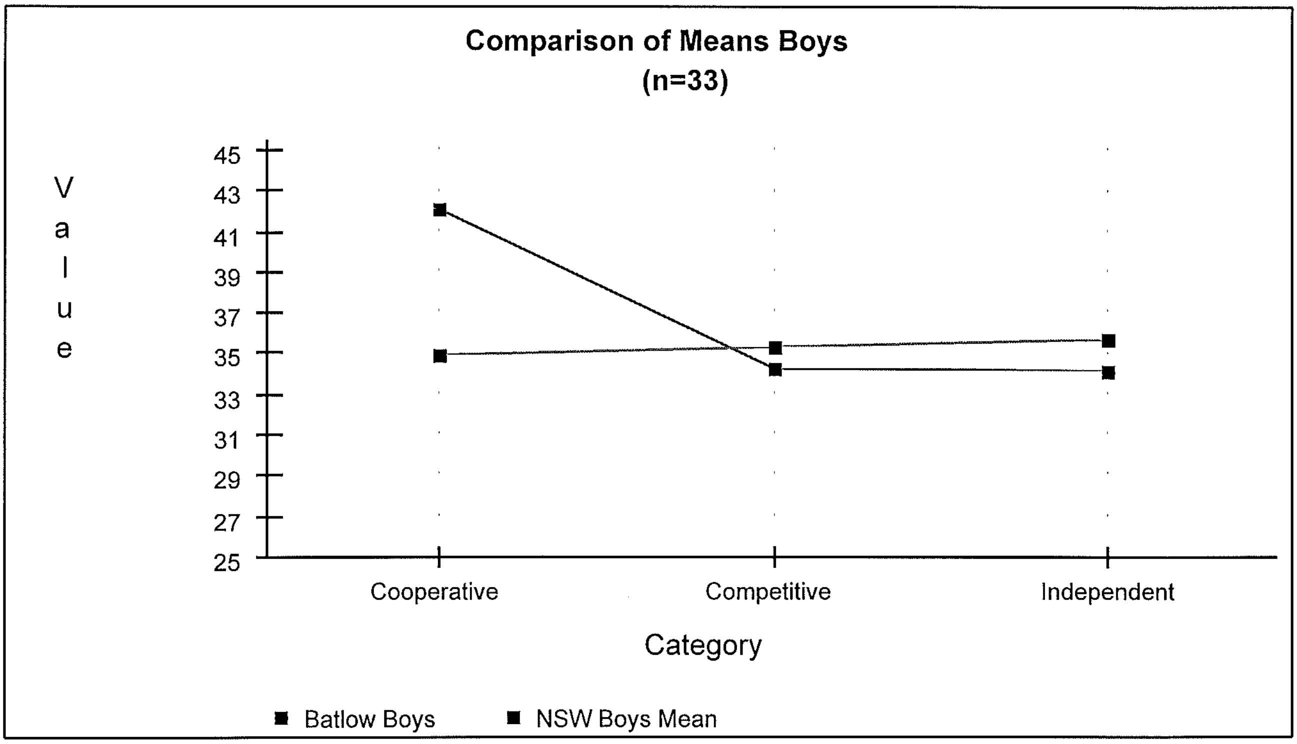
The Learning Preference Scale Students (LPSS) Results

The results the second application of the LPSS scale comply with the results of the first LPSS delivered in the school in June of 1994. The high level of cooperative preference continues to be demonstrated.



Measure	**Coop**	**Comp**	**Indp**	**Coop In**	**Coop%**	**Comp%**	**Ind%**
Batlow Girls	41.1	30.6	31.3	10.5	72.6	32.3	37.1
NSW Girls Mean	37.2	34.5	34.8	-0.29			
Difference	+3.9	-3.9	-3.5	+10.8			
as percentage	10.8%	-11.3%	-10.0%				Table 1

The mean score results of the LPSS have been compared to the state norm means as published in the instrument handbook. (Owens & Barnes 1992) The separate girls and boys results are summarised in Tables 1 and 2. The most dramatic difference is the cooperative learning preference of these students. The girls mean scores are about 11% above the state norm and the boys are about 20% above. In both groups the difference between cooperative and competitive preference scores is about 22%. This preference of cooperative learning is to be expected given the classroom practices these students experience. The teachers have seen the cooperative skills training that they have given the children as an important prerequisite to the whole operation of the laptop project.



Measure	**Coop**	**Comp**	**Indp**	**Coop In**	**Coop%**	**Comp%**	**Ind%**
Batlow Boys	42.1	34.2	34.2	7.8	83.1	46.6	45.8
NSW Boys Mean	35	35.3	35.7	-0.29			
Difference	+7.1	-1.02	-1.51	+8.1			
as percentage	+20.3%	-2.9%	-4.3%				Table 2

The relationship between Cooperative Learning and Technology

It seems that for the students the Laptop technology has provided the main benefit of the project while for teachers the adoption of a philosophy and practice of cooperative learning has been the main outcome. While teachers were happy to contemplate teaching without technology they believed that their students would not now be able to learn as effectively has they have been if the laptops were removed.

"The process was described ... as follows. The introduction of the laptops lead to an increase in peer tutoring and tutoring of the teachers by the students. This was accompanied by a decrease in teacher-centred instruction. The cooperative learning focus was crystallised by a particular inservice event and the establishment of the COLT collegiate group. The innovation continues because it is successful in meeting student, teacher, school and community needs." (Nanlohy & McLean 1994)

From statements made in the interviews it seems that the introduction of the technology unsettled long familiar teaching practices. Part of the response of teachers to the technology was to reassess their teaching methods. The prompting of early visitors and the teacher in residence seems to have set the teachers at Batlow on the path of developing cooperative learning practices. These suggestions fitted with the development of peer tutoring by the students and with a changing role for teachers. The project teachers have for established their own forum for the exchange of ideas and have been determining the direction of the project through this and other in-school decision making processes. While the school sought ideas when the project started they are now judging all the ideas they come across (eg the 4 day inservice) by the standards of the project they have evolved.

Several teachers commented that the use of the technology and the cooperative learning practices were closely linked for the students. They suggested that the social and cognitive skills necessary for autonomous learning were best bought together when technology was used in a cooperative learning setting. The social skills inherent in cooperative learning enhanced personal and shared use of the technology for learning. The laptop computers provided personal ownership of a means of production of school work that was in a form that supported interchange of ideas between students. For example, a LogoWriter file could be copied to a number of computers and the ideas for editing that file developed and discussed simultaneously.

The Difficulties of Technology and Cooperative Learning

The teachers also commented on some of the negative aspects of working in the laptop project. Some of these were attributable to the technology and some to the changed working environments that the cooperative learning practices had created.

The technology itself was a significant challenge to many of the laptop project teachers. Several commented upon the need to rely on students for advice on programming and computer operation. This was given as one of the reasons who a cooperative ethic had evolved in the classrooms. Several suggested that the computers were not and would not be as useful to themselves as to the students. Some suggested that the introduction of the Laptop computers was a "fait accompli" when the school assumed its Technology school status and that they had had to simply get on with their teaching in this new work environment..

The increased dedication of the students to their learning and the increased production of end products was mentioned by the teachers. The marking load had increased because the students wrote so much more when using a word processor and got more deeply engaged in their project work. The teachers explained that they were being met at the door of their classroom early in the morning by students wishing to start work with their laptops. They described how they had to actively shoo the students out of the rooms at lunchtime. The researcher observed this happening and timed the 6 minutes that it took to clear the Stage 3 room one lunchtime. Even at the end of the day the teachers reported that some students were reluctant to leave. While explaining that these changed student expectations were welcome they were also very tiring and did not seem to abate with the passage of time.

The parent interviewed commented in favourable terms on her children's adoption of the laptop as a learning tool. Her thoughts were echoed by other teachers who were also parents of children at the school who commented on the increased excitement and pressure to succeed that their children showed at home.

In general the teachers reported very positive feedback from parents about the project. This high regard had some difficult consequences. The teachers felt that there was an expectation that the project would keep going but they were unsure about how this would happen. They felt that the community wanted all students at the school to have access to the technology while they thought that some parents worried that the resources devoted to the technology would be better spent in other ways.

The project continues
In 1995 the Cooperative learning teaching style adopted by the Laptop project has been extended into the secondary department of the school. All the students in Year 7 and 8 are following a cooperative learning pattern and have been grouped into one Stage 4 class. The Year 7 students have had some experience of this way of working but the Year 8 students have not.

They educational benefits to students of the laptop project have largely been based on the freedom to work in new and engaging ways. The current direction of the innovation at Batlow is breaking new ground. Will the new mixed Stage 4 class be able to continue cooperative learning practices in a secondary learning environment where content on learning is so much more prescribed?

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The integration of IT into teachers' decision-making

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Abstract

The teacher-thinking framework has rarely been applied to research concerning the integration of IT into teaching and learning. This paper explores two main aspects of teachers' decision-making where the integration of thinking about IT can have a major impact on their classroom effectiveness: the planning of teaching and learning activities, and the monitoring of student progress during a lesson. Shulman's framework based on different forms of teachers' knowledge is used to examine the current barriers to teachers' integration of IT into their planning. In particular, the consistent finding that experienced teachers merely assimilate IT into existing approaches to teaching topics is considered to result from teachers' reliance on curriculum knowledge and content knowledge of IT, together with a general pedagogical knowledge which does not allow them to exploit IT fully. Further illumination of classroom issues is provided by McIntyre's concepts of 'normal desirable state of student activity' and of 'student progress'. This theoretical analysis leads to practical conclusions concerning future research and the design of in-service and initial teacher education programmes.

Keywords

Information technology, teacher thinking, subject knowledge, pedagogy

1 INTRODUCTION

The evidence for the learning benefits of IT in the curriculum steadily mounts, but the failure of most teachers to make significant usage of the computer in the classroom at secondary education level is also well documented. This is not a paradoxical situation, since the studies which provide the evidence for learning gains have mainly been carried out in laboratory-style environments, or in the classrooms of teachers who have either been nominated as being particularly effective, or who have willingly come forward to participate in action research, technology innovation or curriculum development projects. Even in the naturalistic studies like those of Olson (1988), the teachers "volunteered to 'adopt' the computer". In the absence of extra support from an expert advisor or project team, it seems that relatively few teachers make significant use of the computer in the natural course of teaching and learning.

In any case, there is no reason to believe that mere usage of computers will result in improvements in learning, nor that studies of usage will divulge any useful evidence about how the promised learning benefits can be achieved. The ImpacT project (Watson, 1993) looked at a number classrooms with 'high' IT usage and a number with 'low' IT usage. The overall findings were inconclusive, and the greatest illumination was provided by a small number of detailed case studies. These indicated "the importance of the interaction between hardware/software availability and use, and the role of classroom organisation and management and teaching styles". Cornu (1993) calls for an "integrated pedagogy" which "uses new technologies as a fundamental component. Evidence concerning integrated pedagogy is rare, however, and we need frameworks within which to identify and analyse qualitatively the factors involved in the effective integration of IT into teaching and learning.

2 FRAMEWORKS FOR STUDYING IT INTEGRATION

There are many studies concerning the factors influencing teachers' take up of IT (see Gruneberg & Summers (1992) for a review of these), and it is possible to identify frameworks for the study of IT in education which are quite well developed, such as those concerning the 'impact of technology on learning' and the 'institutional support for change'. There has been relatively little attention paid to the 'teacher thinking' framework, however.

Veen (1993) has identified the importance of teaching styles and of teachers' beliefs about their subject and about teaching in general. He highlights the extent to which teachers assimilate IT into existing styles of teaching, and change beliefs only slowly. Carey and Sale (1993) investigated teachers' change to a more 'facilitative posture' when teaching with IT, but found no significant difference. Although Sherwood (1993) found that many teachers who had integrated IT had changed styles in response to the computer, these teachers seemed to have beliefs which pre-disposed them to change and made them highly motivated. Offir and Katz (1995) further highlighted the significance for IT integration of teachers' general motivation to innovate and change practice.

Whilst there is consistent evidence that most teachers are now favourably disposed to the idea that IT can improve learning in their subject, teachers also give consistent responses concerning the barriers to use of IT in their classrooms which they perceive. The list of obstacles almost always includes difficulty of access to computers, software unsuited to the curriculum, and lack of time to prepare lessons with computers (see, for example, Pelgrum & Plomp (1991)). Yet it does not appear that merely providing hardware, suitable software or time to develop skills and plan lessons will enable teachers to fully exploit the undoubted potential of the technology to enhance teaching and to give learners more opportunity to satisfy their individual and group learning needs. Research into in-service teacher education consistently finds that teachers request that more attention is given to classroom implementation.

In order to illuminate these issues further, I shall explore the issues of IT integration within teacher thinking constructs under two main headings: planning lessons and monitoring student progress.

3 EFFECTS OF IT ON TEACHER PLANNING

It is now normal for IT to be integrated into the **planned** curriculum, particularly in England, Wales and Northern Ireland where the learning of IT is part of the statutory requirements and the national curriculum organisations have encouraged a integrated approach. In most cases, these curriculum plans result in IT being part of the curriculum which students receive. But the quality and quantity of students' experience is very varied (OFSTED, 1995), and if the effectiveness of learning with IT is to be improved, teachers must develop the knowledge which enables them to integrate IT into their everyday planning and decision-making.

Shulman (1986) identifies three types of subject knowledge relevant to teaching: subject content knowledge (the facts, concepts and structures of the subject concerned), curricular knowledge (understanding of programmes and materials designed for the teaching of particular topics at particular levels), and pedagogical content knowledge. This last form includes "the most powerful analogies, illustrations, examples, explanations, and demonstrations ... the ways of representing and formulating the subject which makes it comprehensible to others ... an understanding of what makes the learning of specific topics easy or difficult ... the preconceptions that students of different ages and backgrounds bring with them to the learning". Wilson, Shulman and Richert (1987) extend the list of forms of teachers' knowledge to include knowledge of other content, knowledge of educational aims and knowledge of learners. Although all these suggested forms of knowledge are relevant to the issues of IT in education, the subject knowledge types, together with general pedagogical knowledge, appear to have the most significant implications for the issue of integration. I will examine each of these knowledge types in turn.

Curricular knowledge of IT involves knowledge of software, resource packs, and ideas for activities. This knowledge is relatively easy to develop, and enables the teacher to incorporate IT activities into lessons. But unless the teacher can evaluate the activities and relate them to the pupils' developing concepts, they may neither illustrate, explain, demonstrate - or make comprehensible - the topic being taught. Consider, for instance, the science teacher who has obtained a spreadsheet template which models the energy flow for a room. He may be content to implement a straightforward activity where pupils insert data into the model and read off the results obtained. This would miss the opportunity for the 'What if ...' questions which will be needed for the students to gain a real understanding of the relationships amongst the variables.

So, perhaps *content knowledge about IT* itself is a more promising matter. Certainly, an increasing number of teachers are gaining subject knowledge of IT, through initial teacher education, InSET and personal use for professional and leisure purposes. However, although this may give teachers the <u>confidence</u> to use IT in the classroom, they may not be able to <u>transform</u> their knowledge for pedagogical purposes in the way that Shulman (1987) describes. Furthermore, few teachers are developing conceptual knowledge of informatics as a discipline, and it is debatable whether the sort of limited experience and training that is available to most teachers will enable them to construct representations of IT concepts which are adequate to support pedagogical reasoning and action. Consider the history teacher who has learned informally to retrieve bibliographic information from the library using IT, and has received training on the setting up of a file of census records from the 19th Century. She still has some way to go in order to be able to plan an appropriate sequence of instruction and activities for pupils which enable them to pose suitable hypotheses and provide evidence for or against them using this new source of primary data in addition to the more familiar media of text and images.

The integration of IT into *subject content knowledge* is more difficult to achieve, since IT must become part of the way the teacher knows his own subject. For instance, Carey and Sale (1993) quote Becker's (1990) finding concerning teachers of English in US schools that "most lessons related to composing and expressing ideas in writing do not involve the use of computers" and that lessons involving IT "focus on teaching students how to use word processing programs", rather than on the effective or creative use of language. And, whereas, traditionally, mathematicians have come to know about graphical representations of functions through laborious plotting of points and drawing of curves, students can now come to know this topic through typing the relevant formula into a graph plotting program. This difference may well make a fundamental difference to their thinking about whole areas of mathematics. There is a vicious circle operating here; IT can only be part of the way one knows a subject if one has learnt through the use of IT oneself. The more recent entrants to the teaching profession may be in this position, of course, and we must hope that the current impetus for HE to integrate IT into teaching in learning will help break this cycle of IT deprivation. Currently, however, there is little sign of even young student teachers thinking about aspects their subject through IT-based representations.

The role of IT in *general pedagogical knowledge* is covered well by Somekh and Davies (1991), as they set out the changes in pedagogy which may be necessary in an IT learning environment. Together with further points identified by Kennewell (1995), they correspond well with the sort of pedagogical practice which has been found to be most effective generally in bringing about long term learning. As an illustration, Hoyles & Sutherland's work (1989) on learning mathematics in a Logo environment highlights the general knowledge the teacher needs about managing the learning environment so as to give students ownership of their tasks and to support them in their particular approaches.

However, Hoyles & Sutherland's work also shows that merely adopting this general approach is not sufficient without the application of specific *pedagogical content knowledge* to the design of tasks and to intervention during students' work on them, in order to challenge the students' intuitive thinking and stimulate the development of formal concepts. It is this understanding of how the teacher should combine with the IT resources to help the student make progress towards specific learning objectives and enable the level of attainment to be raised.

4 EFFECTS OF IT ON TEACHERS' MONITORING OF LESSON PROGRESS

The analysis in terms of teachers' knowledge types gives us some insight into the relation between teacher thinking and IT learning environments. But there is another level of analysis which also needs to be addressed. Brown & McIntyre (1993) identify two types of concept that teachers use to determine their actions during the course of a lesson: the *normal desirable state of classroom activity (NDS)* and *student progress*. The NDS is the set of conditions of certain behavioural variables which the teacher considers the most appropriate. This is a well-developed concept for experienced teachers, and they will be able to vary the conditions desired, without any apparent mental effort, according to the class, the activity, and the stage of the lesson. Any departure from the NDS will stimulate a brief decision-making process concerning action to be taken, and in most cases will result in an intervention procedure which may be either a routine response or a more considered interaction with a student or students. The 'progress' concept is a dynamic one which allows them to monitor changes in the state of task completion or, more rarely, cognitive change in students. This concept supplements NDS in decision-making, and may cause the teacher to intervene if student progress, individually or as a class, is perceived to be unsatisfactory.

We can see here how a teacher's thinking must change significantly if IT is to be integrated into a lesson, since the IT environment changes the NDS conditions from those which she has developed and refined over the years. Furthermore, the usual signs which indicate student progress (or lack of it) may also be missing, particularly if there are no marks of paper to show for a period of activity. It has been noted (Watson, 1993; Kennewell, 1995) that pupils generally measure their progress only in terms of producing the perceived outcome of the task set, rather than in terms of their learning. In an IT environment, teachers often share this product-only view of progress and do not take the opportunities offered for improved monitoring of their students' development of understanding. The teacher must learn to recognise new conditions as desirable and recognise new signs of progress - possibly conditions and signs that would have been contra-indicators in traditional classroom situations, such as movement around the room and animated conversation between students. Although such conditions are not unique to computer-based activity, there may be changes to the way a teacher should react in an IT environment, since the computer is helping to manage the learning and behaviour of the students. In return for this help in management, the teacher can help the computer to aid student progress by intervening with probing questions and challenging tasks.

5 IMPLICATIONS FOR RESEARCH AND FOR TEACHER EDUCATION PROGRAMMES

There are many issues still to be explored concerning the link between teachers' knowledge and their use of IT. It is not clear, for instance, how the adoption of different types of educational IT application - specific CAL packages, flexible teacher tools, and generic software tools - depends on teachers' own capability with IT. We need a greater number of qualitative studies which explore the place and development of IT in teacher thinking through techniques such as concept mapping, interviews about instances, and stimulated recall.

The above analysis in terms of teacher thinking helps to explain why in-service teacher education centred on the technology or on the curriculum has been found to be inadequate in bringing about the integration of IT into lessons, and work in different countries over recent years suggests that a whole-school approach (Ridgway & Passey, 1991) and a teacher-centred approach (Owen, 1992) should be adopted more widely. Furthermore, it suggests that we should look beneath the surface of the clich' excuses for failure to use technology and give due consideration to teachers' thinking about IT in their day-to-day planning of lessons and monitoring of learners' progress. The next major steps in the widespread integration of IT should be supported by the use of the teacher thinking framework in the design of teacher education programmes. Such programmes should help teachers to develop their general pedagogical knowledge by evaluating curriculum knowledge, planning how new IT subject knowledge may be applied, and seeking feedback from the interactive classroom environment. Indeed, explicit discussion by participating teachers of their concepts of pedagogical content knowledge, normal desirable state and student progress should help them to generalise and transfer what they learn from isolated IT activities in the classroom.

We can also draw conclusions regarding initial teacher education. Veen (1993) suggests that "initial teacher training programs should be playing a more aggressive role in changing the situation", but he concludes that initial teacher education "should not aim at the 'know-how' of ... the actual use of IT in schools", and that instead, later teacher development initiatives should pursue this aim. It would, indeed, be wrong to focus entirely on **technical** know-how in initial teacher education programmes. But all the evidence discussed here indicates how difficult it is to change established practices and that experienced teachers tend merely to assimilate IT into their existing approaches. It is therefore vital that IT should gain a foothold in student teachers' nascent **pedagogical** know-how.

There is no predetermined body of pedagogical knowledge which we can just <u>issue</u> to student teachers, of course. Indeed, they will start to construct their own knowledge before their course of teacher preparation, and will continue developing it (we hope) long afterwards. Their general and subject-specific pedagogical knowledge will interact and grow together. This growth will be very rapid during the early stages of their careers, and so it is vital that IT must start to permeate their planning and decision making during the initial period of teacher education.

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7 BIOGRAPHY

Steve Kennewell taught mathematics and computing in secondary schools in England prior to a period as a specialist computing teacher and then IT Advisory Teacher for the City of Birmingham. He now lectures in IT and mathematics education in South Wales, and has particular research interests in teacher education, mathematics education, the development of IT capability, and computer modelling across the curriculum. He is joint editor of the journal Computer Education.

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Computer Science Education Based on Fundamental Ideas

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Survey

- Motivation
- J.S. Bruner's approach
- How to define fundamental ideas?
- Fundamental ideas of computer science
- Example: Fundamental ideas w.r.t. to electronic cash
- Advantages of this approach

1 Motivation

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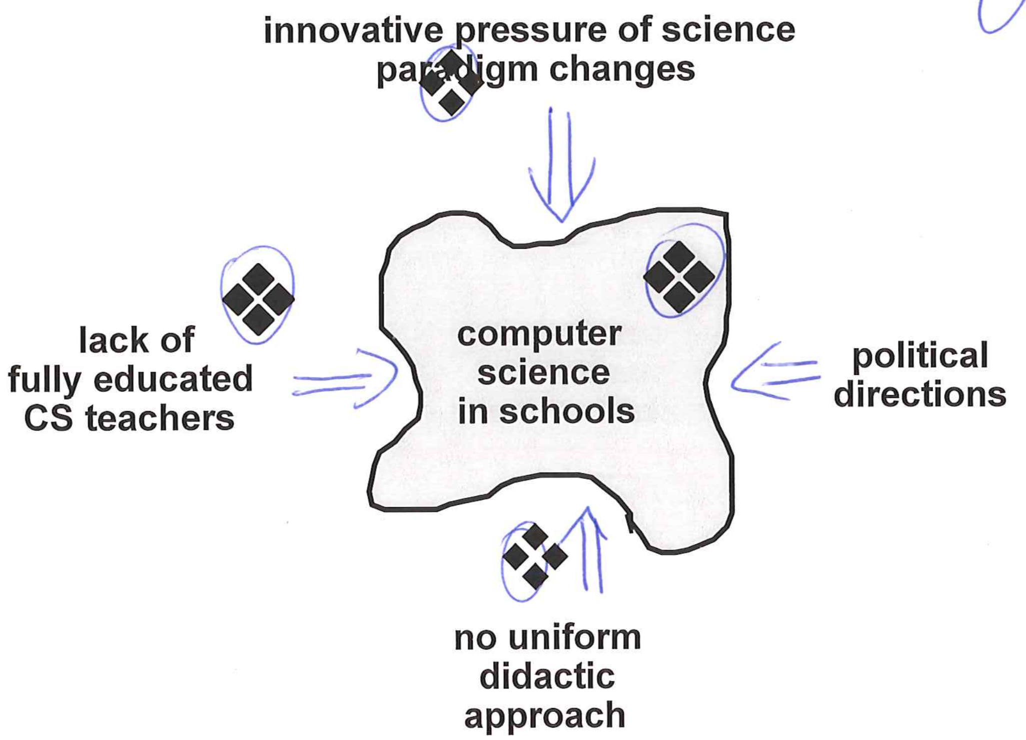


observed/ required by	old	new
Brauer 89,91	sequential processing	parallel processing
	programming as an art	programming as a science of engineering
Claus 89	structured programming	object-oriented programming
	imperative programming	declarative programming
Floyd 89,94	product-oriented software development	process-oriented software development

A possible solution:

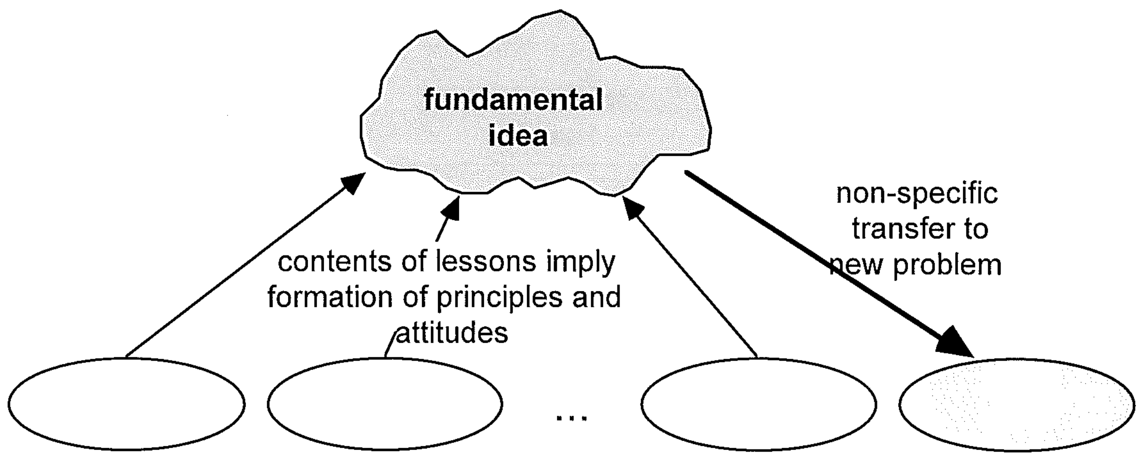
- Don't teach an **incoherent** set of recent technology-driven developments as is often done by inservice teacher education programs
- Teach students and teachers the **fundamentals of computer science** which remain valid in the long term
- Enable teachers to **integrate** new results into their knowledge structure
- Enable teachers to **assess** recent developments with respect to future relevance, school adequacy and other pedagogical issues

=> Orient lessons in schools and teacher education programs towards the fundamental ideas of computer science as proposed by J.S. Bruner 1960

2 J.S. Bruner's approach

Key notion: non-specific transfer

- long-term (often life-long) effect
- you learn fundamental notions, principles, and ways of thinking (**fundamental ideas**)
- you develop **views** and **attitudes**, e.g. to learning itself, to research, to science, to conjectures, heuristics, to your own achievements etc.
- you consider problems occuring later as special cases
- you develop a cognitive **meta-level**



Consequence:

- Orient lessons in schools and teacher education programs towards fundamental ideas.
- Check every subject what ideas it is based on.
- Stress fundamental ideas when teaching.

Problems:

- What are fundamental ideas (of computer science)?
- How to reorganize curricula and teacher education programs in order to make visible the underlying ideas?
- Which subjects are most suitable to teach fundamental ideas on different school levels?

3 How to define fundamental ideas?

Bruner's statements are poor:

- no uniform terminology (fund. concept, key idea, major concept, ...)
- no precise definition
- very few criteria
- no concrete ideas
- very few applications or examples
- transdisciplinary

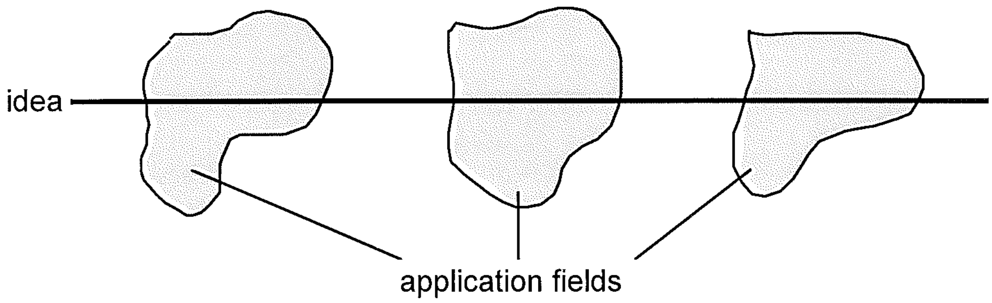
Definition

A **fundamental idea** of computer science is a schema for thinking, acting, describing or explaining which satisfies four criteria:

- The Horizontal Criterion
- The Vertical Criterion
- The Criterion of Time
- The Criterion of Sense

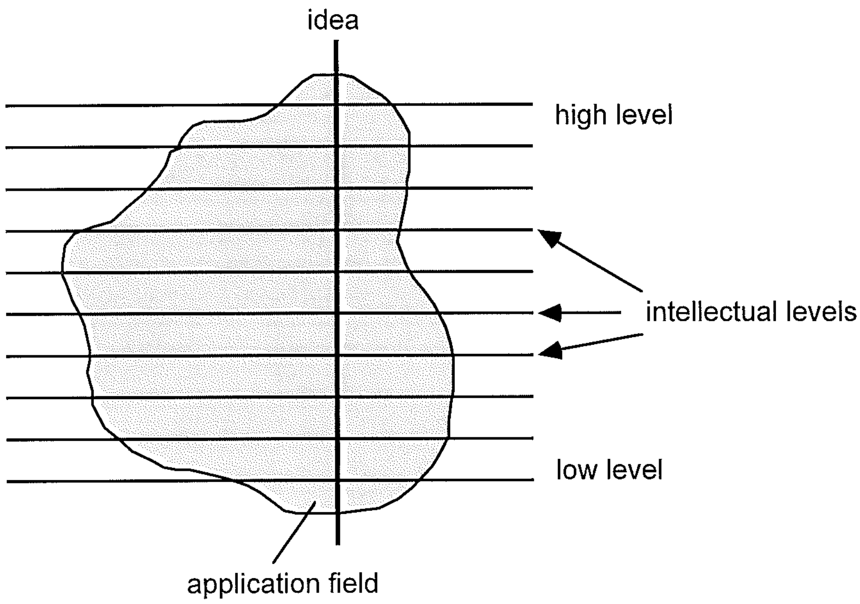
The Horizontal Criterion.

- applicable or observable in multiple ways and in different areas of computer science
- organizes and integrates a wealth of phenomena



The Vertical Criterion.

- may be taught on every intellectual level
- presentations differ only by level of detail and formalization



Examples:
(see paper)

- divide and conquer
- worst-case analysis
- abstract data type

The Criterion of Time.

- can be clearly observed in the historical development of computer science
- will be relevant in the long run

The Criterion of Sense.

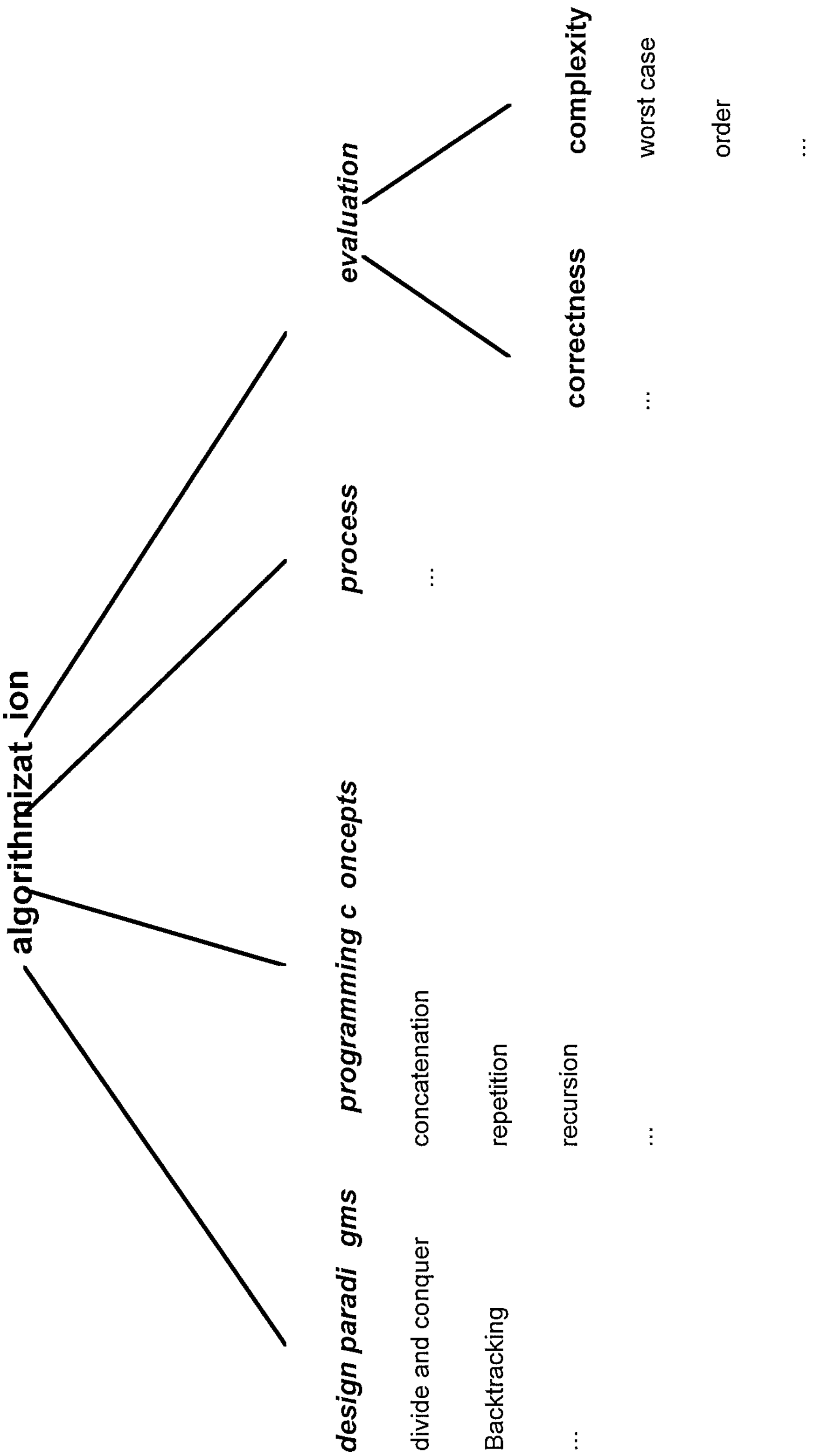
- has meaning in everyday life
- is related to ordinary language and thinking

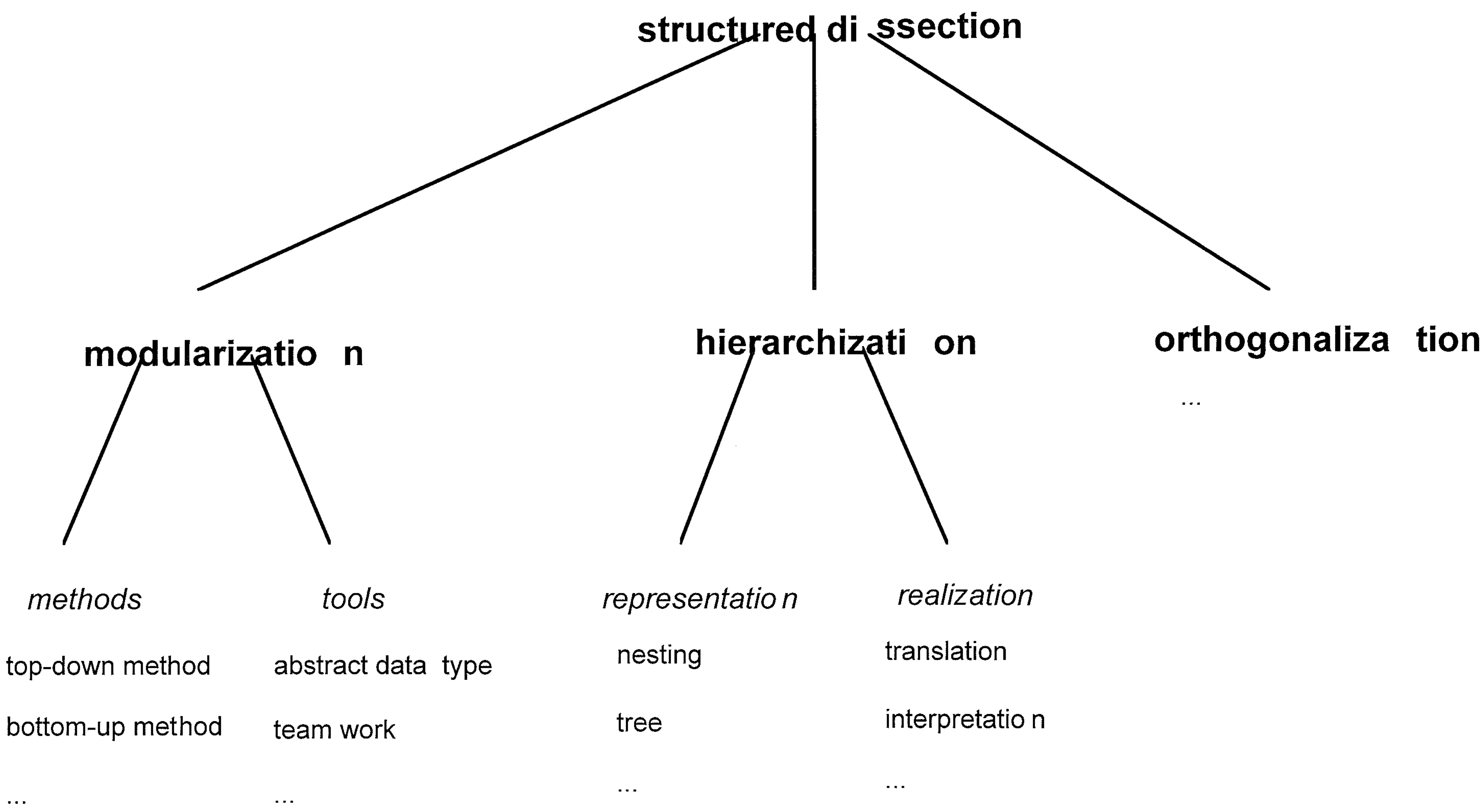
Example:

"reversibility" → an idea "with sense"

"inverse function" → a mathematical formalization of it "without sense"

4 Fundamental ideas of computer science

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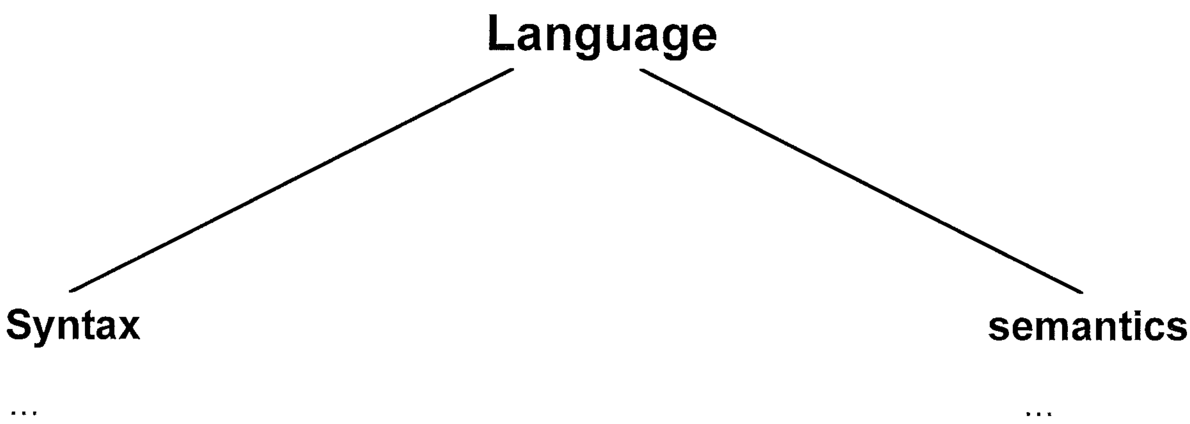
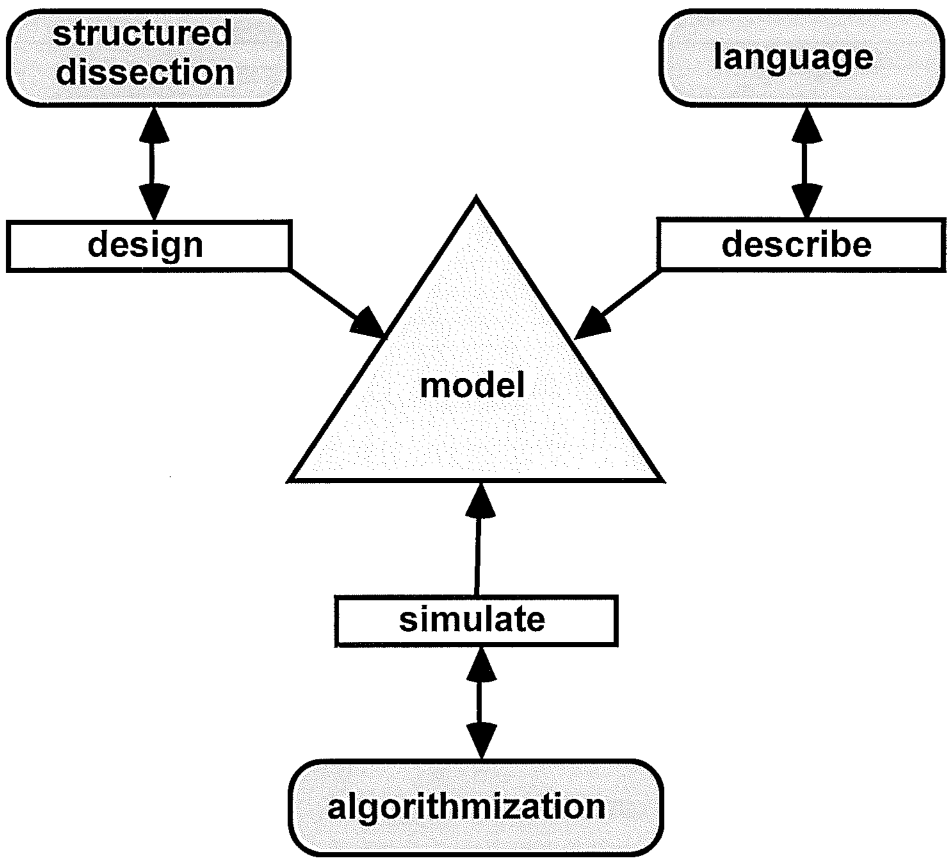


Computer science as the science of modelling?



APPLICATION FOR ASSESSMENT OF SUBJECTS

Is telecommunication a suitable subject for computer science lessons ? (restriction: electronic cash)

METHOD

Find the fundamental ideas

algorithmization	structured dissection	language
encoding algorithms	network topology	syntax (of HTML etc.)
transfer protocols	protocol hierarchy (ISO-OSI model)	document representation
routing-algorithms	transport strategies	translation and interpretation of scripts
concurrency	placement problem in distributed systems	
fairness		
consistency		
authentification		
text searching		

RESULT

Electronic cash is a structurally rich phenomenon from the point of view of computer science. It contributes considerably to the development of fundamental ideas.

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WC96

The computer as a toy and tool in the home - Implications for teacher education

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Abstract

The paper will present the findings of some recent research into children's access to and use of computers in their homes and discuss the implications of these results for preservice teacher education. The study involved over four hundred children who had computers in their homes. The children were aged between five and twelve and came from a variety of social, economic and cultural backgrounds in urban Sydney. All children regularly used a computer in their home or some one else's home.

Significant themes that emerged from the discussion were that children move easily between the notion of the computer as a toy and a tool, and that they bring the language of 'play' with them when they use the computer as a tool. Children learn to use the computer using a variety of strategies including "watching" and "sharing". Some direct teaching from other family members occur, and when it does it is in the mode of "just in time" coaching. In many families, the children, themselves are the expert, and have learnt what they know through 'fiddling' and 'exploring'. As well when children were comparing their experiences at home and at school, mention of issues such as lack of access and control at school were common.

Keywords

Home, children, computers, elementary schools, games, equity

1 INTRODUCTION

There are a number of children in today's elementary classrooms who are confident, competent and regular users of computers in their homes. The purpose of this study was to discuss with these children the computer experiences they have within their homes and their schools. In these discussions the children described the physical and social environments within which they used their home computers. The findings raised a number of issues that need to be considered by practising and preservice teachers.

2 THE DESIGN OF THE STUDY

The study involved over four hundred children who had computers in their homes. The children were aged between five and twelve and came from a variety of social, economic and cultural backgrounds in urban Sydney.

The first stage of the study involved 190 children from years K-6 in three schools in south west Sydney. Children in each of these schools who regularly used a computer in their home or some one else's home took part in discussion groups. Regular users were defined as children who used a computer at least two or three times a week for games and/ or other purposes.

The second stage of the study involved about 250 children from eleven primary schools in urban Sydney. The school were chosen, as their communities represented a wide range of social, economic, cultural and language backgrounds. In each school, 4 boys and 4 girls from each of years 3 - 6 were interviewed using a structured interview schedule. As in Stage One of the study children were selected on the basis that the parent/s reported that their child was a regular user of the home computer.

This stage was designed to seek clarification of the issues raised in the first stage of the research. In particular, an attempt was made to determine what similarities and differences existed across children who regularly used computers at home, and across their families and communities. The following characteristics were identified as key factors that might be associated with differences: gender and age of the children; the number of computers in the home; the computing experiences of the parents; the socio-economic and cultural background of the families; and the children's school experiences.

Discussions were videotaped and interviews audiotaped as well as recorded in the interview schedule. After transcription, responses were analysed using both qualitative and quantitative methodologies.

3 SOME KEY FINDINGS OF THE STUDY

Some of the key issues which have implications for classroom practice are access, use, the way children learn to use the computer, and their perceptions about the differences between school and home computing. Each of these will be discussed below.

Access

The processes involved in selecting the children for the two stages of the study clearly indicated that in all schools there were children who had no access to a home computer, children who had access to basic equipment (a computer and a printer) and a significant number of children who had access to a wide range of the latest technologies. These included two or more computers, coloured printers, CD-ROM drives and in a very small number of cases modems. As expected, the percentage of children in each of these three categories was proportional to the wealth of the school communities and the related characteristic of parental use of computers in their place of work.

A range of factors influenced children's access to home computers. These included location of the computer, ownership (who 'owns' it and who uses it most), and rules about its use. In general children had reasonable control over their access to and use of the home computer equipment, even when the computer was located in a private space such as a bedroom or a parent's study. Younger children had more rules about supervision, older children about maximum duration of use. There were rules about when, how often and for how long children could use the computer. Some children also described rules that differentiated the types of uses such as only being allowed to use it for school work and not being allowed to play games. This notion of priority uses also applied to users, with parents and older siblings doing work having clear priority.

Use of home computers

The children used computers for a variety of purposes and were comfortable moving between playing games and doing work on the computer. While game-playing remained a common activity, many of these children regularly engaged in writing and drawing activities and used information-based programs for leisure as well as school-related work.

Boys and girls reported the same frequency of game-playing on the computer, but boys were more likely to own and operate a dedicated video-game machine in the home as well as the computer. Girls were more likely to report that they wrote stories (narratives) for leisure on the computer, while younger boys and children without printers were more likely not to write stories. Overall the gender differences , in terms of types of use reported, were minor. This is in contrast to Wheelock (1992) who found a common gender-segregated pattern of usage among the children in the homes in the late 1980s. At that time the home computer was still very much an innovation and those families could be considered early adopters. In the current study, the few families who had a modem in the home could be considered early adopters. In these homes the children who used the modem themselves to connect to the Internet or other telecommunications activities were invariably male.

Another feature of children's use relate to the interaction of playing and working environments. Many children, particularly the younger ones, used the language of play and games to describe their use of common tool software: *" I can play PAINTBRUSH and print my favourite pictures"; "I play books* (when referring to reading electronic texts*)" and "my favourite games is KID PIX"*. A number of older children also used similar language or described how they 'played' with information in a serendipitous way: *"Well we got this atlas. And I like going into that and you pick your countries. And you bring it up and they show you the flag and you can play the anthem."*

Learning to use the computer

According to most children (75%) they learn to use the computer by having another person show or teach them what to do. The tutor is usually a family member. Fathers and brothers were named as the tutor twice as often as mothers and sisters. An additional 12% of students said that they learned by watching someone else use the computer, which is an indirect and more passive way of learning. The remainder of learners were taught by school teachers and extended family members such as uncles, aunts and cousins. Only 10% said that they taught themselves or read the computer manual.

Following the initial teaching period the responsibility for learning is gradually handed over to the child. Children were asked if they could fix problems themselves. 41% of the children said "no", 28% said "sometimes, depends or mostly" and 28% said "yes". There were noticeable differences in these responses. Children who had one or more parents using a computer at their work were almost twice as likely to have a positive response to the question. As well, older children were slightly more likely to have a positive response. Interestingly gender had no relationship to the children's responses. Children were also asked whose assistance they sought when they encountered difficulties with something on the computer. In general, fathers were the first person to be called for help.

Differences in home and school use

70% of the children preferred to use a computer in the home environment rather than the school environment. The type of computer hardware and software available in the home and school environments was the main reason given by children for their preference.

Preferences for home computing varied between the schools from 50% to 93% in more affluent communities and where children had more computers in their homes. In community housing neighbourhoods computing activities at school were appreciated by higher percentages of students (up to 27%). Other reasons that children preferred to use the computer at home were the quieter environment, their familiarity with the computer, less restricted access, control over and ownership of the computer.

Frequency of computing varied in the home and school environments. 73% of the children in this survey used their home computer two or more times each week. Only 20% of children said that they used a school computer two or more times each week. The length of time the children used the computer at home was generally more than the time they were allowed at school. Equally important to the children was the fact that they had more control over the amount of time and choice of activity that they spent using the computer at home. 70% of children said that they used their home computer by themselves. At two schools, computer use was structured in ways to allow students to have a computer to themselves, at four schools computers were shared by small groups of students and at three schools computers were sometimes used by single students and small groups. Some children mentioned the availability of assistance at school from teachers and classmates, especially if parents had little computer expertise.

4 ISSUES FOR TEACHER EDUCATION

The above findings raise many issues that need to be addressed both by practicing teachers in classrooms and those preparing teachers in preservice courses. The issues that will be addressed in this paper relate to equity, management of school computing, developing computing skills, and developing home-school links. Within preservice courses, these issues need to be addressed both in wider contexts such as discussions on the broader issues of equity, on select topics such as gender issues in managing classrooms or specifically within technology contexts.

Equity issues

The equity issues involved in children's access to home computing are complex and likely to become more extensive as the range of affordable technologies increases. Clearly there will always be children in classrooms who have no access to computer technologies in their homes as well as children who only have minimal access to basic equipment. These children are likely to come from families who do not share equally in the social and workplace benefits of computing technologies, nor have access to a range of other literacy processes and artefacts in the home. As computer and communication technologies continue to converge the differences between the 'haves' and the 'have nots' will continue to grow and the impact will be strongly felt in the classrooms.

This problem is not new to schools, much research, policy and curriculum development has occurred around the problems of children's access to print-based literacy processes and artefacts in the home. Various models and programs have been devised to handle these differences. These include compensatory, remedial, 'head start', home-school programs, parent helper, tutor and training programs. Practising and preservice teacher need to engage in debates about how to respond to these issues at the school and classroom level and what programmes if any they would seek to use.

At the same time these debates are held practising and preservice teachers need to question the equity issue surrounding the continuing reticence of many classroom teachers to help capitalise on the skills and understandings that some children bring to school. Some of these teachers justify their position on a reverse equity argument that children with computers in their homes would have an unfair advantage. The fallacy of this argument is obvious if once again the analogy is drawn with print-based literacy processes and artefacts: Would any teacher deny children access to books and writing implements in the home, or ignore children who come to school already being able to read? Practising and preservice teachers need to develop strategies and processes so that all children within their classroom benefit from the extra skills and understandings that some children bring to class. Similarly when setting homework and project work, teachers need to help children effectively exploit all the resources available to them at home and at school. A necessary corollary would be the improved ability to assess the content and structure as well as the appearance of electronically produced texts.

Managing computer use within the classroom

Many children bring from home a range of attitudes and behaviours that will have a direct impact on the successful use of computers for instructional purposes in the classroom. These include the strong link children have between game playing and computer use. Not only do many children use the language of game playing to describe their tool use of the computer, they are also likely to transfer some of their game playing strategies directly into instructional tasks. In particular many children in the study expressed a preference for working with their own computer at home because they could work by themselves. When designing computer-based instructional activities, teachers need to make explicit to children the nature of the task they are setting, the purpose of making the activity a group or paired activity as well as helping children to develop the skills and attitudes necessary to make the pair or small group work effectively. In this way children will begin to appreciate the differences between various computer uses and adapt their expectations accordingly. As well teachers need to consider the issue of allocating time for children to explore the use of computer or engage in purposeful tasks on their own.

A further issue that could be explored within a management framework in the notion of maximising children's sense of control over the use of the schools computers. Strategies need to move beyond rosters and booked computer time to take account of the timely access to computers at the point of need, possibly for extended periods of time. Again these issues are not isolated to use of technologies but are more broadly linked to the managing the use of any scarce resources, or in the context of technology-rich schools, training children to accept more responsibility for managing their own learning time.

Skill development

One of the key findings to arise from the study was that neither home nor school (except in isolated cases) have taken the responsibility for the systematic development of the skills and knowledge to effectively and efficiently use computers as information handling and communication tools. Children reported that from time to time, particularly in the early stages of use, parents and teachers did engage in some explicit teaching of hardware and software use. This instruction did not usually go beyond 'getting started'. After this, children used 'watching', 'asking' and 'fiddling' and their main learning strategies. In many cases this meant that children were still using primitive processes to edit and layout their text within a word processor even though they had been regular users for several years. Similarly when children described processes for accessing information from electronic texts such as multimedia encyclopedia, they rarely described processes that went beyond the keying in of the exact term or title of their search. Practising and preservice teachers need to debate the need for some form of systematic skill development in a range of areas associated with computer use, and devise and implement programmes which will develop these skills.

Developing the home school links
A final issue that needs to be addressed relates to the school's influence on what is happening in the home. Although socio-economic circumstances played a large role in determining how much and what computer computing equipment is in the home. There seemed to be little differences in what children did with the equipment they had. Predominantly they played games, and as they get older they completed homework and project work using the computer. As seen by the range of explicit and implicit rules in the homes parents value the educational role of the computer. Practicing and preservice teachers need to engage families in dialogue about ways to increase the educational potential of the computers in homes.

5 CONCLUSION

The issues raised by this study need to be addressed by teachers and teacher educators. They are complex, and in many cases they parallel issues within print literacy which still have not been fully resolved in theory or in practice. Attention to key issues surrounding equity are of particular importance if education is to play a major role in addressing the growing gap between the technologically affluent and poor families in our societies.

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7 BIOGRAPHY

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Laptop Computers and Co-operative Learning

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Abstract
Over the past three years a quiet innovation in teaching and learning has been evolving at Batlow Technology School. Beginning with a Year Three class in 1992 and now extending through the primary classes, each student has had daily use of a personal laptop computer. This paper gives a brief history of the innovation and describes the most recent investigation by an outside researcher. This involved the administration of a Learning Preference Scale to a sample of 68 Year 4, 5 and 6 students. Results indicate a consistent preference for cooperative learning among these students.

Introduction

Batlow is a small pleasant country town in south western New South Wales. It is situated in orchard country on the slopes of the Snowy Mountains halfway between Tumut and Wagga Wagga.

Batlow Technology school is a K-12 central school with 165 primary students and 150 secondary students. There are six primary teachers and sixteen secondary teachers. The school is well resourced and has a number of innovative projects that has improved it image with the local community. (McLean 1994a p. 2)

History of the Laptop Project at Batlow

1991

The principal, Bob Russell, won approval for Batlow Central school to became a Technology school. It is the only central Technology school in Australia. The cluster director invited the school to be part of the National Schools Project on Quality Teaching and Learning.

Initial staff development

As part of the staff development program the principal and two teachers visited the Methodist Ladies College at Kew (Burn 1992, Grasso & Fallshaw 1993, Loader 1993) and Sunrise Research Laboratory (Nevile 1992) at the Melbourne Institute of Technology to investigate the use of laptop computers as a classroom resource. A number of schools have experimented with computer saturation and the staff at Batlow wished to learn from the experience of others who had tried this innovation.

1992

The first laptop class

At the beginning of 1992 the school purchased 37 laptop computers and associated resources. George McLean, the assistant principal, volunteered to work with a Year Three class of 22 students with whom the school "would conduct our own research on the effects of significant lesson time laptop use on learning outcomes." (McLean 1993 p. 15.)

Further staff development

The Director of the Sunrise Project, Liddy Neville, Gary Stager, a consultant to MLC and other interested educationalists visited the school and assisted the teacher and the class to develop their classroom use of the laptop computers. George, the project teacher, visited Coombabah State School and Coombabah State High Schools in Queensland. These two schools were part of the Sunrise program and had computer saturation projects in progress. (Grimmett 1992) The teacher reported that he gained "first hand experience of a classroom culture which had proven most successful in the application of laptops to teaching and learning in primary and secondary schools." (McLean 1993 p. 15.)

An External Evaluation

The principal commissioned a formal external evaluation of the Laptop project by a team from the faculty of Education at Charles Sturt University (Braggett, Hill, Retallick, Tuovinen, & Wallace, 1993) The project report identified 11 significant positive outcomes for the students. These included a change in the classroom culture and a growth in competence and confidence across a number of curriculum and computing skill areas. Students' writing improved on a number of measures and spatial skills were observed to have transferred from LogoWriter activities to other areas. (Braggett el al. 1993) The team also reported a significant growth in peer tutoring. The Year Three students would tutor each other, the teacher and Year 4 students who visited the room.

LogoWriter

One of the features of the laptop computing environment established at Batlow was extensive use of the LogoWriter program. This program provided an implementation of the Logo language and a simple word processing capacity. The students could write with this program and could construct drawings and diagrams. An internal evaluation of the project determined that the students in Year Three averaged 220 hours of computer access over the year with more than 150 hours devoted to LogoWriter instruction.

In an effort to further resource the project, the Principal and the Year Three teacher visited the NSW Minister of Education who listened to their description of what was happening at Batlow and suggested a submission for funds to develop the project.

1993

Expanding the laptop class

At the beginning of the second year, the success of the first group and the growing spirit and practice of cooperative learning led to a decision to increase the number of students involved. The 1992 Year Three and Year Four groups were combined to form a Year 4/5 class of 50 students. The intention was to spread the innovation to another group of children and to another teacher. Kristin Mouat joined George and they worked as a team to plan, facilitate and evaluate the learning of the students in an open plan classroom.

More resources

The school purchased an additional 12 laptop computers. One feature of the hardware establishment at Batlow was that there were a high number of low cost printers available in the classroom and an average of 2 spare batteries per computer.

A teacher in residence

Jenny Betts from the Coombabah Sunrise project was employed as a teacher in the school. She worked with the two classroom teachers in a team teaching situation. Her role was to lend her three years' experience teaching in a computer saturated situation (Betts 1992, 1994) to the expanding Batlow project. As McLean reports, "The development of computer skills and new pedagogy guided by this person at this time was an essential component in the success of the project." (1993 p. 16)

Reflective teaching

During this time the reputation of the project continued to grow and to attract the interest of the parents and community of Batlow, teachers from other schools and educators from interstate. The developing practice of cooperative learning in the project class lead to interest from other teachers in the primary department of the school. This interest and enthusiasm found expression in the formation of a staff group called the "Co-Operative Learning Team" or "COLT" comprising the entire primary staff with a growing number of secondary teachers.

The group met, and still meets, "every Tuesday after school ... to reflect upon the co-operative learning techniques that are being tried in the classroom." (McLean 1993 p. 16) Much of the discussion in this group was focused on classroom practice in both the computer-saturated and non-computing classrooms and on exchanging information on the progress of the innovation.

The success of this collegial group indicated a shift in the source of inspiration and information for the teachers in the project. Where the teachers had informed themselves of best practice in similar settings they were now drawing more on their own reflection and the students' response to the experience to shape the future directions of the project.

Co-operative learning

One of the teachers' aims was to give the students as much control over their classroom learning and whole school activities as possible. The academic day had three components that were not tied to a fixed timetable. These were Basic Skills, a Reading contract and a Social/ Environmental/ Science contract. The students were encouraged to accept responsibility for their own learning and to co-operate in the organisation of their contract and curriculum project activities. Co-operative learning strategies were explicitly taught, positive interdependence and individual accountability were implemented by the teachers in the students' group work. The students were trained to use collaborative social skills and time for reflection on and reinforcement of positive behaviours was part of the daily routine.

The Basic Skills component of the students' program was mainly a time for maths and spelling. This was completed in year groups by the respective class teachers. The Reading contract was designed to develop social and co-operative skills. Group work and collaboration strategies were developed in conjunction with "a literature based reading program where each group had to complete a set of activities associated with a children's novel" that they had chosen. (McLean 1993 p. 13)

The Social/ Environmental/ Science component focused on project work. These activities were designed to develop time management skills and involved the students in planning and goal setting. McLean states "an important tenet of our restructuring is the idea of saturation where a child may spend as much time as he/she wants to on a particular activity so that a goal can be achieved to his/her satisfaction" (1993 p. 11.)

Achievement testing

The class was assessed using the Waddington Reading test and the CATIM class achievement test. The Year Five group is described as having "a large tail with a disproportionate number of 'slow' learners or children with learning difficulties." (McLean 1993 p. 81) The Year Four class had a more even distribution of ability. The results for the whole group were mixed. All but two children improved their reading age between February and December of 1993. The improvements ranged from 1 to 31 months. More significant was the reduction in the gap between student's reading age and chronological age. The CATIM results were more positive with larger and more consistent improvements. Only 4 students out of 41 tested did not show a gain in scores for this test. The teachers believed that the "computer environment has caused considerable maths skill development in the group." (McLean 1993 p. 82)

Towards the end of 1993 the three project teachers wrote a submission to the minister. The school received a grant of $40 000 and were asked to evaluate the outcomes of the project in terms of its stated aims. The grant from the minister financed a doubling of the number of teachers and students in the project.

1994

Another year, another class

The grant was used to purchase an additional 10 laptops and associated resource material. "In 1994 the project extended to 1/2 day use of laptops by four classes (115 children) being team taught by 2 teams of two teachers." The four teachers involved in teaching these two double classroom include two teachers, Kerry Naylor and Lauren Henderson, new to the project this year. The two teachers from 1993 have split the original team to form two new team teaching pairs with the two other teachers from the primary department.

Another outside evaluator

A Sydney based academic was asked by the Training and Development Directorate of the Department of School Education to assist the school to structure the evaluation of the grant and to address the issue of whether the projected outcomes for students were being achieved. A one day visit and workshop was held at the end of April.

Two outcomes for the future direction of the project came from this event. Firstly, a structure for the evaluation was decided and secondly the opportunity was created to talk through issues associated with the future direction of the project. The following questions that were related to the educational aims of the project were canvassed. In what ways has the classroom culture and the experience of school changed for students and teachers in the Laptop project classes? How and why has this change happened? What is the link between the introduction of a high number of laptops and the changes in classroom culture and practice?

Links between cooperation and computing
The process was described in the discussion as follows. The introduction of the laptops lead to an increase in peer tutoring and tutoring of the teachers by the students. This was accompanied by a decrease in teacher-centred instruction. The cooperative learning focus was crystallised by a particular inservice event and the establishment of the COLT collegiate group. The innovation continues because it is successful in meeting student, teacher, school and community needs.

The changed relationship between the students and teachers has been validated by research, (Braggett el al. 1993, NBEET 1994) commented upon by outside observers (Nanlohy 1994) and the reflected in the dynamism of the students' classroom experience.

Small scale school-based action research
The practice of reflective teaching and learning are evident at Batlow. Parallel to the chronology of the Laptop project has been a consistent action research approach to learning from practice. To begin, the teachers of the laptop project sought to visit and learn from other examples of computer saturated schools. As they developed their reflective practices and a collegiate forum (COLT) they became an example that others would wish to visit.

In the early stages of the project the teachers involved visited MLC and Sunrise in Melbourne and the Coombabah schools in Queensland. The staff from Batlow sought to learn from experienced practitioners. Staff from these places came to Batlow to teach and to share their experience and expertise. The process of developing and documenting the project reports to funding bodies has also caused the Batlow teachers to reflect and refine their understandings of this innovation.

The project teachers have shared their insights with their peers and have established the COLT collegiate group as a familiar forum for their discussions. They have been prepared to provide evidence about the effects and efficacy of their classroom practice and of the students' experiences. The staff have participated in several formal evaluations of the project by outside academics. The school has drawn on a variety of evaluation techniques, both quantitative and qualitative, to assist the formative and summative evaluation of the project.

All through the life of the project the community has been consulted and communication with parents has been a two way process. The Community Liaison Officer has played an important part in facilitating this communication. Surveys of (Braggett el al. 1993) and by (McLean 1994b) parents have helped the teachers to gain insights about the reactions of the students to the project.

An investigation of classroom cooperation
With the agreement of the school, the Sydney academic returned in a private capacity to assist the teachers answer some of their questions about why the innovation was working as they had anecdotally observed. It was decided that

it would be useful to assess the preference for cooperative, competitive and individual learning styles in a way that would allow comparison with other samples from a similar population of NSW primary aged school children. It was also agreed to assist the students to participate in the evaluation. They were asked to choose the work samples to be examined and to comment on their own classwork.

A visit was arranged and a program of activities agreed upon. The visit took place in the last week of Term 2. The investigations covered a range of quantitative, sociometric and qualitative methods and included:

- Classroom observation
- Learning Preference Scale
- A Sociogram
- A photographic record
- Student work samples
- Informal discussions

A morning with George McLean, Lauren Henderson and the students.
This time provided the researcher with an opportunity for observation of the class in action. The focus of the observations was the role of the teachers in the classroom, the lesson organisation and the pattern of interaction between students, between students and teachers and between the teachers. A mix of formal and informal, teacher-centred and autonomous teaching and learning was observed and documented.

Informal observations
The opportunity was also taken to talk informally with other teachers in the school to try to ascertain what they felt about the project. An interaction between the two teachers on the other project class and a secondary teacher pointed to future challenges when moving the project from the primary department into the secondary department when this year's Year 6 students move into Year 7.

The primary teachers were explaining how they had to rewrite their maths program for the coming term because most of the children had progresses so quickly that they had covered most of the material the teachers had intended to include. The secondary teacher who was interested in how the computers were being used commented on the difficulty of being flexible when teaching prescribed secondary syllabuses.

Administering the Learning Preference Scale
The Learning Preference Scale (Owens & Barnes 1992) was administered to Year 4, 5 and 6 students to gauge the students' balance of preference for Cooperative, Competitive and Independent Learning. The response sheets were scored by student volunteers, checked and processed by the academic and George McLean that night and the results discussed with the students in subsequent class times. The summary results are discussed below.

Sociogram

At the same time as the learning preference scale was administered the students were asked to nominate three other students with whom they would like to work on a computer related task, an off computer classroom task and with whom they would like to play in the playground. Analysis of the sociograms is continuing. It is hoped that by comparing a Cooperative Involvement subscale score with the frequency of choice of an individual by other students it may be possible to investigate the role social interaction plays in the cooperative culture of the classroom.

Photographic record

Three rolls of photographic film were shot in the 40 minutes of general project work time that remained between the end of the learning preference scale administration and lunch. The colour print photos were processed that afternoon and mounted onto white paper. The photos were used to seek the students' response to the question; "What were you doing when this photo was taken? The photos are also to be used to aid the description of the class setting and work habits of the students. For example, at lunch time after the children had been asked to finish (save) their work and go out to lunch, the researcher stood at the end of the double room and took one photo per minute until the room was cleared of students. This took 6 minutes and was accompanied by occasional urging by the teachers for the remaining individuals to leave.

Student Work Samples

The students were asked to provide the researcher with a disk copy of their "favourite" recent piece of work. A single disk was passed from child to child for this purpose. A number of children did so but the published reports of the Batlow Laptop Project have proved to be a richer source of student's work samples. (McLean 1993, 1994) Analysis of these samples is continuing.

Results of the Learning Preference Scales

There were a number of historical influences on the development of a cooperative learning ethic at Batlow. The staff expressed the belief that the growth of a cooperative learning environment came out of a combination of the support given to the project by the Principal, the examples of other schools, the enthusiasm and insight of the class teacher, the active participation of the students in the new learning environment and the support of the students' parents and the school community.

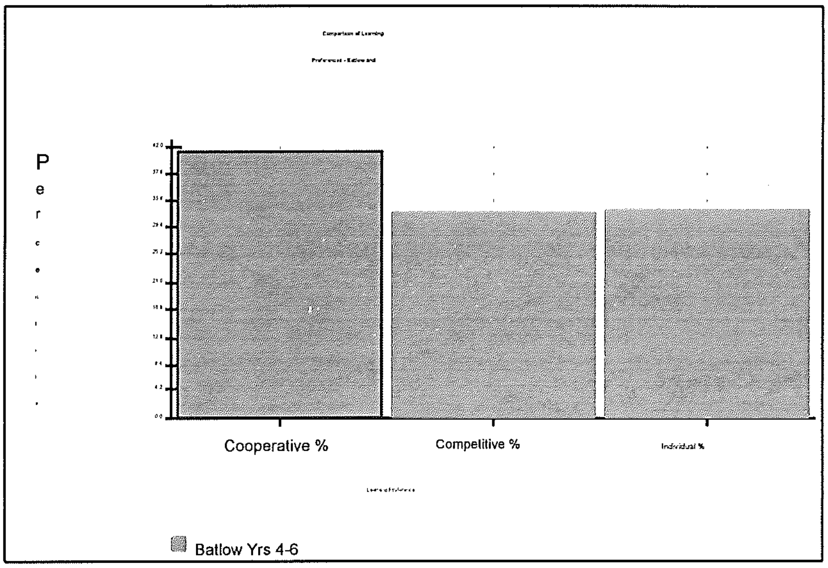

Figure 1.

Averaged percentile scores for whole Batlow sample

The Learning Preference Scale - Students (Owens & Barnes 1992) was administered to 68, Year 4, 5 and 6 students in June of 1994. The children came from the "Stage 3" class were combined with the Year 4 children from the "Stage 2" class. On the advice of the author of the scale, the administration of the questions was given orally. The averaged results showed a high preference for cooperative learning. (Fig. 1.)

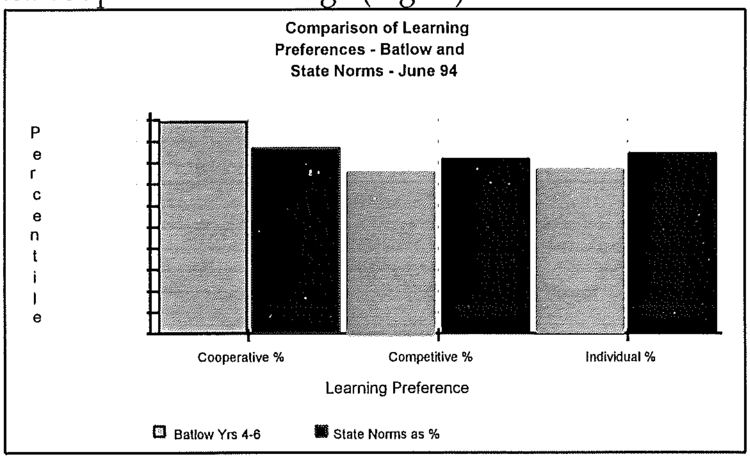

Figure 2.

Averaged percentile scores for whole Batlow sample compared to state norms.

The combined boys and girls averaged mean scores were higher than the state average for cooperative learning preference. (Fig 2.) This may in part may be because of their classroom experiences of reflecting on social skills and group process that is part of the Reading contract.

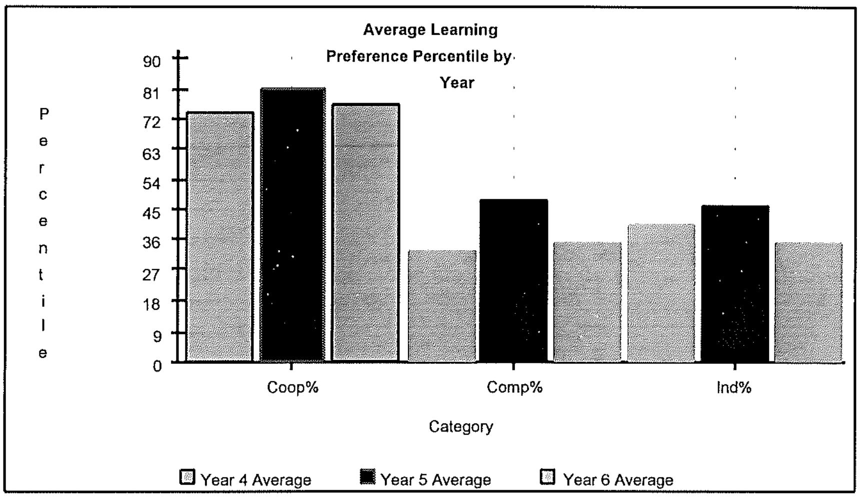

Figure 3.
The averaged percentile scores for each year and learning preference

The breakdown by years, this time measures in percentile levels, shows a stronger preference by the Year Five students across all three learning preference scales. These are the students who have been using the computers for two and a half years, a year longer than the other students in the sample. This would suggest that the Year Five students are more certain about the choices they might make in the learning situations described in the questions of the Learning Preference Scale - Students' form. The pattern in the norm referenced sample was for a general increase in competitive preference and a decrease in cooperative preference as children grew older. This effect was more pronounced in boys than in girls. (Owens & Barnes 1992)

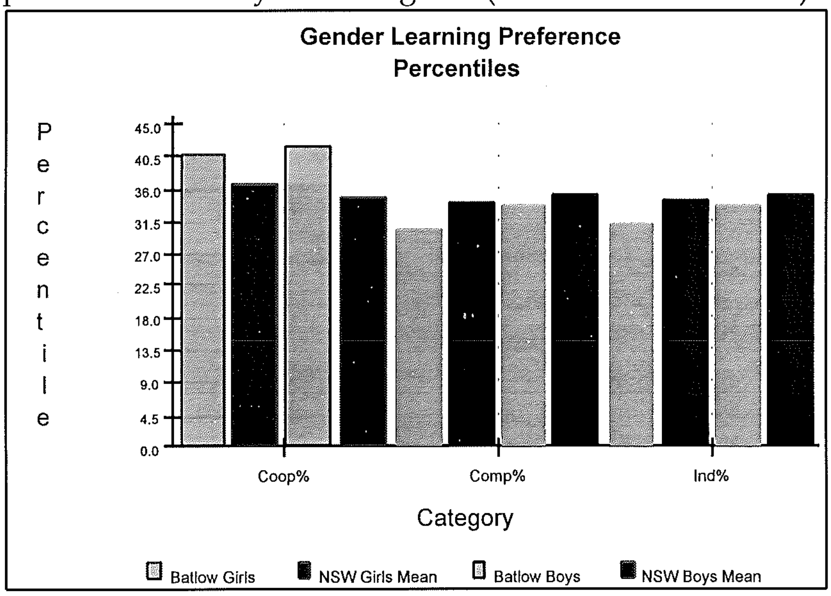

Figure 4.
The averaged percentile scores for boys and girls are compared to state norm scores.

A gender breakdown showed a slightly stronger preference by boys for than girls across Cooperative, Competitive and Independent Learning styles. (Fig. 4.) This is against the trend in the state norms (Owens & Barnes 1992 p. 38) where boys tend to have a higher preference for competitive learning than girls of the same age but a lower preference for cooperative learning. When Batlow Boys and Batlow Girls are compared to State means for both Boys and Girls a pattern emerges. Although the differences vary in size Batlow children have higher scores for Cooperative Learning preference and lower scores for Competitive and Independent Learning preference.

Future Possibilities

The return of the researcher!

Current plans include a return visit to the school in November 1994. The Learning Preference Scale will be administered for a second time to see if the preference for Cooperative learning has been maintained. The research focus will be on teasing out the factors that link high levels of use of personal computing resources to student experience of classroom practices that feature autonomous learning, content mastery in advance of age expectations and a strong preference for cooperative learning among the students. The author will use interviews with teachers and other school adults, with children and with parents to attempt to illuminate the focus questions.

It is important to consider whose purposes are being served by the research being carried on at Batlow. The school has expressed a need for outside evaluators and researchers to help them to test the assumptions and beliefs that have evolved as they are deeply engaged in this innovation. External agents must be guided by the participants in the innovation.

It seems that questions for the future will revolve around happens to the use of computers as a personal resource as the children move into secondary school. Will this way of teaching and learning be possible in the subject centred culture of NSW secondary education? The school began to address the curriculum, organisational and resourcing issues inherent in this question in 1993. The school is preparing for the next stage in the Laptop project that will begin in 1995.

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Bachelor of Teaching (Primary)

Foundations of Literacy and Mathematics

A1922G

AUTUMN SEMESTER 1995

LECTURERS:

Jan Hancock, John Collerson, John Conroy, Jenny Kidd, Phil Nanlohy, Kay Owens, Katina Zammit

1. Rationale

1.1 Students require a sound conceptual understanding of mathematics and literacy in order to appreciate the essence of related curriculum studies. Proficiency in these disciplines is essential for teaching and continuing learning in these areas.

1.2 The integration of mathematics and literacy creates opportunities for a deeper understanding and higher order thinking in these disciplines.

1.3 Confidence, attitude and ability in relation to mathematical and literacy processes, are facilitated through engagement in the discussion, reporting, recording, reading, writing and editing that is involved in various integrated projects making up this subject. Hence confidence, attitudes and abilities should be improved.

1.4 The acquired skills will result in the students being able to develop adequately and express their understandings in all subjects that they will encounter in the Bachelor of Teaching degree.

2. Specific Objectives

2.1 Students will develop their understanding of the nature of mathematics and literacy.

2.2 Students will engage in various oral and written modes of communication to investigate, elucidate, explain and report on solutions to mathematical investigations.

2.3 Students will recognise the value of mathematics through the development of their confidence in using mathematical processes and knowledge.

2.4 Students will produce and edit a variety of types of text for a number of different audiences using word processing technology.

2.5 Students will extend their knowledge of the many literary genres used in texts through reading and sharing books with their peers and examining the qualities and structures of various types of literature.

2.6 Students will gain experience in communicating orally and in written modes in a variety of registers, structures and systems, through participating in a wide range of activities in tutorials.

2.7 Students will reflect on their own literacy and mathematical development during the semester.

3. Subject Content - Literacy Strand

Wk	Tutorial Title	Tutorial Content
1.	Introductions	Student's reading, Writing requirements, The Literacy Assignment, Article to read.
2.	Reading and Writing in Society	Personal writing experiences Personal reading experiences
3.	Literacy and Literature	Use of Literature for Literacy development, Text Types, Forms of Writing Picture Books, Letters
4.	More Stories	Cumulative narratives, repeated patterns, poetic language and rhymes.
5.	Picture books to chapter texts	Bridging the gap between picture books and older fiction / chapter texts, fiction for older readers.
6.	Satire in books	Literary texts can cover issues in society and challenge stereotypes
7.	Factual and Media texts	How are factual texts and media texts constructed and used by individuals and agencies in society.
8	No Tutorial	Consultations and Week 7 Friday tutorials
9.	How children learn language.	Oral language. Laying the basis for literacy. Implications for teaching.
10.	How children learn language.	Relationships of spoken and written language and of language of home and school
11.	Introduction to Teaching English	Language approaches vs fragmented skills based; a functional approach to language. A balance between learning and teaching
12.	Exploring the reading process	Context and prior knowledge. The three cuing system
13.	The reading writing link	Continue to explore the reading process and compare with the writing process.

4. Who's who

The lecturing team is made up of two specialist teams and a subject convenor. Each lecturer will be responsible for two groups of students and that lecturer is your main contact. However students may approach any lecturer if the need arises. The subject convenor is Phil Nanlohy.

Package	Lecturer	Strand	Location and extension.
ACT & SA	Jan Hancock	Literacy	"Kennels" Ex 6459
Tas & Qld	John Collerson	Literacy	Main Building Ex 6316
ACT & SA	John Conroy	Maths	Messages with secretary
Tas & Vic	Jenny Kidd	Maths	Messages with secretary
NSW & NT	Phil Nanlohy	Both	"Everglades" Ex 6207
Qld & ACT	Kay Owens	Maths	"Stables" Ex 6430
Vic & WA	Katina Zammit	Literacy	"Everglades" Ex 6207

5.1 Competency Checklist

	Wouldn't have a clue	Had a go once	Can do	Know it well	Can do it in my sleep
WORD PROCESSING					
* load Program					
* format disk					
* list/catalogue files					
* more cursor					
* delete text one letter at a time					
* insert words, sentences and paragraphs in existing text					
* correct spelling errors					
* search and replace text					
* move blocks of texts and block copy					
* load files					
* save files					
* edit files					
* delete files					
* copy files					
* format text using:					
* underline					
* bold					
* centre text					
* right justification					
* characters per line					
* lines per page					
* tabulation					
* use embedded control codes					
* incorporate different font styles					
* manipulate printer configurations					
* load files from another word processor					
* move information between data base and word processor					
OPTIONAL					
* merge files					
* use related packages, e.g. spelling and style checker					

6. Information regarding computer use

Students will learn to use a number of educational computing packages. The completion of some assignments will require students to use a word processor. Students are encouraged to use any word processor that is available to them. Regular individual practice of typing and word-processing is necessary to build confidence and competence.

Software is available from the User Services Desk in the Computing Centre. Students will need to hand in their ID card in order to borrow these disks. Software is to be used in the Computing Centre; it may not be copied and is not available for home or school use. A User Support person is available if technical help is needed, or if equipment is not working properly. They are not available to demonstrate the programs. Please check with the Computing Centre for opening hours.

7. Assessment Summary

In order to pass this course students must:
1. Attend all tutorials and actively participate in activities.
2. Complete and pass three assessment items.

It is expected that all students will participate fully in the subject activities. In particular the tutorials are an opportunity for students to show what they are learning and to demonstrate their use of spoken language.

Failure in any of the assessment items may constitute sufficient grounds for failure in the subject as a whole. Where an assignment is assessed as having a failing grade its author *may* be offered an opportunity to resubmit if in the opinion of the marker a resubmission may result in a passing grade. Only one assignment may be resubmitted in this subject and it can then only receive a pass or fail grade.

Students are urged to contact their lecturer if they are experiencing any difficulties in preparing their assignments. Only in exceptional circumstances may an extension of time be granted. Students should see an Administrative Assistant in the faculty office for an explanation of the process and the application form. The rules governing assessment procedures may be found in the assessment policy and procedures booklet. Boxes are provided for each lecturer for the submission of assessment items. Please try to find out where your lecturer's assignment box is located. **All assignments must use a standard faculty cover sheet.**

Assignment	Value	Date and Time
1. Mathematics Assignment	40%	Thursday, 13th April 4 pm
2. Literacy Assignment	40%	Friday, 5th May 4 pm
3. Myst Investigation	20%	Monday, 6th June 4 pm

- Look in the library and in schools for resource books (e.g. Eureka Mathematics) for other activities linked to this theme.
- Record your responses to these experiences in a systematic way. For example, keep your reactions to video, computer game etc; the notes you made during the computer game, the list of resources you consulted, ideas you gleaned from the resources. Submit these in their rough form as evidence of your experience.

Part 2. Create your own theme.

- Choose a theme and an excursion place. Investigate the mathematics that is used in that place at your own level. This may involve questioning business people, exploring the use of spreadsheets or graphs, a measuring instrument, an architectural feature etc. Present your research neatly. Write up your description.
- Write a letter for parents outlining the value of the excursion for the children's mathematical learning (specify the year group).
- In less than five lines each, outline three school-based mathematical activities that would link into your theme and excursion. The links between the activities and your theme need to be clearly described. Full references and acknowledgments must be given.
- Package and present all the notes on your investigations, excursion, letter and activity in a way that will demonstrate your understanding of the mathematics involved and that will be accessible to someone who has not read this assignment description.

Criteria for Assessment

1.	Evidence of all recommended experiences on "Gold". Depth of mathematical use and understanding.	8
2 (a)	Choice of viable theme and excursion useful for mathematics, • Mathematical thinking - depth and extent • Adequate representation of mathematics • Creativity	18
(b)	Letter is clear, suitable for parents, well written, notes major mathematical components.	4
(c)	Activities are suitable for children, clearly expressed.	6
(d)	Presentation, references, sufficient detail.	4

7.3 Assignment 2 - Literacy Assignment 40%

The purpose of this assignment is to encourage you to write in a number of "text types" and consider the processes you use and relate that to helping children to learn to write. This is an individual assignment.

Step 1

Read lots of children's books, especially children's literary and factual books. See the list of children's books on p. 11. Check the Curriculum (CC) section of the library for factual books. The computer based children's texts can be borrowed and used in the Computing Centre.

Picture Books
Who Sank the Boat? Pamela Allen
Mr Archimedes Bath. Pamela Allen
Window. Jenny Baker
A Dark, Dark Tale. Ruth Brown
Willy the Champ. Anthony Browne
The Very Hungry Caterpillar. Eric Carle
Hairy Maclary. Lynley Dodd
Possum Magic. Mem Fox
Don't Forget the Bacon. Pat Hutchins
You'll Soon Grow into them , Titch Pat Hutchins
This Old Man. Carol Jones
Mulga Bill's Bicycle. A.B. Paterson
Six Dinner Sid. Inga Moore
Aranea. Jenny Wagner
Once there were Giants. Martin Waddell
Harry, the Dirty Dog. Gene Zion
Murgatroyd's Garden. Judy Zavos and Drahos Zak

Junior Primary
Jane and the Dragon. Martin Baynton
Jim and the Beanstalk. Raymond Biggs
The Jungle of Peril. Patrick Burston
James and the Giant Peach. Roald Dahl
The BFG. Roald Dahl
The Magic Finger. Roald Dahl
The Enemies. Robin Klein
The 27th Annual African Hippopotamus Race. Morris Lurie
A Piece of Straw. Junko Morimoto
The Paper Bag Princes. Robert n Munsch
Alexander who used to be rich last Sunday. Judith Viorst

Middle Primary
Papa and the Olden Days. Ian Edwards
The Magnificent Nose. Anna Fienberg
Jurassic Park, The Junior Novelisation. Gail Herman
The Battle for Muck Farm. Ivan Jones
Elephant Feet. Suzanne Keys
Penny Pollard's Letters. Robin Klein
The Rainbow Serpent. Dick Roughsey
Higglety Pigglety Pop!. Maurice Sendak
Bumble's Dream. Bruce Treloar
Charlotte's Web. E.B.White

Upper Primary
The Riddle of the Trumpalar. Judy Bernard-Waite
Jandy Malone and the 9 O'clock Tiger. Barbara Bolton
The Pinballs. Betsy Byars
The Twits. Roald Dahl
Cannily, Cannily. Simon French
I am David. Anne Holm
To the Wild Sky. Ivan Southall
Miranda Going Home. Eleanor Spence
My Place. Nardia Wheatley & Donna Rawlins
A Little Fear. Patricia Wrightson
The Nargun and the Stars. Patricia Wrightson

Computer Based Texts
Explore a Story Series
Explore Australia.
Rosie the Counting Rabbit.
Sleepy Brown Cow.
Where did my tooth brush go?
The Three Little Pigs.
The Bald Headed Chicken.
Whales.
What makes a dinosaur sore?
The Quasar Kids.
Jacaranda Adventures and Simulations
Dinosaur Discovery.
Goldfields.
Zoopack.
Kraken.
CD Rom Based Stories
Myst
Our World
The Manhole
Little monster at School
The Tortoise and the Hare.
Arthur's Teacher Troubles.
New Kids on the Block.
Grandma and Me.
Ruff's Bone
The Tale of Peter Rabbit.
The Paper Bag Princess.
From Alice to the Ocean.
Acorn Software
Edwina's Energetic Elephant.

Hint: At the conclusion of each Myst session save your game to your computer disk. To start your next session. Put in the Myst CD, Use the File menu to Go to the Finder. Open your disk and double click your Myst game file to go back to where you left the game.

Some dictionary definitions:

sĕ'lènīte *n.* 1. Gypsum occuring as transparent crystals or thin plates; hence sĕ'lènĭ'tic *a.* 2. (Chem) Salt of selenious acid. [... Gk *selēnitēs (lithos)* moon(-stone) f. *sēlēne* moon see also **sèlē'nĭum** and **sèlē'no-**

dŭ'nnȳ *n.* (Sc.) underground passage or cellar esp. in tenement.

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Myst Stories 1

Name .... Group .... Package ....

Please describe one of the Myst puzzles that your group solved. Please describe the location, the problem, the list of clues and the solution.

1. Location. (The Age, the physical site, what is special about the site)

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2. The Problem (What was it that you were trying to do?)

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3. The list of clues and the solution.
(There are two parts to the clues. First the part of the story that told you how to do something, eg the letter to Catherine, and second the information needed to make something happen eg enter 8 into the visualiser,)

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Myst Stories 2

Name .... Group .... Package ....

How did you **feel** while you were trying to solve the Myst puzzles.
Please talk about the following aspects of what you have done

1. Exploring the Myst program with your group

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2. The story you helped to write

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3. The role of the wall display. In what ways did it help you and how could this sharing have been arranged to better help you.

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WC 96

Myst - An Adventure for All Ages

What is Myst?
Do you know this program already? Myst is a mythical mystery story. You may have read the adds or have played the game. You may even have invested the time to solve all its puzzles. If you haven't, this article will introduce you to the world of Myst. If you have delved into this interactive fiction you may wish to hear how this program has been used to help students create a range of written texts.

So what is this Myst? It is a prominent example of a new type of simulation and adventure software. Just like its predecessors, Cosmic Osmo and Manhole, it broke new ground in interactivity. Clicking the mouse in a given direction the allows the user to appear to "walk" through a world depicted with finely rendered graphics. Movement from scene to scene is smooth and the wide angle view from a head high perspective gives a sense of personal placement within the simulation. The only point of view allowed in the program is that of "first person participant." Myst is foremost a personal experience. The authors, Rand and Robyn Miller, say in their introduction; "The key to Myst is to lose yourself in this fantastic virtual exploration and act and react as if you were really there." [1]

Why use Myst with your students?
Myst can be used to pursue outcomes from the English, Science and Technology and Human Society and Environment subject areas. To a lesser extent the real world problem solving objectives of the Mathematics syllabus are also supported. In this article the focus is on writing for particular purposes within the English KLA.

Myst demonstrates many text types or genres. There is a underlying mythical narrative that is unfolded as the adventure is explored. Written and spoken texts are used to reveal clues to the puzzles within Myst. The solutions to the puzzles are embedded in these texts and in the landscapes and artefacts of Myst. Literary, mathematical, technological and social understandings must be exercised to collate the clues and find the solutions. In this involved and involving process that the program provides possibilities for learning. In pursuit of the story students are presented with opportunities for writing in a range of genres.

Previous experience in senior primary classrooms with complex simulations has shown that students of this age can profit from such experiences. Programs like Destination Mars!, Simcity and even SimEarth can be used for educational purposes even though they are intricate and difficult to negotiate. These programs were not as rich in narrative as Myst which while creating a simulation of another world also weaves a complex plot within an adventure game. This program was for a long time the highest selling computer game for the home market. This makes Myst a mass media text.

The narrative within Myst arises from an exploration of the places and artefacts of the program. There are written texts and speech texts scattered around the island that is the central location of Myst. Unlike the rigid sharp jumps of most hypertext documents the growing awareness of the Myst story evolves with experience. The myth within Myst pervades the locations. There are clues directly linked to the story all around the main island and scattered throughout the connected ages. The books in the library that is at the centre of Myst island are the main source of stories that contribute to the myth.

Recount texts may be found in the author's description of the design process. This personal recount in included as a movie on the CD. The Making of Myst tells the story of the CYAN design team. It is an excellent way to introduce the game to students because it sets Myst in context as an authored text. The authors intentions are clear and the suggestion that the users of the program should write and draw as they explore is reinforced by the inclusion of an empty high quality exercise book in the package.

The Myst adventure has a relatively non-violent scenario. Violence both physical and emotional is alluded to in the various texts that are scattered through out Myst island. However there is not the overt murder and mayhem of the type of games whose most common visual effect is the spurting of arterial blood. Success comes through problem solving and persistence rather that quick reflexes on a trigger or a penchant for crushing cosmetically challenged creatures.

The microworld that is Myst

Words alone can not convey the richness of imagery that the authors of this adventure have created. The best introduction is an exploration of the simulation itself. In the absence of a hypertext environment that would allow a link to the CD please go to the side bar for a description of Myst island. (Please see page XXX).

The experience students gain in this virtual world can provide meaningful stimulus for writing activities. At one level Myst is a multi modal literary text. [2] There are many hand written texts in the library on Myst island but far greater depth and complexity is given to the adventure through the wealth of visual and auditory information provided. One educational use for the program is to draw on student's experience of the adventure as a stimulus for creative and factual writing. The organisational task for the teacher centres on devising strategies for students to capture the detail of their experience so they may use this as stimulus of writing.

The first classroom trial

The author has been assisted by classroom teachers to trial Myst. The first trial was in an inner urban school in third term last year. The experiences of this experiment led to a changed plan for a second trial in a country school. The first class was a Year 6 OC that had extensive experience of factual writing. The teacher was keen to also offer her students the opportunity to create personal recounts and narratives of the mystery text form. The extended adventure in Myst was seen as a model for serial narratives.

Teaching Plan

The teacher suggested ten groups of three with a girl and two boys in each group. this reflected the numbers in the class and with this structure the students were asked to from their groups. Each group was given a lined exercise book which they covered with a copy of the cover of a similar book that comes with the program. The author visited the class each Thursday afternoon to first lead the whole class activities and later to conduct writers conference with the groups of three. The groups had one hour each week to use the Myst program. The weekly program was as follows. [3]

Week 1

Myst introduced to the class:

- loading and opening the program demonstrated;
- movement within the adventure demonstrated;
- discussion of group member's rotating roles, Mover (with mouse), Writer (in journal), Thinker (decision making and suggestions);
- discussion of mystery stories and the role of clues within those stories;
- discussion of group's Myst journals stressing the importance of writing and drawing.

Week 2
Recount of the story so far:
- discussion of the story structure using a concept web. Each box on the diagram representing the students recollection of a significant location in Myst;
- discussion about sharing information between groups to reduce the highly competitive atmosphere that had developed around the adventure.

Week 3
Developing descriptive texts:
- discussion of the significant locations discovered by the students;
- joint construction by groups of a detailed descriptive text about a Myst location;
- individual writing of descriptive texts suitable for the orientation stage of an imaginative narrative;
- discussion about how to hide clues to a mystery in a descriptive text.

Week 4 and the 3 subsequent weeks
Writing conferences were held with each writing group in the withdrawal room off the classroom. This room also housed the computer and so observations could be made of groups using the adventure. Each group's conference was begun with a reading of what they had written in their journal since the previous conference. The author asked four questions and initiated a discussion of the processes the students were using to develop their story. The questions were:
1. What is next in the story?
2. Where are the clues in the story just read?
3. What is the plan for the continuation of the plot so far?
4. How will you organise the next piece of writing?

Outcomes of the plan
Few teachers have the time to evaluate their students work to this depth but these conferences were revealing. The plan was only partially successful. Recounts were initially written in the Myst Journals and the whole class activities were successfully completed. All groups developed stories and enjoyed the adventure. They engaged deeply in the Myst adventure and in the narrative within. While they had been asked to write about a mystery other than Myst the links between their experiences with the adventure and their story ideas were evident in the conferences. Some groups wrote exceptional stories well beyond their usual writing efforts. Most groups didn't.

As the weeks passed the momentum of the stories that had started so well trailed off. Those who wrote the most imaginative stories did so in their own time at home. The fact that the class teacher was on leave may have contributed to the loss of momentum. The biggest concern was that the groups became competitive and secretive. The information sharing sessions set up to counter this trend went some way to changing the atmosphere. However the students tended to offer information they thought would be news to other groups but in terms of their own adventuring was "old and useless."

Answers to the last two questions asked in the writing conferences revealed the difficulties the girls were having within this learning organisation. Several complained of being marginalised when the writing was going well and being asked to write the linking passages by the other members in their group. Still others told of being left to do most of the writing while the boys in the group rotated the Mover role between them. Observation of the students using the program confirmed what the girls were saying. These girls were, on the whole, assertive but the boys were made bossy by their engagement in the adventure. They would grab the mouse from each other when they disagreed with an action that had been taken. Voices were raised and in the relative isolation of the withdrawal room less teacher supervision was possible.

The first trial helped to shape the second. Some of the issues addressed in the design of the second classroom trial were:

- a focus on Myst as a text and a more direct stimulus for the content of student's writing. The writing and drawing processes used by the program's authors were presented to the students;
- role definitions with individual responsibilities to other group members described and practiced as the adventure was introduced to small groups;
- early encouragement of a cooperative environment with timetabled weekly sharing sessions and student creation of "clue cards" as cryptic hints for their peers;
- work tasks both at the adventure and back at desks more clearly described and monitored;
- an opportunity to resolve any conflict was built into seat work time. [4]

The second classroom trial

This Year 4, 5 & 6 class is in a rural central school in a farming area in NSW. The class has a high level of access to technology and operates with a cooperative learning philosophy. The students are grouped in a two teacher double classroom. The class tradition of cooperative learning meant the groups of students were chosen randomly. This allocation to groups meant that students from across the three grades might be working together. The groups could be of single or of mixed gender. The trial began in the second term of the 1995 school year.

Teaching Plan

The author initiated the trial and then left it with the classroom teachers. He introduced the teachers to the program and the intended learning outcomes were discussed at some length. The aim was to provide students with a chance to write for a number of purposes demonstrating the genres or text types of recount, procedure and imaginative narrative. A display space was created to provide a focus for the publication of the student's writing. A large print of the map from the Myst island library was the centre piece of this display.

Introducing the adventure to the students

In the space of a few days one or two groups at a time were introduced to Myst. The author showed the Making of Myst Quicktime movie. This recount was intended to show that the people who wrote the adventure used the same processes that the students were going to use. Roles within each group of three were outlined, the activities to be completed before, during and after each session with the adventure were discussed. The logistics of loading and saving were practiced.

Introducing Myst

- The Making of Myst (big) movie was played and the process of the creation of the adventure was discussed. The brothers discussed their ideas, wrote storylines, drew illustrations and maps and discarded a lot of material.

Group roles and responsibilities

- Pilot - Controls the mouse but does not act till there is group agreement.
- Journalist - Writes notes for the group's recount of each session.
- Artist / Cartographer - Draws the diagrams, maps or illustrations for the recount.

Establishing group processes

Before the session with the adventure

- Finish the previous recount text and submit this to the class teacher.
- Publish as part of a class Myst journal specific to each location.
- Discuss what is to be done in the next session.

During the session with the adventure

- Agree on roles which are to be rotated each turn.
- Make plans for exploration and discuss predictions of what will need to be recorded.
- Assist other group members e/g the journalist with construct recount notes.

After the session with the adventure

- Discuss the major events and any puzzles and/or solutions discovered.
- Redraft the recount text and submit to teacher.
- Contribute to the class publications as requested by teacher.
- Discuss plans for the next turn with the adventure specifying the information needed to solve the current puzzle.
- Resolve any disagreements.

Continuing the adventure

- First weekly class sharing meeting was run by the author and the class teachers.
- Students reported on their first experiences.
- Students predicted what the exploration would be like and some recounts were read out and information shared.
- A chart of group tasks (as above) was added to a large wall map of Myst island.
- A blank exercise book similar to the blank journal the authors provide with the Myst package was given to each group.
- The purpose of "location specific" journals were discussed with the students.
- A roster for group use of the program was finalised and displayed.

Conclusion

At this time the author has not returned to this school to see how things went while the trial was running. During these few introductory days the willing way the students adopted of the ground rules for the trial suggested that this class would be more successful than the last. However only a fulltime classroom teacher can guide an innovation such as this through the day to day contingencies of school life.

Tucked away on page XXX in this issue is a summary of the solutions to the beginning puzzle for each of the first four Ages of Myst. **Don't read this summary** if you want the fun of discovering these solutions with your students. However this information may be useful if you are planning to introduce Myst. Knowing these answers will help you guide your students through the problem solving process. Send me a Mac disk for a copy of all the support material developed for this program.

[1] Miller,R., Strand, L. & O'Harra, M., (1993) Myst Users Manual This booklet is contained within the CD cover and is well worth a read.

[2]Downes, T. & Fatouros, C. (1995) Learning in an Electronic World, Sydney: PETA p.6

[3]This program has been reproduced from Nanlohy, P. (1995). "A Myst Investigation" in Guss, L. (Ed.) Proceedings of the Multimedia in Education Conference, Melbourne: MLC Kew. This article contains a longer description of the process and the outcomes of this classroom trial together with details of the student's own evaluations.

[4]ibid. Because of its location this trial was not monitored by the author. It continued successfully until the CD was lost illustrating the venerability of technologically based teaching and learning strategies.

A Walk through Myst Island
As the simulation begins the player is landed on a wooden wharf on the southern shore of the island. Next to the wharf is a sunken ship whose mast and crows nest are still visible above the waterline. The ocean stretches out to the horizon. At the eastern end of the wharf is a small flight of stairs leading up a rocky hill. There is also a small pillar that has a switch on its apex. This is a marker switch and eight of these are scattered in strategic locations around the island.

On the south eastern corner of the island there is a flight of stairs leading up to a platform on which are two giant cogs. There are several buildings on the island. As the player moves uphill from the wharf they will pass a round building that is a planetarium. At the peak of the hill in the eastern centre of the island is a library. Behind the library, built into a craggy peak, is an observation tower. Perched on a stone platform that extends out from the north eastern corner of the island is rocket ship reminiscent of the Flash Gordon era.

From the front of the library a pathway extends westward down to a clock tower that stands a little way off the shoreline. The first part of the pathway is lined with eight pillars. Halfway down to the water the path it branches to the right and to the left. To the right of the path is the entrance to an underground generator. There is a cable strung on brick towers running from the generator entrance to the rocket ship. To the left of the path and covering about a third of the island is a pine forest. The path through the forest leads to a wooden hut and a huge tree that is fenced with a low brick wall. In the simulation the students are able to explore this environment as though they were walking around the island. Accelerated movement is available and the game situation can be saved.

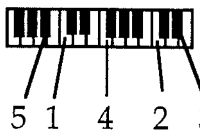
The Exploration Process
(Warning! Answers to puzzles follow.)
There is a general pattern to the effective exploration of Myst and its connected ages. Begin by exploring the island, turning on all the marker switches that are available then return to the library. On the wall is a map of Myst island. When approached the map shows those locations where a marker switch has been thrown. The tower flashes. When "pressed" with the mouse the tower begins to rotate. The tower rotation picks out important marker switches with a red line.

The tower can be accessed through a tunnel behind the bookcase in the library. One side of the tower shows the location of the exit to another age and the other side provides a set of clues. The books on the bookshelf in the library fill in the details with descriptions of the ages as the central characters, Atrus, Alchenar or Sirrus created them. These descriptions are narratives and are models for the writing task that students may complete.

The central task that links all the journeys to the ages is to collect the blue or the red pages and so get more and more information from the red or blue books in the library. Each page requires its own journey. The information so gained provides the clues to the end game in the Dunny age.

Don't look at these answers ....
if you still want to have fun with the Myst simulation.

The information in this table will spoil Myst for you. The steps described below will take a player to the edge of each of the ages connected to the central Myst island. A red and a blue page must be collected, one at a time, from each of the ages. There is a final Age that is available after these have been completed. Getting to this age is not described here as it would give too much away. Completing the Ages and entering the final Dunny age (yes it really is called that) is as they, say another story.

Myst Age	Information in the Tower	Action on Myst island	Library Information	Finding the exit to an Age
Stoneship Age Map line points to the sunken ship.	October 11, 1984 10:04 AM January 17, 1207 5:46 AM November 23, 9791 6:57 PM	Enter dates into starmap generator in the planet-arium. Draw the star pattern for each date.	Match the star maps to the maps in the Red and Blue book from right top of the bookshelf. (Leaf Insect Snake)	Click these boxes in the colonnade in front of library. Find the book in the cabin of the ship by the wharf.
Selentic Age Map line points to the rocket ship.	59 volts	Set the under-ground generator so both dials read 59. Test each button then set a combin-ation of buttons that adds to 59.	 Blue Book Middle shelf.	Open the rocket door. Match each note (1 to 5) on the keyboard to sliders at the other end of the rocket. Pull the lever. Find book.
Channelwood Age Map line points to the giant tree.	7,2,4	Use 724 to open the safe in the hut. Strike the match and light the furnace. Turn the wheel clockwise.	No specific clues. Information is about the Age and its environment. Green and Red book Top shelf, Left	When the noise stops turn the wheel anti-clock-wise. Rush to the tree to catch the elevator.
Mechanical Age Map line points to cogs on hill.	2:40 2,2,1	Use wheels on waters edge to set time. Press button to make cog bridge. Enter the tower.	No specific clues. Text adds to the myth and story. Black book Bottom shelf, Left	Set the tumblers to 2,2,1. Pull right, Hold right, Pull left, Hold left. Go back to the cog hill and find the book.

Next time a click by click solution to a complete age. If you cant wait that long buy the book, Myst Official Strategy Guide by Barba and DeMaria (ISBN 1-55958-480-7) or write to me with Mac disk for all the support materials that have been produced as part of using this program with my students.

Note:
If you are having trouble getting your saved Myst games to load try this procedure.
1. Load Myst as though it were a new game.
2. Before the game begins with the fly-by over the island choose Restore Game from the File Menu.
3. Use the buttons in this Open file dialogue box to find your floppy and your file.
4. The saved game will be opened with you looking at the ceiling of the library but all your discoveries will be intact.

From Personal Use to Classroom Use.

Implications for Teacher Education in France

Georges-Louis Baron	Eric Bruillard	Alain Chaptal
INRP -TECNE	IUFM de Créteil	CNDP -DIE

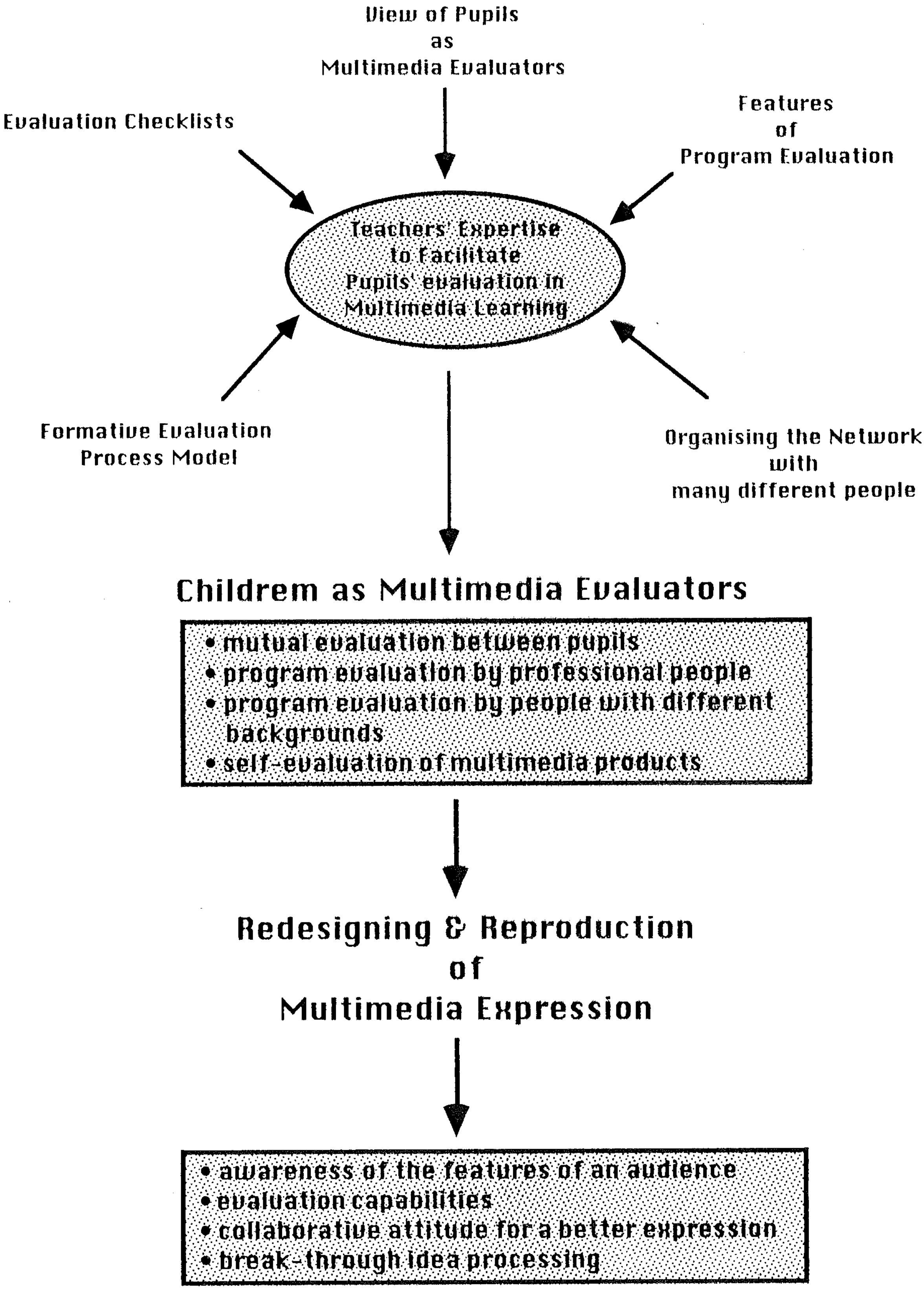
Key Issue

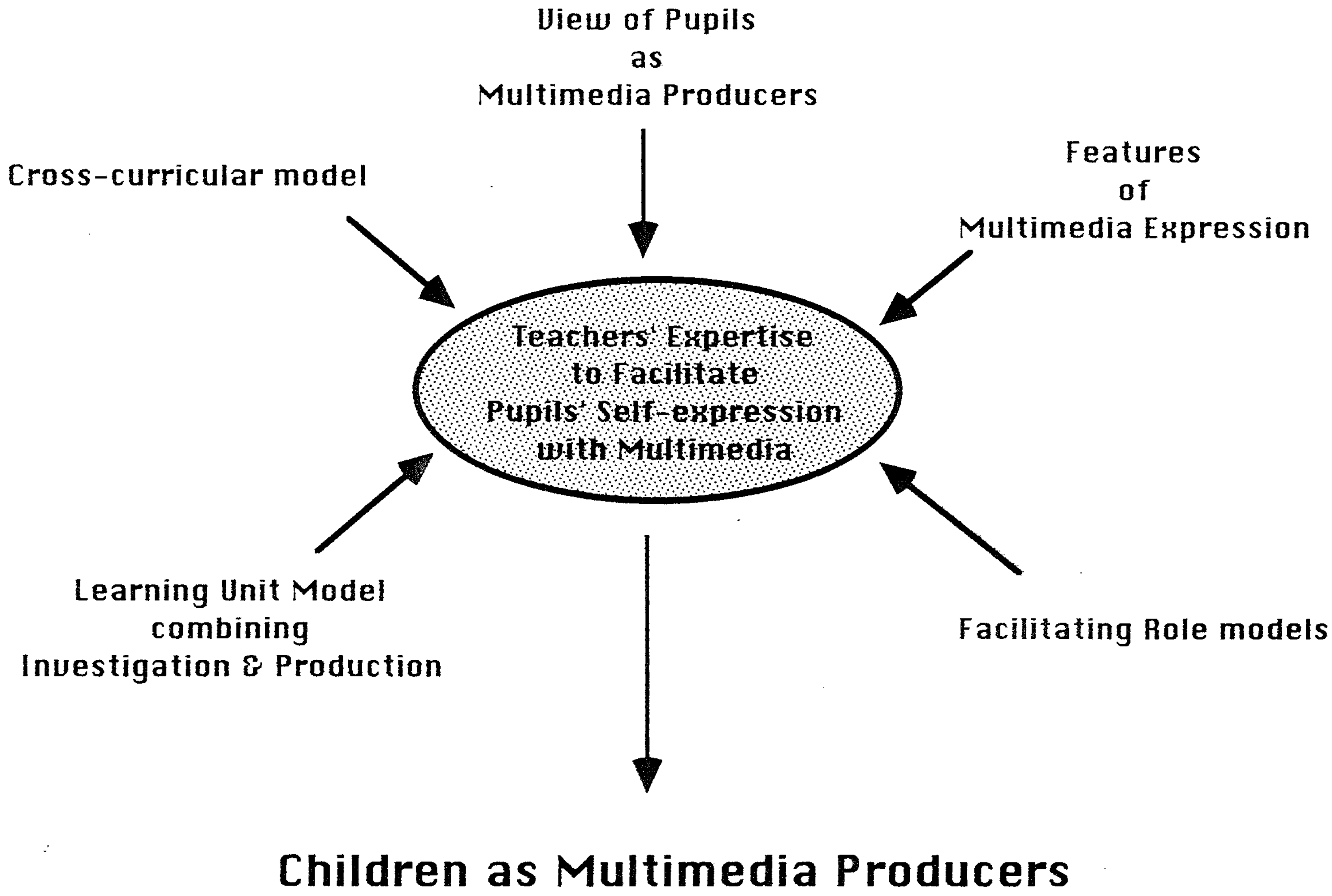
Possibility of transfers between teacher personal and professional practice

Implications for teacher education

To develop student-centered activities
it is necessary to develop
in the first place
teacher centered activities

Computer assisted presentation tools


View of Pupils as Multimedia Evaluators
Evaluation Checklists
Features of Program Evaluation
Teachers' Expertise to Facilitate Pupils' evaluation in Multimedia Learning
Formative Evaluation Process Model
Organising the Network with many different people
Childrem as Multimedia Evaluators
• mutual evaluation between pupils
• program evaluation by professional people
• program evaluation by people with different backgrounds
• self-evaluation of multimedia products
Redesigning & Reproduction of Multimedia Expression
• awareness of the features of an audience
• evaluation capabilities
• collaborative attitude for a better expression
• break-through idea processing


View of Pupils
as
Multimedia Producers
Cross-curricular model
Features
of
Multimedia Expression
Teachers' Expertise
to Facilitate
Pupils' Self-expression
with Multimedia
Learning Unit Model
combining
Investigation & Production
Facilitating Role models
Children as Multimedia Producers

Loethe 1

WC96

Projekt CIMS
Computer Integration in Mathematics Study)

Starting Theses

- teachers are the main innovation problem for Computer Science and Computer Use in Schools

➢ in-service training is in general limited:

- no real change in working habits
- problems with fundamental knowlegde
- focused on software use
- instead of general, future-proof concepts

➢ pre-service training has a chance to do the job, though there are a lot of problems

➢ mathematics teachers have to be trained in

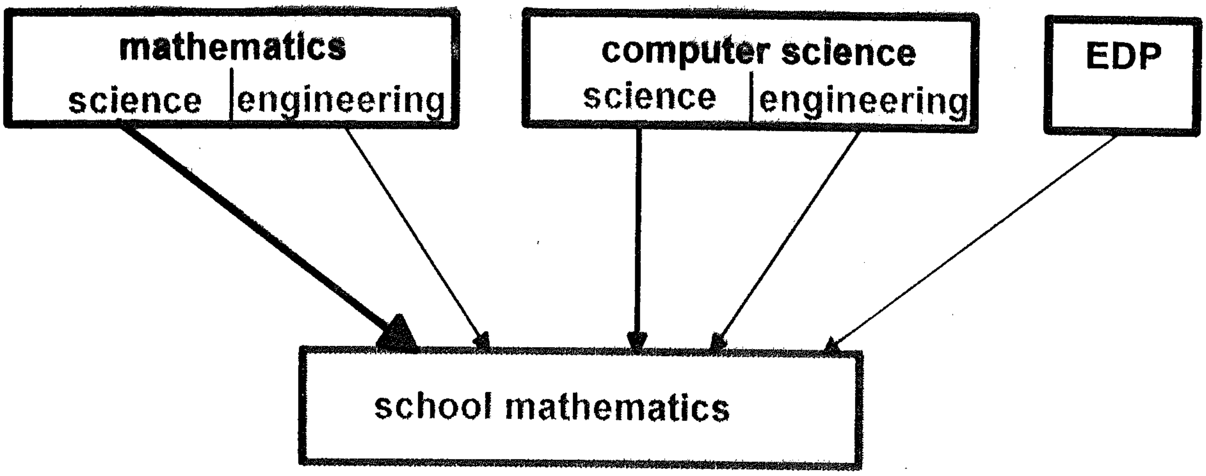
mathematics with informatics

- they are mostly in charge of the computer facilities in school
- they are mostly teaching computer activities
- science of mathematics education can serve as a model for computer science education

Didactics of mathematics with informatics

Loethe 2

Reference disciplines of school mathematics for decisions about teacher education



"engineering"
oriented on actual use of mathematics or computers performing standard calculations, using present software (e.g. standard packages)

"scientific"
oriented on concepts, future-proof contents, knowing how and why to perform, being able to transfer experiences

There are two tasks for the future of mathematics:

- **integration of computer science elements, vision: an interacting part like geometry**
- **mastering the unevitable change in mathematics under the impact of CAS, geometry systems, etc**

Loethe 3

Course material, software, working styles

Introduction to mathematics (compulsory)

- elementary math. sets. lists, functions, logic
- number theory primes, position system etc.
- math. structures relations, lattices, fields

Textbook with theory and activity pages

- lecture: 80 - 200 students

paper-and-pencil-exercises

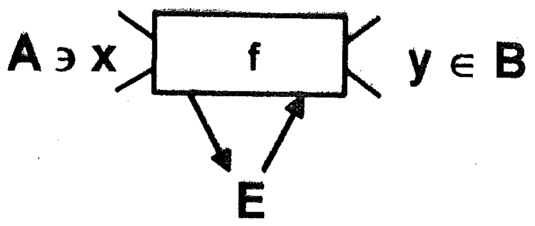
- tutors with small groups

computer practice: PC-net with tutors or at home (individuals)

- self-demonstration of concepts (e.g. types of combinations)
- computer as calculator (e.g. factorial, binomial coeff.)
- experiencing algorithmic aspects of concepts (e.g. function, primes, position systems)
- experimenting, trying out conjectures (e.g. number theory, geometry)

Loethe 4

Example: Feedback on the concept of function



Function as an object

((x) -> (x * x))

Naming of a function

(def square ((x) -> (x * x)))

compare e.g. Maple:
plot(sin,Pi..Pi); plot(sin(x), x=PI..Pi);

Function with parameter (free variable)

(def parabola ((x) -> (a * x * x)))

the function depends on the environment (context)

Side-effects by a function on the environment

```
(def parabola1 ((x) (a := (a + 10))
                (a * x * x)))
```

the function changes the environment (context)

Integration of concepts of function and automata.

Loethe 5

Results

- colleagues quite content with curriculum and integration,
  but: the vision is for the future: less structural, more algorithmic mathematics,

- quite content with Scheme (and the extensions)
  but: notation is still a problem:
  closer to mathematics vs. a simpler grammer

- acceptance by students is, of course, a problem:
  math with computers is harder to do,
  more time consuming.
  Why should a teacher for elementary school learn Scheme?

- the rating of the material and the teaching is quite encouraging (see paper)

- the whole group is polarised by the need of an active learning habit for computer work

- lateron in the study the top group (might be a third) become very effective workers with computers

WC96

Time for Change: Critical Issues for Teacher Educators

- When we discuss teacher education what are we saying that we would not have said 20 years ago?
- What has changed and why?
- What needs to change and how do we effect those changes?

Time for Change: Critical Issues for Teacher Educators

- A change in the way software evaluations are conducted has occurred in the last few years. (Gilliland, 1992; Squires and McDougal, 1994).
- It is time for a similar change in the questions asked about the process of teaching and learning in technology-equipped classrooms.

- Let's acknowledge that there are fundamental differences in teachers' (and researchers') beliefs about teaching and learning: behaviorist, constructivist, and instrumentalist.
- Let's also acknowledge that the differences translate into different questions and strategies for answering the questions.

- Up until now the majority of studies have been conducted from the behaviorist perspective.
- Many interesting questions have yet to be asked.
- Let's review a set of questions that could and should be asked.

- Question 1. What, if anything, has changed in teaching since the introduction of the personal computer to classrooms?
- If there are changes, are those changes consistent with good pedagogical practice?

- Can we say change has occurred just because “electronic flashcards” are used instead of or in additional to workbooks?
- Does the use of technology itself constitute change or is it the acts of teaching that we should focus on?

- Are we looking for a wide range of teaching behaviors in technology-equipped classrooms? If so, what behaviors have we seen or should we look for?
- Do we know how to judge the effectiveness of those behaviors?

- Question 2. Can we say that changes that have occurred—apart from a reliance on drill—have been productive either for students or teachers?

- How shall we define “productive?”
- How do we capture the changes?
- How do the changes come about?
- What is the cost of change?

- Question 3. How has using technology changed the content of what we teach?

- Is more problem solving occurring?
- Is more student-oriented and student-directed work occurring?
- Are more investigations occurring?
- If so, what have been the gains and what losses?
- What is the effect, if any, on students?

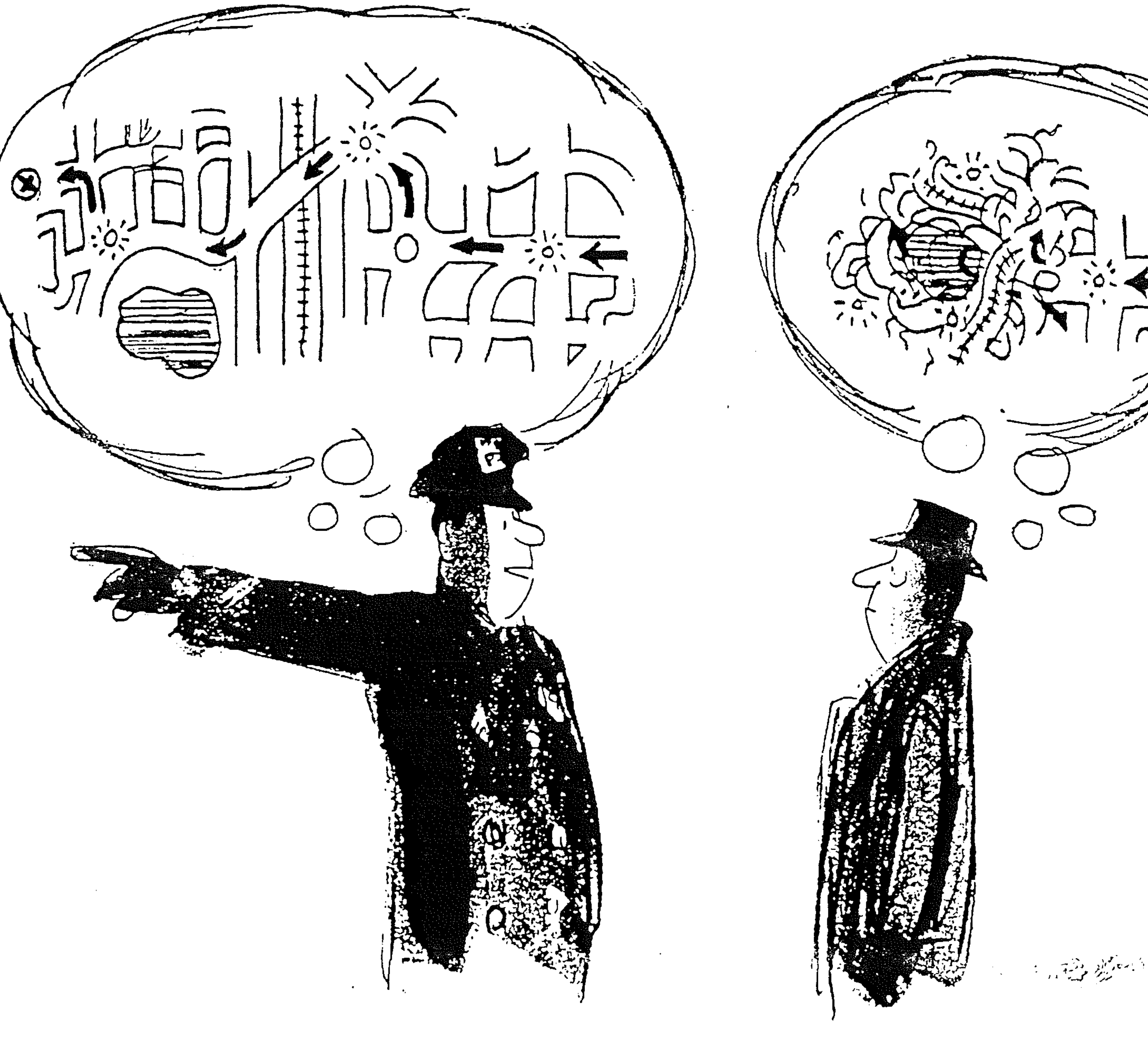
- Question 4. What conditions lead to teachers' successfully changing their teaching practice as a result of technology, and are those changes productive for learning?

- Do we know what changes are difficult to make but worth making?
- Is the change lasting?
- Can all educators make those changes?
- Can we characterize the change and communicate it to others in such a way they can adopt the change?

- Do we know what constitutes good technology-based pedagogy—at all age levels and for many subject areas?
- Do we have a set of guidelines for the acquisition of those pedagogical activities?
- Do we have a set of guidelines for deciding the impact of technology-based teaching?

- We must have guidelines, but we also must have rich descriptions of what changes have been made, criteria for success, suggestions on fruitful change occurs, and resources to effect those changes.

- For everything there is a season . . .
  - and the season for grappling with the problem of how to help teachers change and adapt to IT is long overdue.



Preliminary Report

of

Children's Use of Electronic Technologies in the Home

(based on discussions with 190 K-6 children in three Sydney Metropolitan Schools)

October 1995

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Background.

In 1994, as part of an educational computing course , seventeen graduate students who were teaching in local schools surveyed some or all of the children in their class about the technologies they have access to in their home. The method and content of the teachers investigations varied. Teachers analysed their own results, and discussed the implications of their findings in terms of policies and practices within their classrooms. In general the teachers were surprised by the high ownership of electronic technologies in the children's homes. The following table shows the degree of family ownership of a range of technologies as reported by the children. The results have been aggregated for the seventeen classes. In all, 460 K-6 students were surveyed in sixteen primary schools (two teachers were at the same school) in south west Sydney.[1]

Table 1

Family Ownership of electronic technologies

Technology	*Family Ownership*
television	99.5%
telephone	99%
VCRs	90%
video games	62%
computers	58%
printers	40%
video cameras	33%
answering machines	27%
hand-held	25%
fax machines	10%
modems	5 %

[1] A fuller description of the result and discussion from this work is presented in Appendix A

While the results of the surveys are not generalisable beyond the classrooms of this particular group of teachers, they raised a number of questions and issues that could be addressed by further research. These relate to access and ownership of the computers in the home: Who owns the computer? Where is it located? Who uses it most? and Are there any rules about its use? Other issues relate to how children use the computers in their homes and what they think about computer use.

This preliminary report presents the next stage in the research where a number of these issues were addressed.

Purpose of this phase of the study.

The purpose of this phase of the study was to more fully describe how children use computers in their homes and the physical and social environments within which they use them.

Key issues explored were diversity of access, range of uses and factors which influence use including gender, age, parental and sibling role models. As well the impact of home access and use on children's perceptions about use of computers in schools were explored.

Design and Procedures:

The project involved discussion groups with same grade children from K- 6 in three primary schools in south west Sydney. While the selected schools drew children from communities with a range of social and cultural backgrounds, they could best be described as middle class communities. As part of the process of seeking permission, parents were asked to complete a brief survey of their perceptions of their child's use of a range of technologies in the home. This survey is reproduced in Table 2

Table 2

Statements parents responded to as part of the permission process.

At home my child	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than one a week	Not at all
watches television						
listens to their own music						
uses the telephone to talk to friends etc						
plays games on a Nintendo, SuperNintendo, Sega, Megadrive or other games machines						
plays games on a computer						
uses a computer for writing and /or drawing						
uses a computer for school projects and homework						
uses a computer for other purposes:........................... .... *please specify*						

Rate of return of permission notes varied between schools from about 35% to 85%. The varying response rates were not seen as a major problem as the notes were mainly used to identify regular users among the children and to provide some ability to check children's own perceptions about the frequency of their use.

The parent responses were analysed, and children whose parents indicated that they were regular users of computers were selected for interview. Regular users were defined as children who used a computer at least two or three times a week - for games and / or other purposes. A range of in-school events and child absences prevented all selected children from being interviewed but Table 3 presents the numbers of children whose parents returned permission notes and the number of children interviewed by gender and grade groupings across the three schools.

Table 3

Numbers of children in Discussion groups and/or had permission notes

Grades	*Boys*		*Girls*		*Total*	
	Dis'n Gps	*Notes*	*Dis'n Gps*	*Notes*	*Dis'n Gps*	*Notes*
K-1	33	87	35	74	68	161
2-4	36	109	26	125	62	234
5-6	34	78	26	72	60	150
Total	103	274	87	271	190	545

In general two researchers worked in a school, holding discussion groups over a period of 3-4 days. Discussion groups lasted from twenty to forty minutes, depending on the age and number of children involved. Discussion groups usually had six children of both genders. Questions used varied over time as issues emerged or questions were deleted or refined.

All sessions were videotaped and complete transcripts of the sessions were generated. Children's responses were coded, by three researchers, based on the question asked or, in some cases, the answer given, as children often provided a rich variety of information within the one utterance. Reliability of the three coders was monitored through cross-checking.

Results

Both parent surveys and children's discussions were analysed. Some frequency tables were generated for the parent surveys and frequency ratings were averaged. These averages were used an index of frequency of use as appropriate.

The analysis of the children's discussions was mainly qualitative with some simple frequencies generated for categorical responses such as location of computer and use by family members.

PARENTS PERCEPTIONS OF PATTERNS OF USE

Five hundred and forty five parents returned the surveys from the three schools. About sixty five percent (n=350) of the parents indicated that their children used a computer at home. About twenty five percent reported that their child used the computer once a week or less and about forty percent indicated that their children used the computer several times a week or more.

Table 4 displays the frequency indexes for the whole range of activities for those children whose parents reported that they used a computer at home. It is clear from the table that television watching is still by far the most common activity for these children. In fact only one parent indicated that their child watched television less than two or three times a week and they reported that the child did not watch television at all. Parents also reported that the amount of TV watching was constant across ages.

Table 4

Frequency Index for activities using a range of electronic media

(N=350: children whose parents reported that they used a computer at home)

Activity	Frequency Index
watch television	4.3
listen to their own music	2.3
use the telephone to talk to friends etc	1.5
play games on a games machines	1.4[1]
play games on a computer	2.1
use a computer for writing and /or drawing	1.2
use a computer for school projects and homework	0.6

[1] Not all children who had access to computers at home had access to video games machines as well.

There were, however, age and gender differences with most uses of the other electronic devices. Parents reported that their daughters used the telephone and listened to their own music slightly more often than their sons, and their sons played games on video-games machines and computers more often than their daughters.

Game playing and all activities using the computer were reported as steadily increasing with age. Of interest, however is that while parents reported that using the computer for writing and homework increased with age, there were no gender differences. On the rare occasions that parents reported that children used the computer for uses other than games, writing and homework they reported activities such as making cards, posters etc, playing educational games, learning or practising typing, using CD ROM- based encyclopedias and learning maths.

About twenty five percent indicated that their child used the computer for a variety of tasks, while forty percent reported that their child mainly played games.

No differences were found between the responses of the parents from each of the schools. On the whole parents reporting was consistent with children's responses. Direct comparisons were not possible as, in the discussion groups, not all children answered all questions.

CHILDREN'S PERCEPTIONS OF COMPUTING EQUIPMENT IN THE HOME

The one hundred and ninety children interviewed had been selected because their parents indicated that they were regular users of home computers. A small number of children interviewed stated that they did not have a computer in their home but reported that they regularly used computers in other homes eg. cousins, friends. All other children confirmed that they did have a computer in their home. About twenty percent of the children reported that their was more than one computer in their home. Some of these were portable computers (e.g. laptops) that parents brought home from work: *"yes 3, we have a CDRom one and two laptops that belong to my mum and dad's school but they keep them at home ....".* Others were earlier models which were basically discarded or no longer worked: *"We have a Commodore 64 which we never use and a business computer - an IBM which is my dads".* A smaller number of children had two or more working computers in their home: *"I've got two, an old one and a new one that my dad uses for work".*

Asking children to describe the computer in their home prompted an amazing variety of responses. Younger children tended to describe the computer in terms of what software it has or what they do with it The following comments from kindergarten children were typical: *"I play game and do drawings on it. I draw houses"*; and *"My computer has treehouse. there is some paintings and cars and bears too. You can play anything else"*. Consistent with naming software in the description a small number of children described their computers in terms of the operating system: *"My computer's called 'Windows' "*.

The Grade 5 and 6 children were more likely to describe their computers by brand or model, with boys giving slightly more detail than the girls: *"Mine is a 386DX2. We don't have a sound blaster. Just the one hard drive and a monitor, And the hard drive is separate, not like that one there. It's like separate there and the monitor is there"*.

About seventy percent of the children responded that they had a printer at home. Several who didn't were able to describe other strategies for printing: *"No, my dad prints it at work"; and "No, but I use my cousins"*. An older child replied: *".....don't have a printer. I'm sure I'll get one for when I'm in high school"*. CD Rom drives seemed less common, with only twenty percent of the children mentioning one. Modems in the home were rare. Only seven children reported that they had one at home and all but one of these linked it to work related activities of a parent: *"Mum has one she's the president of an organisation. Only mum can use it"*. Only one child reported using one: *"I have a modem and I sometimes use it with my uncle. It is not good to copy games you wreck the disk and the computer"*.

CHILDREN'S PERCEPTIONS OF ACCESS TO COMPUTING IN THEIR HOME

A range of factors influenced how much access children have to computers in their homes. Some of these factors were explored in the discussion groups. These included location of the computer, ownership (who 'owns' it and who uses it most), and rules about its use. Each of these is discussed below.

Location

Computers can be found in most spaces in the home. Children reported that computers were located in spaces such as living / loungerooms, dining rooms, family rooms, studies/ offices, bedrooms, granny flats, garages, the sewing room, and interestingly a space which eight children labelled a computer room: *"...my father calls it the computer room - both computers are in there"*. It was obvious from a small number of comments that many families have had to make a space for the computer: *"one's in my brother's room and we are trying to find a* *spot for the other one - it's in the dining room at the moment, but we are trying to find somewhere to put it".*

About forty percent of the children named a bedroom (own, parents, brothers, sisters, and spare) as the place where the computer was kept. An equal number named more public spaces such as the living room. About fifteen percent of the children named a space such as a study or an office, with most providing comments such as *"in mum's office";* or *"in the office where mum and dad work because they sometimes work in it".* In general, when describing other people's bedrooms as the place where the computer was kept, the number of brothers and sister's bedrooms, seemed reasonably equal, however there was a major gender difference in reporting "my bedroom". Of the ten percent of the children who named their own bedroom, sixteen were boys and four girls.

Sometimes when the computer was in someone else's room the children clarified the issue of access or control: *"...... keep it in my sisters room but I use it too "; "in my dad's room because if its in my room my brother would come in and do what he wants on the computer.... ";* and *"mine's in Dad's office so I can work without anyone bugging me".*

Ownership

Two different approaches were used to further address the topic of access. Children responded to questions about who they thought owned the computer and who used it most.

The children reported that the computers in their homes were more often individually owned than shared within the family. Only about twenty five percent of the children reported shared ownership with comments such as *"All of us"; "mum, dad, my brother and me";* and *"me and my sister own the one with the most games...... ".*

Dads were by far the most commonly named individual owner of the computer (about twenty five percent). About twenty percent of the children named themselves. More often than not, these were boys. Mothers or siblings were each named about fifteen percent of the time, with brothers and sisters receiving about equal mentions,

Interestingly when the children were asked who uses the computer most in the family about thirty five percent named themselves. The gender ratio in this group slightly favoured boys. The significant gender differences came as twenty percent of the children named their dad as the person who uses the computer most and another twenty percent named their brothers. The remainder named their sisters, and in a few cases their mother or both parents.

Rules

Rules about use of computers also had an impact on children's access to computers. In discussions about rules, it became obvious that there were many different types of rules about computer use. These included more general rules about how they used the computer and rules directly related to access.

General rules about operating the computer covered a wide range of issues, caring for the computer, use of the printer as well as those governing security or privacy of others files. They were, by far, the most commonly volunteered rules. Typical rules about caring for the computer included not eating and drinking near the computer, nor banging the keyboard: *"don't bang the keyboard, no drinking around the computer because you might wreck the keys, you might spill the juice in the keys and the keys might break".* Many younger children also had rules about what they can do by themselves and what they need help with: *"I'm not allowed to put the disk in myself and put the game on. Mum does if for me?";* and *"I'm not allowed to print by myself. My two sisters help me".* The latter have a direct impact on access, particularly if help is not readily available.

Few children mentioned issues of privacy or security of programs or files. When doing so it was mainly in relation to their father's work files: *"Don't have the computer on when we have friends or visitors because of dad's files".* Others mentioned these issues as more generic rules about loss of programs: *"...you can't put nothing in the rubbish bin, no games and if the rubbish bin is fat, the disk may come out but only for mum and dad it will. .... my sister and brother did once try to put a game in the rubbish bin ".*

Rules directly related to access covered issues such as when, how often and how long children could use the computer, types of use, who has priority use and how disputes were resolved. Only a few children mentioned explicit rules about when, how often and for how long children could use the computer: *"I'm only allowed to use it on holidays and weekends";* and *"I have a time limit of an hour".* Some of these children also described rules that differentiated the types of uses: *"I'm only allowed to work on it when I've got my school project or some work I have to do at home. I'm allowed to play games on the weekends only";* and *"We can use it for 15 minutes for games but if it's homework we can have as long as we need".* More commonly children described rules that indicated that there were priority users and uses within the family. Parents doing work on the computer and older siblings doing school work seemed to have clear priority: *"We have to get straight off if mum or dad wants to do something"*; and *"If my sister's on it I have to wait because she's doing her HSC... "*. Homework or school work had priority over games: *"I tell my brother to get off because I need to do homework, study or typing or printing. He goes off and goes and watches TV or just something else.. "*.

Issues about turntaking and disputes seemed related more to game playing that other uses on the computer: *"If we fight over the computer no one is allowed to play it. "*. Many children mentioned strategies that parents used to regulate fair use. Time limits, turntaking, playing two player games were commonly mentioned, so was the notion of not being allowed to fight about who should have access: *"If we fight the computer goes off. We always keep a watch next to the computer"*.

A number of children did volunteer examples of difficulties with disputes over access. Interestingly these were provided mainly by girls (of all ages) but they were not always aimed at brothers! The following statements provide a range of situations: *"......he never lets me on. When he's busy I tell him "After you can I have a turn?" by then its probably tea time and I have to go to bed so he never actually lets me have a go"*; *"sometimes I'll be playing games and my brother (OLDER) will just push me off the chair ; "my older brother and sister use it more. If I want a go they stay on the computer but if I want a turn they just come on"*; and *"Whenever I want to play it when Lucy's(OLDER SISTER) playing it, she's 9, turning 10 in a couple of weeks, I ask dad if I can have a go next and he says "we'll see". And I go over and I watch Lucy and she's always playing Marjhong which is a game with finding the same tiles and you .... It's always at night time and dad says "All right you can have a go after Lucy's finished this go". And I go "Lucy can I have a go?" and then she starts typing some stuff and I say "Lucy, it's my go" and then she just pushes me away. So I tell dad and he makes Lucy get off and I get my go.... " (NB: alias used for sister's name.)*

It is interesting that the Lucy, the older sister swapped from playing to typing in order to increase her chances of staying at the computer. This strategy suggests that their were some types of rules about priority uses within that home.

PARENTS AND SIBLINGS USE OF COMPUTERS

As mentioned earlier about forty percent of the children named their father or their brother as the family member who used the computer the most. In general discussions about which other family members also used the computer at home children tended to report that the whole family used it. On the rare occasion that a child reported someone in the family not using it, it was likely to be the mother, both parents or a baby brother or sister: "*...my mum hasn't used it yet because she has other stuff to do* "; and "*.... my parents don't use it because they don't know how*".

When discussing what family members used the computer for the children reported two main types of use - work, related to employment or school, and games. A range of other uses were also mentioned including work for voluntary organisations, household work e.g. budget, study at college or university, homework/schoolwork, printing (cards, banners etc) and typing (often referring to letters).

When talking about parental use, dad's work was the most commonly mentioned task, being mentioned twice as much as mum's work. A small number of children described how both parents used the computer for work: "*well my mum normally uses it for her work, for her essays, sort of thing - like assignments because she works in a tax office (name of the office removed) or something like that. And she always has to do stuff because they know she's good at computers. My dad uses it for the army......*". Children mentioned a wide range of occupations when talking about their parents using the computers for their work within the home. These included plumbing, sales management, insurance, engineering, teaching, armed forces, taxation, retailing, police work, computing, graphic design, airline work, hotel management, sales and community home care. A small number volunteered descriptions of the use: "*......my dad's a plumber, he works. And if he works at someone's place, like if there's a blocked drain or something, well they put that on the computer. And if they don't pay for it being done well they have to go and tell them because he went and did it for them*". A small number of children also mentioned that their mother typed up work for their father: "*mum types up work for dad who is a sales manager*".

A number of children identified computer use with their parents' further study: "*my dad does lots of work on it because he goes to study at university*" and with work in voluntary organisations: "*my mum uses it for typing letters for football*". Not surprisingly younger children were more vague in their descriptions of how their parents used the computers:

"...they can do jobs and writing"; "...they do some work on it.."; and *"they use them to write..."*.

Many children made references to one or both of their parents playing games. About an equal number of mentions were made of mothers as of fathers, particularly with reference to the types of card games, that come with system software, such as SOLITAIRE. Apart from one reference to TETRIS only fathers were named as playing games that would be separately purchased such as SIM CITY, GOLF or PRINCE OF PERSIA: *"mum plays games like SOLITAIRE and other card games and dad plays driving games ....- the super video car game."*. A small number of younger children mentioned that their mother of father played games with them or helped them learn to play games: *"My dad helps me learn some games"*; and *"I play games with my mum"*.

Only two children described a parent in a way that might indicate that they were a computing hobbyist, both were dads: *".....he just makes them up from other games ... uses the same characters and all that but he sticks the game and compacts it and makes a couple of levels in it and all that.... he doesn't sell them because you are not allowed. Mostly he deletes them and all that because he doesn't want them to get sold. He keeps them on a disk..."*. While the other comment was a shorter reference to a father's use of a modem: *"...dad uses it .....to talk to his friend with the modem"*.

When talking about siblings' use some clear patterns emerged in the children's responses. Overwhelmingly, older brothers and sisters use the computer for tasks such as college or university work, school work, home work, and projects: *"My sister uses it for homework because she is in high school"*. Again, as with parents, gameplaying was the second most common response, though little detail was volunteered: *"...my brother also plays games on it.."*. When talking about younger brothers and sisters 'playing' as well as playing games was mentioned: *"..she's four in December, She just plays. She types but she just presses anything..."*.

CHILDREN'S OWN USE OF COMPUTERS

Overwhelmingly the children reported that their most common use of the computer is playing games. Drawing, writing, making things, and doing school-related work all come a far second. Each of these uses will be discussed in greater detail below.

PLAYING GAMES

As mentioned earlier, both the parents and the children reported that the children's most common use of the computer was game playing. As well, many of the children also play games on dedicated games machines, such as Super Nintendos and Segas and on hand held machines such as GameBoys. In many of the discussions about game playing it was difficult to separate the different game-playing environments, although a small number of older children did differentiate: *"I play the Sega much more than the computer. I would say I only use it (the computer) once every two weeks,...I play the Sega more like once a day..."*. In the following discussions game-playing is treated as a single activity, regardless of the environment.

A further complication stems from the children's generic use of the term "play" and "games". As mentioned in previous sections children use this language to describe a wide range of computer uses. Some of this more general type of talk was evident when children were talking about playing games. For example, when talking about their favourite game, a number of children mentioned KID PIX or other types of programmes that enabled children to draw or paint.

Frequency of Game Playing

The frequency of the children's playing varied from every day to once a week, although a very small number indicated that they rarely played games. Some children mentioned restrictions on their use. The reasons behind these restrictions varied from *"I go in phases. It depends how often mum brings home the laptop....."* to *"...like Monday and Tuesday's is my brother, Wednesday and Thursday is me and Friday and Saturday is my Dad..."*. Duration of play also varied enormously among the children from several hours to about ten minutes. In discussions about duration a number of children mentioned that duration of particular sessions also varied greatly: *"I don't know how long I play with it because sometimes if I'm playing a fighting game and they kill me, I get really angry and I just turn if off .."*. Some mentioned the fact that some games take a long time: *"..with Monkey Island, it takes ages so I do it for about 2 hours every day"*. Other children mentioned some restrictions: *"usually one hour. For homework I get overtime. Other times 20 minutes ..."; and "...it depends if others are waiting to use the computer. I have a time limit of half an hour .."*.

Only ten children reported that they played for several hours every day, all but one of these children were boys in the eight to twelve age range: *"Most of the time, once of a morning and* *three times in the afternoon. Every day. Sometimes I play it until I finish a game no matter what. Sometimes I play through tea without having any tea or breakfast. ...1 to 2 hours but sometimes of an afternoon I play for 5 to 6 hours ".*

Type of Games Played

Overall children mentioned more than 60 different games when they were describing their favourite game. No one game was outstandingly popular. A small number of games were mentioned by several children. These included KID PIX (as discussed earlier- this is not a game), TETRIS and STREET FIGHTER. There were gender and age differences in choices of favourite games. For example, KID PIX, AND ROGER RABBIT were only mentioned by younger children, TETRIS was only mentioned by older girls and games such as STREET FIGHTER and MORTAL KOMBAT were only mentioned by older boys.

OTHER USES

As well as playing games the youngest children reported that they colour in and draw, and write stories and letters. There seemed to be little gender differences. Few of the these children volunteered much detail about their activities. Many who did, used the terms 'play' and 'game' in their descriptions whether they are using the common tool software or programs specifically designed for early childhood that have 'play' or 'game' contexts embedded within the software: *"I can play PAINTBRUSH and print my favourite pictures"*; and *"...I print out my fairy games. I can print every game what's on the computer. I have to print it by myself. And sometimes I know how to send it out. And if I make mistakes I just rub it out and do it again. You get the soap and then you click on it and move it and where you made the mistake, you click on it again and it rubs out..... "*. For one child this carried over to his use of electronic stories: *"..I play books... "*.

Children in the middle years of primary school also began to mention homework in their descriptions of what they did. Again there were no discernible gender differences. Some gave detailed descriptions of how they did their spelling or tables, while others only volunteered the term 'homework': *"...Like I do my spelling. look, cover, write, check. I look at the word, then I cover it, then I write it on the computer and then I look to see if it's right and if its not I go right back and "rub it out"..... "*. A number of children also mentioned 'looking up' information or 'finding things out' but without specific references to particular electronic texts or software e.g. encyclopedias. The language of 'play' still persists in some children's descriptions of what they do. As well a number of the children seem to use the term 'typing' interchangeably with 'writing'.

Children in the final years of primary school make many more references to projects and homework, to using encyclopedias and to completing writing begun at school. Few children mentioned drawing as a use, apart from graphics, pictures and title pages within projects. A small number of girls did refer to designing things: *"..well sometimes I just sit at the computer and I like designing my own flags, like the Aboriginal flag and doing different sorts of backgrounds..."*. Another girl spoke of SIM CITY in terms of liking design: *"I like going into a thing called Sim City. I like designing things like that. You build your own cities.... and you go into a thing called evaluation and it tells you how many people the city has. And it tells you the thing that's happening like it might be pollution......"*.

A number of points of interest arose from these older students more elaborate responses to their uses. The first was that a small number of older children were still using 'play' and 'game' terminology in their descriptions of use: *"...I like playing Kid Pix and Magic School Bus and..."*; and *"...there's games like Encarta...."*. The second was that some children were 'playing with' information in a serendipitous way: *"..Well we got this atlas. And I like going into that and you pick your countries. And you bring it up and they show you the flag and you can play the anthem ."*

A third set of points related to the using the computer to do school-related projects. For most children doing a project involved moving back and forwards between screen and paper. Some children reported using paper-based sources of information: *"...first I get the information out of a book, write it on a piece of paper, type it out on the computer, and then print it out. I stick it on cardboard to hand it in to the teacher"*. Other children began with an electronic source but completed the project by hand: *"I get information from the CD Rom and type up the information and print it and then put it in my own words"*. Some others read from an electronic source then organised the information on paper, before returning to the computer: *"First I go to Encarta, print out the information, read it, put it into my own words, shorten it from 6 pages to 3 pages, type it into different paragraphs, print it out, print pictures through the large screen and then put colour cartridge to print (the pictures) in colour"*. This pattern of moving between screen and paper was also mentioned within the context of completing projects as school: " *At school......we print out what we need and then we go back and write* *out our own copy and them we go back and type it on the computer...and we get the pictures as well".* Only one child described a process of working with an electronic text the whole time. i.e. copy the text from an electronic source straight into a word processor, where they read, reorganised and wrote in their own words.

A number of children described how they used pictures, and maps from electronic sources in their projects and images from clip art collections for title pages. The issue of copyright of pictures within encyclopedias was mentioned by two children, as was the notion of creating a bibliography to name the sources of information. However, it was common for children to mention changing the texts into their own words: "*....you can just look at it and change it into your own words".*

LEARNING TO USE COMPUTERS

The children reported a variety of ways that they learnt to use the computer. The most common processes were direct instruction, experimenting and watching others. A small number of children also mentioned using manuals and help files. A small number of children mentioned school or teachers when they described how they learned. Two children reported that they couldn't remember it was so long ago!

Direct instruction was mainly from parents, especially dads, older siblings and in a few cases from the computer vendor. Younger children, in particular, mentioned this process. Children of all ages, however, reported that they had learnt/taught themselves: *"I learned by having a fiddle around"; "I just pressed the buttons"; "I did it all by myself, I played it, I just know it";* and *"I just picked it up by having one in the house".* One child described the process in detail: *"with one of my computers, my first one I got when I was pretty young ....And I learnt that you could fiddle around with it and it wouldn't break so I just kept pressing all these different buttons ......".* An older girls described it this way: *"if I am playing an educational game or a video game, I'll just take risks because I want to see what happens".*

Many children also reported watching parents and older siblings use the computer: "*.....when my dad played I just watch him so I just copy him and I remember in my mind";* and *"I just looked at my mum and how she used it".* In particular younger children watch other children play games: *"...my cousins play and watch until I get the hang of it";* and *"...I play games and watch my sister play".*

When describing how to learn to play games a number of older children referred to reading instructions and manuals: " *When you buy a game you just play along and I usually read the instruction book....* ". Some children reported that they only use the manual after they have tried to work it out for themselves: *"Try and go through it and if you get stuck you go and get the manual"*. One child explained the role of previous experiences: *"You like take the experience from another game and you just fiddle... "*.

Many children mentioned a combination of learning processes. A few older children differentiated their learning processes by type of use: *"Dad showed me the keys for WordPerfect. Dad showed me the function keys F1, F2... and how to use the help screen, he wrote them down for me. And for games I just practiced. "*. A number of children, while not referring to the processes used mentioned playing games as the way they learned to use the computer *"......from playing games on it"*.

USING COMPUTERS AT SCHOOL

Computer usage in schools is dependent on the type of access which the school and the individual teacher provides. Each of the three schools has their resources organised in different ways. One school has a computer room with approximately 15 computers and printers. A few classes also have a computer in their room. The second school has 8-10 computers with CDroms in the school library, one computer in each classroom and others on movable carts which can be brought to the classroom. The third school has one computer in each classroom and two in several senior primary classrooms. It is interesting to note that regardless of the setup at the school the children's responses to a number of topics were similar across the three schools.

Most children reported that they do use computers at school. Those who said that they didn't were more often than not in kindergarten. No gender differences were found in the children's access to computers. However, some children, both boys and girls, expressed concerns such as: *"The boys take the computer"*; *"All of the boys want to have a go and they're not letting the girls have a go.. "*; and *"Normally all the boys go on before the girls go on"*.

The children reported that they used the computers at school for a variety of purposes. The most common uses were playing games, writing stories and publishing, and using CDroms to obtain information. Additional uses were printing, painting, word processing, typing, and doing projects. A number of children descriptions of what they used the computers for were very vague *"......School things"*. Most children who mentioned games, did not elaborate about the subject of the game though some of the older children used terminology such as 'educational games' and 'computer games'. One older child did attempt to explain the difference: *"We've got like this little page here and that's the Main Menu. And in the Main Menu is the Social Studies ones. Like they're also games but they're challenging. There's Maths and Science and they're all in a different category. So if you want Social Studies you can do Ancient Empires and all other games. And there's only one little Games directory which has got nothing to do with it, like there's no problem to solve or anything. And that Games directory contains Crystal Caves, Secret Agent and games like that. Social Studies (educational* games) - *there is a challenge in them also but it's also a game to play for fun so it's like a mixture)"*.

The boys were more likely to say they "play games" than the girls. One student said that he *"plays writing games "* at school.

Many of the children reported that ten to fifteen minutes is the usual duration of a turn at the computers. Some children expressed frustration: *"there's lots of people and you only get a short time on it "*. Frequency of use varied from twice a week to one or two times a term. A number of children described how their teachers used rosters and lists to ensure equal access: *"Mrs X in the library has a roll of the class and she ticks off if you had three goes and whoever hasn't had three goes gets the next turn"*; and *"Two go at a time.. everyone has a number and we get turns ... "*.

Some children reported other methods that teachers used to determine access. These included, selecting children who finished their work early, children who were well behaved and those who asked. Some of the children volunteered comments on the results of these types of approaches: *"Mrs X lets you go if you've finished your work or if we're having free time....yes... normally all the boys go on before the girls go on. Well yes but they're only 10 minutes behind or 5 minutes behind so you don't get very long on the computer, it depends because some peoples are better at spelling and handwriting and the others are better on maths, so it just depends. So everyone gets about two goes a week nearly"*.

A number of children said that they did not get to use the school computers much at all. They focused on the issue of access. Some of the younger children, both boys and girls, perceived that the computer was controlled by 'others' and they had been denied access: *"People keep taking my turn - they just don't want me to get a turn. They keep playing it"*; *"The teacher* *doesn't let us do it because we might do the wrong thing"; "Some people have had a turn but she always picks the same people"; "I haven't had a turn at school yet because the teacher won't let me (514")*; and *"You put your hand up and the teacher picks somebody. When I play with Sarah she has all the turns, she is really bossy".*

About a third of the children stated that they preferred to use the computer at home. Their reasons focused on having more time at home, more choice of what to do and the quantity and quality of games at home: *"At home you have as much time as you want"; "You don't have to share and there is no time limit"*; and *"I think it's much easier to work at home - it just comes natural ... At school it has to be forced out of you. You have more time to think at home".* Children spoke about distractions from classroom noise and other children watching them.

Perceptions of the differences between using computers at home and school also involved using them for different purposes eg. games at school and assignments at home (or vice versa), different types of computer equipment (older/newer, brands, colour/monochrome, printers, CDroms, screen savers) and the selection of games that are available on them. Older students were able to discriminate some difference between recreational games and educational games but it did not affect their enjoyment of computers and computer games at school: *"they're completely different games"; "there is more school stuff than games on the school computer".* Other children commented on the lack control over the school computers: *"you can't put new games on"; and "you're not always allowed to print at school".*

Discussion

The results of this part of the study clearly indicate the extent of integration of the computer into the home lives of these children. Children spoke in a matter of fact way about a wide range of issues associated with their access to and use of the computer or computers in their home.

Two of the important facts to emerge from the study were that around twenty percent of children came from homes which had two or more working computers and that particularly with the younger children, several had had computer/s in their homes for as long as they could remember. This latter fact is particularly significant for schools who need to face the challenge of the coming generations of children that have been or will be born into a world of computing.

Two important issues also emerged with relation to children's access to the computers in their home. Firstly a significant number of children regarded themselves as the 'owner' and/or the person who most often uses the home computer/s. While there appeared to be some gender differences in this perception, with the number of boys placing themselves in this category being greater that the number of girls, the differences were not as large as was expected. In many children's families the computer was owned and used by all or most members of the family. In others, dads were perceived to be the owner and main user of the computer.

Secondly, while the location of the computer varied enormously from private places (another's bedroom) to public places (the family room), most restrictions to access came about because of the existence of priority users and uses: Adults and older siblings had preference over younger users as did 'work' over 'games'. In some families these rules were sufficiently explicit that some children were able to manipulate them to gain greater access. Few children complained that they did not get enough access to the computer, although a small number did mention disputes with siblings. In fact when comparing school use to home use, many children identified the factor of access as a key factor in their preference for home computing.

Children described a variety of ways that they used the home computer. Not surprisingly playing games was the most common use. Very few children appeared to be 'addicted to' game playing in the sense that they spent too many hours playing. On the other hand, many children identified game playing as one of the ways they developed their confidence and competence with the computer. The language of 'playing' and 'games' permeated children's talk about computers, for some, even when they were referring to other uses such as writing, drawing or reading electronic books. As well the strategies of 'trial and error', 'fiddling' or 'playing around' when learning new games also seemed to extend to the task of learning to use other types of programs and system software. Combined with some direct teaching from a parent (usually dad) or sibling and the strategy of 'learning by watching', most children were confident in their ability to learn how to use new software or new processes associated with using the hardware.

As well as providing direct instruction for the children parents and siblings also played a number of other important roles for children in their home computing. The most important of these was as role models. Not only did children spend time 'learning by watching' they also enjoyed the spectacle of watching others play games, and at times playing games with others. In addition, children perceived that both parents and older siblings mainly used the computer for 'work'. Such a perception may help balance the media and advertising influence that portrays game playing as a dominant use of computers for children.

As well as playing games, most children used the computers in other ways as well. These included school-related activities as well as a range of self-generated tasks such as making cards and writing letters. About twenty percent of the children, mainly older ones, spoke about using CDRom-based electronic texts, such as encyclopedias. It is important to note that, at this point in time, telecommunications does not feature at all in these children's use.) When working with electronic texts, children seemed very comfortable with the processes of moving between paper and screen. tasks that worked on at the computer.

There was great variety in the amount and nature of the school-related tasks that children undertook using their home computer. The tasks are in large part influenced by the type of homework and extended project work that teacher set for their class. A number of children commented that they did not get the type of homework that could be done using a computer.

When children spoke about using computers as school, the language of 'playing' and 'games' was again prevalent. Many children initially described school uses solely in terms of playing games. Only after further questioning did more differentiated descriptions emerge. A key issue to arise from children's descriptions of their school use was access. This is not surprising given the difference between home and school access. As well children differentiated between school and home on other factors such as perceived control over access and use, the modernity of the equipment and the range and types of games. It is not surprising that often the home environment was seen as more favourable by the children.

NEXT STAGE OF THE RESEARCH

In order to seek clarification of many of the issues raised in this stage of the research a further 250 structured interviews have occurred with children in eight Sydney schools, across wider range of socio-economic and cultural backgrounds. In each school (or partner school) equal numbers of boys and girls in each of the upper four grades (Yrs 3-6) were interviewed. Again, children were selected based on the information provided by parents that indicated that the child was a regular user.

APPENDIX A

Results -of aggregated responses to the teacher surveys in 1994

an extract from Downes (1995) Children and Electronic Media: The Home-School Connection. in Tinsey. D. & van Weert, T. Liberating the Learner. Proceedings of the World Conference on Computers in Education, Birmingham UK, 1995. London: Chapman & Hall. pp 543-553.

In the first part of the study there were 17 teachers and 460 students. In describing the school community eight teachers reported low socio-economic status and nine reported middle socio-economic status. In general schools had high populations of children from language backgrounds other than English (LBOTE). For the purposes of analysis the children were placed in two grade groups - younger children (5-7 yr old students) and older children (8-12 yr old students).

CHILDREN'S ACCESS TO TECHNOLOGIES

As reported in the literature there were technologically affluent and poor families within the communities surveyed. At one end of the spectrum 53% of families owned television and telephone plus three other technologies and 37% of families owned both computer and video games machines. At the other end of the spectrum 3% of families owned no other technologies beyond television and telephone, 5% of families owned neither video recorder or video games and 18% families did neither computer nor video games machine.

There were also age and gender differences in a number of areas. Family ownership of computers and video games increased with the child's age. Gender differences were mainly related to video game ownership. There were no gender differences in family ownership of computers.

CHILDREN'S USE OF TECHNOLOGIES

Table 2 displays the percentages of children who reported that they used these technologies in the home. While reported usage was high, less that 5% of the children responded that they used any of these technologies for purposes other than entertainment.

Table 2 Children's use of electronic technologies.

Technology	*Use*
television	100%
telephone	80%
video recorders	70%
video games	50%
computers	45%

There were age and gender differences in use. Younger children only used the video recorder for entertainment. Although older boys were are more likely to use video recorders than older girls, they are less likely to use it for purposes other than entertainment.

Boys were more likely to use video games than girls and the gap between the usage widened with age. In classes where teachers asked the students to talk about the games they played, or to name the games, further gender differences emerged. Boys could name and discuss a far wider range of games, most of which were games of aggression. Girls named few games, some could not remember or didn't know the name of the games they played, and in all but one case named or described games of adventure or sport. These games were also on the boys lists.

There were age differences in computer use. 33% of younger children and 55% of older children reported usage. About 10% of all children reported that they used their computer for purposes other than games, for example homework or making cards. There were no gender differences.

APPENDIX B

A brief review of literature

A literature search on the topic of children's use of media in the home revealed some interesting findings.

Firstly, very few studies focus on children from five to twelve years of age. Research with young children in the home is usually related to print literacy and occasionally television. Studies that concentrate on electronic or mass media tend to focus on adolescents and young adults [1]. Even the recent Times- Mirror study in the US [2] that focused on technology in the American household defined 13-17 year olds as children. The recent ABS study [9], while providing information for families with dependent children across the age range, used 5-9 years and 10-14 years as their categories, only interviewed adults about access and use in the home.

Secondly few studies address children's perceptions of the growing gap between home and school technologies. Almost all studies are concerned with the impact of these technologies on children's behaviour [1] [3]. Many stem from concern about addiction to viewing or playing these devices or concern about the effects of violence and stereotyping on children's attitudes and behaviours. While these concerns are real, few researchers have asked children their views on these important matters.

Thirdly there is little if any Australian research beyond investigations of children's attitudes and use of computers. On notable exception is the work of a Deakin University group who have been bold enough to ask the question "Are their Aliens in our Classrooms?" [4]. This work, however has focused on adolescents.

The following sections summarise some of the important international findings in the area of access and use and some of the implications directly related to schooling.

ACCESS AND USE

Most of the findings on access and use, confirm the belief that electronic media are natural ingredients of children's lives [1] [2] [3]. As well as television, video, electronic games (video, computer and hand-held) and computers, there is also a significant component of listening to music through stereos, walkmans, and music videos [1]. Television still dominates children's lives. Patterns of family life and children's leisure have also changed significantly over the last 20 years. Leisure activities such as reading and outdoor and indoor unstructured play have decreased, but not necessarily in direct response to access to electronic media in homes [5].

Patterns of access and use vary according to geographic region, the socio-economic status of the community and family, and the child's age, gender, and peer culture [2] [6]. The Australian Bureau of Statistics study [9] reveals that about 20% of Australian households own one or more computers. Some preliminary research with primary- aged children, living in south Western Sydney, suggests that the family ownership of computers, is closer to 50% [10].

In many ways the advent of electronic technologies in the home is further widening the gap between rich and poor, powerful and marginalised, literary cultures and popular cultures, generations and genders.

FAMILY COMPUTING

Few studies investigated the family home as a context for children's computing. One notable study by Giaquinta et al [11], followed seventy families patterns of use over a three year period from 1984-1986. They investigated children's educational and recreational uses of computers. They revealed a near absence of what they described as academic computing (using computers to learn school-related content and skills), only modest amounts of programming and word processing and almost no telecommunications. They found that game playing took up most the children's computing in these families. More importantly, the study made a significant attempt to identify the sources that influence children's use of the home computer.

As with the many studies of adult's uses in the home from that period, programming was still a significant feature of the environment. As well the Giaquinta study was situated at a time when there was a strong notion that schools could and would be replaced by children learning from computers in their homes, hence their emphasis on 'academic computing.'

RELATIONSHIP BETWEEN HOME MEDIA AND CLASSROOMS

A number of research studies have focused on the relationship between home media and classrooms. Some findings include: children's views on computer use at school are shaped by home experiences [7] [8]; metaphors and images found in games extend to real and classroom life [3]; and excessive game playing is linked to poor academic performance [1].

Overall the literature poses more questions than answers. However, it does suggest teachers need to pay serious attention to a range of issues. It also clearly identifies a significant gap in our understanding of the experiences and perceptions children bring from their electronic world outside the classroom to their classroom world of learning.

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Stage 2 Preliminary Report

of

Children's Use of Electronic Technologies in the Home

(based on structured interviews with 275 children in eleven primary schools in urban Sydney)

February 1996

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1. Summary

The results of this part of the study clearly indicate that there are a number of children in today's primary classrooms who are confident, competent and regular users of computers in their homes. The purpose of this study was to describe the computer experiences these children have within their homes and to explore patterns of similarities and differences in terms of the child's age and gender, and the characteristics of the family and community from which the children come. It is not the purpose of this study to estimate what proportion of the primary school population belong to this group.

These children use computers for a variety of purposes and are comfortable moving between playing games and doing work on the computer. While game playing remains the more common activity, many of these children regularly write and draw and use information-based programs for leisure as well as school-related work. Boys and girls reported the same frequency of game playing on the computer, but boys were more likely to own and operate a dedicated video-game machine in the home as well as the computer. Girls were more likely to report that they wrote stories (narratives) for leisure on the computer, while younger boys and children without printers were more likely not to write stories.

Many of the children in the study have one or both parents using computers as part of their paid employment. There was a strong link between parental use of computers at work and the school/community to which the child belonged. Children who had one or more parents using computers in their work place tended to have more computers, printers, CD Rom drives and modems in their homes, however the uses the children made of the equipment varied little from those children whose parents did not use the computer in their work place.

Generally the children came from homes where other family members also use the computer/s for a variety work-related and leisure activities. In many families the fathers were the predominant individual "owner", the main teachers in the early stages of the children's learning about computers, the primary source of technical help when the computer needs 'fixing' and often the key decision maker about purchasing new software. In these families, the children still saw themselves and their siblings as the predominant users of the computers, along with their father. As well, other family members also played an active part as role models in using the computer, with mothers often helping with computer-based homework and supervision of

computer use. Siblings too played important roles, as models, helpers and game-playing partners. In many other families the computer belonged to "the family" and the children had a strong sense of "ownership" of the computer, saw themselves and their siblings as the primary users of the computers and played an active role in making decisions about software purchases.

When there is competition for access to the computer, older members have priority over younger members and those doing work have priority over those playing games. As well families have explicit rules about community and personal use and care of the computer. Younger children are more likely to have rules about how to care for the computing equipment, while older children are more likely to have rules which govern the frequency and duration of computer use.

The latest technology to enter the home, the modem, is still relatively scarce in these children's homes. Where a family owns a modem, it is mainly for work-related purposes of the father. Fathers and older brothers are the users of this new technology. Only a few of the children used the modem themselves to connect to the Internet or other telecommunications activities. Those who did were invariably male.

2. Background

In 1995, Stage One of a study into *Children's Use of Electronic Technologies in the Home* was completed. In this stage researchers held discussions with 190 children from three schools in south western Sydney. These children ranged in age from five to twelve years of age. They were selected on the basis that their parents had reported them as regular users of computers in their homes. Regular users were defined as children who used a computer at least two or three times a week for games and or other purposes. In these discussions the children described the physical and social environments within which they used the computers. Topics ranged from who owned the computer/s, where it was located, who used it most, how the children used it, what rules surrounded the use of the computer, how the children learnt to use the computer and the children's perceptions about the differences between home and school computing. The results have been published in a report[1].

3. Purpose

Stage Two of the study was designed to seek clarification of many of the issues raised in the first stage of the research. In particular, an attempt was made to see what similarities and differences existed across children who regularly used computers at home, and across their families and communities. The following characteristics were identified as key factors that might be associated with differences.

children : gender and age

families: parental computing experiences, number of computers in the home

communities: socio-economic and cultural factors, school experiences

The study was designed to investigate these differences in terms of children's perceptions of their access to and use of computers. Key topics explored include children's ways of using the computer, ways of learning to use the computer, who they perceive 'owns' the computer,

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[1] Downes, T. Reddacliff, C., and Moont, S. (1995) A Preliminary Report of Children's Use of Electronic Technologies in the Home. University of Western Sydney, Macarthur. (t.downes@uws.edu.au)

who uses it most and who helps them, what they see other members of the family doing with the computer, what rules exist in the family to regulate computer use, what they learn from playing games and using computers, and differences in home and school use.

4. Design and Procedures

Two hundred and seventy five children were interviewed by researchers. Children were selected from eleven primary school communities in urban Sydney. The school communities represented a wide range of social, economic, cultural and language backgrounds. One of the schools selected was a single sex school (School 1) and another had single sex classes in the higher grades (school 5). These schools were matched with partner schools, on the basis of same type of community and school. Thus the data analysis refers to nine school communities.

In each school (or partner school) plans were made to interview four boys and four girls in each of the upper four grades (Yrs 3-6). Children from the lower grades (K-Yr2) were not included in this stage of the study, because in the discussions during Stage One some of these children were not able to fully describe or explain their home environment and others provided inconsistent or conflicting responses.

As in Stage One of the study children were selected on the basis of information provided by their parents. All parents in the upper grades of each school received a letter of introduction and a permission note. These documents were translated into fourteen languages that were spoken by families across the nine school communities. Rate of return of permission notes varied across the grades and schools but each school had sufficient returns to allow four boys and girls to be selected for the interviews. Children were selected on the basis that the parent/s reported that their child used the computer two or three times a week for a variety of purposes. These included games, school work, writing, drawing and other computing activities. In some cases absences and school events prevented all selected children from being interviewed. A difficulty did arise with Year 4 girls in School 3 but this was compensated for by interviewing more girls in the same grade in School 4. Schools 3 and 4 were similar in geographical location, socio-economic status, cultural and language backgrounds. Table 1 indicates the breakdown of the gender, grade and school (and partner school) of students who were interviewed.

Table 1

Numbers of children interviewed

Grades	3		4		5		6		Total
Gender	M	F	M	F	M	F	M	F	
Schools									
1	4	4	4	4	4	4	4	4	32
2	4	4	4	4	4	4	4	4	32
3	3	3	3	1	4	4	4	4	26
4	4	4	3	6	3	4	1	3	28
5	4	4	4	4	4	4	4	4	32
6	4	4	4	4	4	4	4	4	32
7	2	4	4	4	4	4	4	4	30
8	4	4	4	4	4	4	4	4	31
9	4	4	4	4	4	4	4	4	32
Total	33	35	34	35	35	36	32	35	275

The interviews lasted between twenty and thirty minutes. They were structured, using a set schedule. Appendix A contains a copy of the interview schedule. During the interviews researchers recorded responses on a form. All interviews were taped, to allow for checking the accuracy and completeness of the information recorded on the form. The interview schedules were based on issues that were identified in Stage One of the study. They were trialed in one of the schools engaged in the earlier stage.

5. Results

5.1 Communities

The communities of each of the nine schools varied in socio-economic and cultural backgrounds. Two school communities could be described as wealthy predominantly anglo communities (1,9); two school communities as middle class communities- one multicultural (2), the other predominantly anglo (6); three as multicultural middle class/working class communities (3, 4 and 5) and two multicultural communities in south western Sydney drawing a large proportion of their families from public housing estates (7,8).

Each community also differed in terms of the computing environments within the schools. Types and numbers of computers varied across the schools, as did their configuration. Three schools had computer rooms or laboratories and the rest had computers in classrooms, laptop computers or a combination of the above. In all schools the primary focus of computing was across curriculum use, however two of the schools supplemented this with well-defined systematic instruction in computer use. Almost 50% of the children reported they used the computers at school about once a week, while 30 % reported less than once a week and only 20% more than once a week. Table 2 presents a breakdown of children's perceptions of frequency by school attended.

Table 2

Children's perceptions of frequency of use of computers at school

	Less than once a week	About once a week	More than once a week
School			
1	9%	69%	22%
2	44%	47%	9%
3	43%	35%	22%
4	0%	86%	14%
5	53%	25%	22%
6	44%	22%	34%
7	0%	73%	27%
8	55%	35%	10%
9	44%	31%	25%
ALL	33%	47%	21%

Interestingly even children within the same grade reported different perceptions about frequency of use. Overall the children in the older grades reported more frequent use than those in younger grades. As well there was some variation across the schools in the children's perceptions. Differences in frequency of use did not relate to the number of computers in the school nor the socio-economic or cultural background of the communities. However, there was a direct relationship with children's perceptions of frequency of use and how the computers were organised in the school. In the three schools that had computer laboratories and timetabled classes over 69% of children reported that they used the computer at least once a week.

5.2 Family members

The age and gender of the children interviewed is presented in Table 1 above. 142 girls and 134 boys were interviewed. About 90% of the children came from two-parent families with about a third of the children being the oldest in their family. There were equal numbers of families with sisters and brothers. Almost half of the children came from families where the oldest child was still in primary school, a third where the oldest was of secondary school age and the remainder where the oldest was post-school age.

5.3 Family use of computers

The children were asked to comment on their family's use of the computer in their home. About 75% of the children reported that their father used the computer/s in the home, about 65% that their mothers used the computer/s and about 84% that their brothers and/or sisters used them. In general children saw other family members using the computers for a variety of tasks. In the case of parents, children reported that they bring work home or work from home, do family work or voluntary work for local organisations, and use the computer for leisure. While these patterns hold for both mothers and fathers, children reported that their fathers are more likely to do employment-related work on the computer and mothers more likely to do home-related work and work for voluntary organisations.

When reporting their siblings use of computers, the range of tasks covered school work, writing and games, with games being the predominant activities for brothers and the combination of school work and games for sisters.

There were differences related to community for numbers of children reporting parental use but not sibling use. The differences though marked were not fully consistent with the socio-economic / cultural differences in the school communities. For example fathers of children from schools 3, 4, 5 and 7 were less likely to use the home computer/s than their counterparts, and mothers of children from schools 1, 2 and 6 were more likely to use the home computer/s than their counterparts.

About 60% of the children reported that the children in the family used the computers most, 23% the parents (predominantly the father) and 14% the whole family. About 25% of the children believed that the whole family "owned" the computer/s, about 25% that the father "owned" it/them and the remainder a combination of family members. Where the family owned two or more computers, usually the whole family or the children "owned" one computer and an individual "owned" the other/s.

5.4 Parental use of computers in the workplace

The children reported whether their mother, father or any other adult in the home used a computer at work. Few children had other adults in the home. 60% of the children reported that one or both of their parents used a computer in their workplace. Less than 10% of the children responded that they did not know. About 14% of the children reported that their mother did not go to work and about 8% that their fathers did not go to work or did not live at home. Table 3 presents a breakdown of the number of children with one or both parents using a computer in the workplace.

Table 3

Percentage of children with one or both parents using computers in the workplace (by school)

	Neither Parent	Father only	Mother only	Both Parents
Schools				
1	13%	29%	19%	39%
2	9%	28%	31%	31%
3	81%	8%	12%	0%
4	57%	14%	11%	18%
5	53%	22%	13%	13%
6	16%	47%	13%	25%
7	53%	23%	23%	0%
8	61%	19%	13%	6%
9	9%	47%	25%	19%
ALL	38%	27%	18%	17%

The differences between mothers and fathers using a computer at work are not as great as they seem. When children who have both parents using computers at work are taken into account, 34% of the children report that they have mothers who use a computer at work and 44% have fathers that do.

Large differences do exist, however, across school communities in terms of the percentages of children who report that one or both parents use a computer at work. These percentages vary from about 20% at School 3, through to about 90% at schools 2 and 9. In this instance there does appear to be a consistency with socio-economic and cultural backgrounds of the school communities with the wealthier school communities (1, 2, 6 and 9) having higher proportions of one or both parents using computers at work and the less wealthy school communities (3, 4, 5, 7 and 8) having relatively fewer parents using computers at work.

5.5 Computing equipment in the home

Two hundred and sixty six children had computers in their homes. Nine children without computers in their home had regular (several times a week) access to computers in the homes of members of their extended families or neighbours. Of the children who had computers in their homes, about 30 % had two or more working (not broken) computers, about 80% had a printer, about 50% a CD Rom drive and 20% a modem. In general the children used all of this equipment, except in the case of the modem, where less than half of the children who had a modem in their home, actually used it. Invariably these were boys.

While there were no age and gender differences in the children's perceptions of what equipment they had in their homes, there were differences between children who had one or more parent using a computer at work and children who had neither parent using a computer at work. Children who had one or more parent using a computer in their work were twice as likely to have two or more computers in their home, and more than twice as likely to have printers and CD Rom drives. Furthermore, these children's families owned all but 8 of the 52 modems! As noted above, parental use of computers at work is also linked to socio-economic and cultural backgrounds. Within the scope of this study it is not possible to further clarify the relationship between the amount of equipment in the home, parental use of computers at work and the socio-economic and cultural backgrounds of the families. Therefore in the following analyses the age and gender of the child and parental use at work will be the key factors when exploring systematic differences between children's reported beliefs and perceptions.

5.6 Software in the home

The children spoke about how often their families purchase software and who makes the decisions about software purchases. 27% of the children reported that their family did not buy software, 26% reported that they purchased software about once a year, 23% several times a year, 17% every 2 - 6 weeks and 7% on special occasions such as sales, birthdays or when they needed a piece of software for a particular purpose. The children who reported that their families didn't purchase any software offered a number of reasons. Some expressed the view that their family was content with the software they already owned or which had come with the computer. In some cases the computer has just recently been purchased. Some explained that they borrowed any software that they wanted. A couple of children described difficulty in obtaining suitable software. Comments included:

"can't buy any right now because all the programs are for 486's" (Year 5 boy)

"we have a Commodore and an Amiga, we can't find any games any more" (Year 6 boy)

Reasons given for the purchase of new software included: they wanted more games; bored with current programs; someone they know has it and it looks good; for school work; to get information for school; on special; advertised; as a gift or present; and needed for their parent's work. The children were asked to name the last piece of software that their family purchased. 28% children named a piece of educational software which had recently been purchased by the family. Educational programs, including encyclopaedias and children's word processors, were mentioned as often as recreational games. Examples of educational software popular with the children and their families were: Sim City, Dangerous Creatures, Encarta, Fine Artist, Myst, children's word processors such as Creative Writer, My Own Stories and the Writing Centre.

There were no systematic differences in the frequency of purchasing or in what was purchased based on the age and gender of the respondents. This is not surprising as, about 50% of the children who reported that their families purchased software described their father as the main decision maker. In many of these cases children were also involved in the decision making process, but nowhere to the extent of their parent. Consistent with this fact that parents (particularly fathers) were involved in the decision making process, children from families where one or both parents used computers at work were more likely to regularly buy new software for the home.

5.7 Children's talk about computers and computing

When children were asked to describe the computer equipment in their home, there was a wide variety of responses. This is consistent with Stage One of the study. In particular the age differences in approaches to describing the computer was still evident although in Stage Two, the children's ages only ranged from eight to twelve years old. As expected younger children gave shorter and simpler answers and older children more elaborate ones involving more technical terms. Younger children were also more likely to describe the computer in terms of its looks and the software on it, while older children described the capabilities of the machine and the purposes for which it is used. Girls were less likely to describe the computer in terms of its technical capabilities. There were no family- or community-related differences in the descriptions. Some examples of comments from these children are:

"my computer at home is big and heavy and a bit grey" (Year 3 boy);

" its a (Brand), its very easy to use, its has lots of things that came with it, it runs most games, and has a lot of megabytes" (Year 4 girl);

"(brand), 486, 33 Mhz, 16 bit sound card and superVGA colour monitor" (Year 6 boy); and

"an old (brand) model, no Windows, but has DOS, its useful. It has Word Perfect, drawing program, new Print Shop and games" (Year 6 girl).

In all 29 children described the capacity of their computer using a string of technical terms. 20 of these children were boys, 17 of which were in Years 5 & 6. Many children were comfortable with a range of technical terms. These included: *icon, options, applications, accessories, megabytes, soundblaster, hard drive, disk drive, joystick, memory, RAM, files, file manager, control panels, finder, password, modem, Internet, graphics, arrow keys, and disks.*

The more common vocabulary that was used included: *mouse, keyboard, CD Rom, click on it, enter, play, windows, DOS, load, wait, programs, games, buttons, power switch/button, menu, monitor, and compatible.* The importance to the children of having a mouse became evident during the descriptions with over two-thirds of the children mentioning that their computer had a mouse. CD Rom drives were also mentioned frequently by the children who had them.

When asked how they operated their computer most children chose to describe their computer's start up operation. Examples included:

"have to turn the monitor on and the other switch on, type WIN and just wait. Then it has a picture, press enter, it has all the programs and click it twice with the mouse to choose" (Year 3 girl);

"turn it on, get into it, press a button and use it" (Year 4 girl); and

"it loads and goes to Windows. Click on the icon for CD roms and a list comes up with all the CDs. To play games in DOS, you leave Windows, put in CD\(backslash) and the name of the game and it comes up" (Year 6 boy).

The students described how they were able to "get into" games or programs on their particular machine Descriptions included:

"use the keyboard. Press pink button, wait. Then go to the game. Then press enter. Then get the password to get into the games" (Year 3 girl);

"put on the switch. At the C prompt, type in WIN. Put the CD in the CD Rom for a game. Type in the name or go to directory, then it will tell me what to type in" (Year 6 boy); and

"turn on the disk drives and the monitor. It goes to Windows straight away. Press start and programs are stored under certain names. Go from file to file to find what I want" (Year 6 girl).

While age and gender were related to obvious differences in the way the children spoke about the computer, the differences related to families and communities were more subtle.

The children were also asked to report whether they spoke about computers and computing with family and friends. Over two thirds of the children reported that engaged in or heard frequent talk about computers. Of these children 36% spoke with their family, 42% with their friends and 22% with both family and friends. There were some age and gender differences in that the older boys were more likely to talk about computers than the girls or younger boys. Children who come from families with one or more parents who use computers at work, and children who come from particular school communities (3, 4 & 6) are also more likely to report that they talk with others about computers and computing. The former related to talk within the family and the latter to talk with friends. Both sets of differences, however, were quite small.

The children reported that they spoke about the kind of computer and software they had, new games and programs, what they had recently done on the computer, when their computer wasn't working, when they were able to use it, and about stories they were writing on the computer.

5.8 Ways of using the computer

During the interview children were asked questions about what they used the computer for. In particular they were asked questions about writing, drawing, doing projects and other homework. Each of these topics is discussed in turn below.

5.8.1 Writing

Over 90% of the children used the computer for writing. Those that didn't were more likely to be boys in the younger grades or children without printers. About 66% of the children write on the computer both for school-related tasks as well as recreational or non-school tasks. Many of the children reported that they used the computer to write for a variety of purposes and audiences. These included stories, letters, party invitations, signs, poems, songs, cards, jokes, memos/messages, lists, captions, diaries/ journals and recipes. A small number of children reported that they copied texts from books. Only one child mentioned the word Internet within the context of writing letters to friends although in another part of the interview two children spoke of 'talking' to friends using the modem (which requires writing). The only systematic difference found was related to gender and writing stories, with girls being the predominant story writers.

Some children write straight on the computer and others write on paper first and some children do both, depending on the task. There appears to be a school / home difference in the minds of some of the children:

"Depends if it's for fun I write straight on the computer. If it's for school then I want it to be perfect, so I write on paper first. (Year 4 girl).

Some children prefer the computer because of the ease of editing:

"it's not much use doing a draft because you can delete it if you do a mistake" (Year 6 boy);

"straight on the computer, it's much more fun, you can rub it out again" (Year 4 girl); and

"ideas come quicker on the computer" (Year 5 girl).

There were no systematic differences in approaches to writing based on age, gender, family or community factors.

The children were also asked to describe the last piece of writing they had done on the computer. Children varied in how they responded to this question. Some described what they wrote, others retold the processes they used and some a mixture of both. Some comments were:

"about a bush walk. wrote straight on the computer, did title page, headings and pictures by hand" (Year 4 boy);

"just thought it up, typed it in, used MSWord, used spellcheck, did heading and underlined it, saved on disk, and printed it at uncle's place" (Year 3 boy); and

"invitation for sleepover, also a fiction story about a monster typed onto the computer, did heading and used different fonts (Year 4 girl).

Twenty four children used the term "word processing" in relation to their writing activities and one hundred and sixty children could name at least one piece of writing software.

5.8.2 Drawing

Over 85% of the children indicated that they used the computer for drawing or working with graphics. There were no differences across age, gender, family or community. The activities included: experimenting/ playing within painting and drawing programs; making cards, banners, signs, posters and invitations; drawing pictures or using ready made graphics to illustrate stories, assignments or projects and designing things such as flags, dresses, houses and cities. Several children commented that they did not ever save or print out their work; some mentioned 'cutting' and 'pasting' their pictures into their writing document:

"I use Paintbrush to practise drawing. Don't print it because we have no colour printer. Use the rubber to take it off the screen" (Year 4 boy).

5.8.3 Homework

65% of the children interviewed described their home computer as a useful tool for doing homework. The school work they referred to included projects, assignments, essays, book reviews, research, making notes, answering questions, getting pictures, using the calculator for maths, practising times tables, making newspapers, finding the meanings of words, poetry, writing, spelling lists and speeches. Older students (Yrs 5 &6) were more likely to report that they use the computer for homework, with 86% of Year 6 children saying that they do some kind of homework on the computer.

For the majority of students doing projects still involved moving between the screen and paper. Some children used screen and paper-based sources of information, others printed out the information from the screen, worked on it on paper, then typed the final version back into the computer. A small number of children worked within the screen environment until the final stages then wrote the final copy by hand. Most of these children did not have access to printers in their home. Some illustrative comments were:

"print the information off Encarta. Underline the bits which are important and type them up" (Year 4 girl);

"...used Groliers to get the information, and used encyclopedia (books) for information. Printed the information from Groliers and changed it into my own words. Typed it back again. Printed pictures and did a title page."(Year 5 boy);

"project on gold. Click on encyclopaedia. Choose topic. Print information out. Do draft. Start to type it back in. Change font for headings and writing. Use underline and borders" (Year 6 girl); and

"on Humpback whales - went into Encarta and typed in whales and it took you to all the whales. Looked up humpback whales gave me all the info, printed it and wrote it out by hand." (Year 3 boy).

When obtaining information from CD Rom encyclopaedias, many students were able to use their reading, summarising and editing skills. Many read through the information and selected information to put into their own words and re-typed it back into the computer. Some students were able to do this within a fully screen-based process:

"go to the encyclopaedia, cut information from the encyclopaedia and paste it into (word processor). I change, add, delete and try to put it in my own words" (Year 6 boy).

Some children showed a lack of understanding of copyright and plagiarism as they literally pasted the print straight into their book or project or directly copied paper-based text into the computer. Two such children explained how they:

"printed out the information. Read it. Cut it up with scissors because some of the information is too hard to understand. Pasted it onto cardboard" (Year 4 boy); and

"went to the library - got book and photocopied it and just typed in up on the computer (Year 3 girl).

Another interesting feature of the children's comments about their school- related home computing was the number of children who mentioned the help they received with their work.

Parents helped their children with many aspects of the work. They helped the children print out their work, in some cases type it in, check their work and help them put the text into their own words. Both mothers and fathers received equal mentions for giving this type of assistance.

5.8.4 Games

The children reported that game playing was their predominant activity on the computer, with about 90% of the children reporting that they played games once a week or more often. No gender and age differences were found in children's reporting of the frequency with which they play games on the computer. Table 4 presents a breakdown of frequency of game playing by gender. There is a difference, however, in the number of boys who reported that they also own and used a dedicated games machine in the home . 78% of the boys reported that they had a games machine in the home which they used, this compared to 55% of the girls. It is also interesting to note that 23% of the boys reported that they used the games machine more often than the computer, compared to 10% of the girls. There are also some age differences in terms of younger girls being the group less likely to use dedicated games machines at all.

Table 4

Frequency of Game Playing on the computer

	Never	Hardly ever	Less than once a week	About once a week	Two or three times a week	At least once a day	Several hours a day
Gender							
Girls	3%	1%	8%	28%	31%	23%	6%
Boys	-	1%	10%	24%	39%	22%	5%
All	1.5%	1%	9%	26%	35%	22.5%	5%

In terms of frequency of use of game playing on the computer, there are some differences in frequency of use based on school community. Children from schools 3, 4, 5, 6 and 7 were more likely to report a higher frequency of game playing on the computer. Again, these differences are not completely consistent with the socio-economic and cultural backgrounds of the communities and they are compounded by the fact that the biggest differences in frequencies are from girls in these schools where more that 30% of them report playing at least once a day compared to their counterparts where 18% or less report doing so.

5.9 Ways of learning to use the computer

The first things that children say they learn to do on the computer are to turn it on and off, to save files, play games, use word processing or typing, use Windows, move the mouse and click on things, operate the keyboard, and use the disks. Children's comments included:

"double click the mouse to get into things" (Year 5 girl)

"how to get into games and then click on a thing and it had another thing I could do like writing and drawing and I went on from there" (Year 5 boy)

"then dad taught me how to use the directories" (Year 6 boy)

According to most children (75%) they learn to use the computer by having another person show or teach them what to do. The tutor is usually a family member. Fathers were named as the tutor twice as often as mothers, and brothers were named as the tutor twice as often as sisters. An additional 12% of students said that they learned by watching someone else use the computer, which is an indirect and more passive way of learning. The remainder of learners were taught by school teachers and extended family members such as uncles, aunts and cousins. Only 10% said that they taught themselves or read the computer manual.

Following the initial teaching period the learning is gradually handed over to the child. When children get encounter difficulties with something on the computer they were asked whose assistance they sought and why the person named is their helper. Most children selected a family member on the basis of their knowledge of computers:

"my sister- because she knows more about computers than dad" (Year 4 girl)

"my brother- he is the smartest one on computers" (Year 5 boy)

"dad's friend is the most computer literate person I know" (Year 6 boy)

If something goes wrong with the computer when it is being used, children were asked if they thought they could fix it themselves. 41% of the children said "no", 28% said "sometimes, depends or mostly" and 28% said "yes". Older children were slightly more likely to have a positive response. However, children who had one or more parents using a computer at their work were almost twice as likely to have a positive response to the question. Interestingly gender had no relationship with the children's responses yet fathers were, overwhelmingly the first person to be called for help, if the child could not fix it. Uncles were also frequently called up if dad could not help. Mothers and sisters were only mentioned by 10 children as a person to be called when things went wrong. Some typical comments of the children were:

"depends - if a big mistake ask my dad but usually fix it myself" (Year 3 girl);

"My dad calls my uncle, and my uncle, my dad and me and my friend fix/do it together" (Year 3 boy);

"No - my mum can fix it up, once she got a disk wiped off and she got it back on" (Year 4 boy);

"Yes - just try things until they work"(Year 5 girl); and

"depends - if a minor problem I can, if its a disk I can delete things, but if its a big malfunction I call dad" (Year 6 boy).

5.10 Family rules to manage computer use

All children spoke at length about the family rules regarding computer use. As with the discussions in Stage One of the study there were many purposes for the rules. Rules could be either explicit - a clearly stated rule, or implicit- inferred from particular behaviour or decisions parents made. The rules tended to fall into three categories: rules regarding the management of a community-owned item; rules regarding the child's use of the computer; and rules regarding the care and operation of the computer.

The first group of rules, the community rules, included rules for managing the processes for shared use of the computer and its resources, resolving conflicts and defining acceptable behaviour. The most commonly reported rule related to 'taking turns'. In general older family members have priority over younger ones, and people needing to do work have priority over those who want to play games. Some examples of children's comments are:

"share it and don't fight over it; mum or dad decides who will get it" (Year 6 girl);

"if sister has work to do she uses it but if she wants to play games and I am on it then its tough for her" (Year 6 boy);

"cant distract anyone while they are using it." (Year 4 boy);

"not allowed to use CDs that are for dad's work; not allowed to scrap someone's saved files;" (Year 5 girl); and

"don't put music up too loud" (Year 5 girl).

The second groups of rules, the personal rules set conditions and limits on the children's use. These include when and how and for what the children could use it, when supervision or permission is needed, and codes of behaviour when using the computer. Many children reported that they need to complete homework (on or off the computer) before they can play games and they have overall limits on the amount of time they can play games. Their comments about personal rules included:

'no rude pictures; no rude words on the program where you type something and it talks" (Year 5 girl);

"If I have homework I have to finish it and then I can play games on it" (Year 5 boy);

"only once a week, if a play it too much mum will take out the mouse and hide it." (Year 6 boy);

"not allowed to use the Internet unsupervised. No shooting games." (Year 4 girl);

"one hour a night for school nights, anytime on weekends, take a rest after two hours on weekends and must ask to use the modem." (Year 6 boy); and

"If I've been in trouble at school then I'm not allowed to use it for a couple of weeks." (Year 5 boy).

The third set of rules involve care and use of the computer:

"Don't eat near it: wash hands; don't touch the screen, be careful with it, don't play around with the mouse." (Year 4 girl);

"don't hit the keyboard hard, don't be rough with the mouse." (Year 4 boy);

"don't turn it off automatically because you wreck it, close Windows 95" (Year 3 girl);

Within this category there are also rules about use of printers. Many of the younger children reported that they cannot use the printer without supervision / permission. Some children also reported that there were limitations on how much they can print or how much colour they can use. One child reported similar limitations on Internet use. Typical comments were:

"can't print too much" (Year 3 girl);

"don't use too much colour on the printer" (Year 4 girl); and

"on the Internet, only allowed 30 minutes to 1 hour. When time runs out you have to turn it off. For other things, can use as long as I want." (Year 6 boy).

In all 23 children reported that there were no rules in their homes. However, half of these qualified their statements. Many of these statements indicated the presence of implicit rules. An example of such a comment is:

"no rules - mum makes us play together if we both want to use it" (Year 4 girl).

Few systematic differences in reported rules existed across the key factors. Younger children were more likely to report explicit rules about caring for the computer and its equipment and the need for supervision/ permission. Older children were more likely to report explicit and implicit rules that related to how often, how long and when (i.e. after homework) they could use the computer. Interestingly children who had one or more parents using a computer at work were less likely than their counterparts to report the latter types of rules.

5.11 Learning from playing games and using computers

The children were asked to comment on what they learnt from playing games and from using the computer. Most children believed that there were benefits from using both games and the computer more generally. Children provided a range of responses to the question about games. 30% of the children responded that they learned nothing from games, they played them for fun. Others reported that they learned a number of skills, strategies specifically related to that game, to game playing in general or they developed general computing skills and knowledge. More interestingly some children reported that they learnt a range of 'real world' skills from the simulated environments within the games. Examples of these included physical skills such as driving cars, skiing, playing golf, playing soccer, controlling aircraft, shooting missiles, how to use guns, and other more strategic skills such as handling money, building cities and playing real card games. A small number of children reported that they learnt how to solve problems, develop thinking skills, have patience and develop perseverance, memory and imagination. Some of the children's comments were:

"how to use computers" (Year 3 boy);

"to do some things sometimes to kill the baddies." (Year 3 girl);

"that if you practise it will get easier" (Year 4 boy);

"with driving games, if you have good graphics it can show you how to drive a car"(Year 4 boy);

"I haven't learnt much from playing games but there are some games that you can learn from - (child names a desktop publishing package)" (Year 5 girl); and

"how to play better and compete against sister and mum in games" (Year 6 girl).

Not surprisingly the children made similar types of comments about what they learnt from using computers. They commented on learning software specific skills and general computer skills. Others generalised to learning about new technology - how to understand it more, learning that computers are a useful thing. A number of children mentioned the future, or skills for when they're older. Many children mentioned "how to get information" and gave examples of the topics /areas that they had learned about. These included countries, wars, animals, machines and famous people. More often than not these comments included references to CD Rom-based encyclopedia or factual texts. As well, a large number of children referred to school subjects such as maths, reading, writing, spelling, sentence construction, history, geography, science or the general description "how to do school work". 74% of children said that owning a home computer gave them an advantage at school:

" computers help us to learn a lot more to work together, to find out information, and they are lots of fun. If you think computers are boring, they are not. You are always learning new things. (Year 6 girl).

5.12 Differences in home and school use.

70% of the children preferred to use a computer in the home environment rather than the school environment. 14% of the children enjoyed using a computer in either environment and did not want to select a preference:

"It doesn't matter where you use a computer" (Year 6 girl); and

"There are lots of different games to choose from at home and at school" (Year 3 girl).

The type of computer hardware and software available in the home and school environments was the main reason given by children for their preference. Frustration was caused by the limitations of some computing equipment:

"My computer stops in the middle of a game. School has a better computer, it works properly" (Year 4 girl);

"At home our computer is old, it's just about had it" (Year 5 boy);

"School has things that I don't have at home, like a CD Rom" (Year 4 girl);

"At school the printer sometimes doesn't work, so it's unreliable" (Year 6 boy); and

"The school computer is easier to use because it goes straight to Windows" (Year 6 boy).

Some families had more sophisticated computing equipment than their local schools:

"My computer at home has better things on it, more information, more programs and it's more modern" (Year 4 boy);

"At home my computer is better and faster with more memory and programs. I have 500 megs of memory at home. The school computers only have 40 megs." (Year 4 boy);

"I prefer home, because it has much better things on it to do" (Year 5 girl); and

"The ones (computers) at school don't give you all the information you want" (Year 3, girl).

Preferences for home computing varied between the schools from 50% to 93% in more affluent communities and where children had more computers in their homes. In community housing neighbourhoods computing activities at school were appreciated by higher percentages of students (up to 27%):

"At school, they give us drawing and I like drawing" (Year 3 girl).

Other reasons that children preferred to use the computer at home were the quieter environment, their familiarity with the computer, less restricted access and control over and ownership of the computer:

"because it's fun at home, you have more peace and quiet and no children talking" (Year 3 boy);

"I know how to use the computer better at home.." (Year 4 girl);

"because I can use it anytime I want, not like at school" (Year 5 boy);

"at home, you don't have to compete with others for a turn" (Year 4 boy);

"at home, I've got it to myself because at school all the boys hog it" (Year 4 girl);

"at home, you can do anything you want, you can choose" (Year 6 girl);

"I can do whatever I want instead of what the teacher says to do. I get more time to think" (Year 6 girl); and

"it's mine and I've got my own things on it " (Year 6 boy).

In the home and school environments children said that they were usually engaged in different computing activities:

"At school, we do postcards, stamps, illustrations and designing. At home, I type projects and reports" (Year 6 girl).

A few specialised computing activities were enjoyed at school because they were not available in the majority of homes: designing and making CDs; learning touch typing; learning to put graphics into documents; scanning photographs and producing newspapers; making video clips; working with animations; using a modem and the Internet.

Several students stated that help was available to them at school:

"You've got a teacher that knows how to use the computer. Mum and dad might not know much at home" (Year 4 girl).

Children reported that rules at school tended to concentrate on computer care and behaviour when using the computers. Teachers had rules about when the students can use the computer, behaviour on or near the computer, taking care of the equipment and the number of students using the computer.

"if the teacher's not there you are not allowed to use the computer" (Year 5 boy);

"be quiet" (Year 4 boy);

"can't mix up or delete anything" (Year 5 boy);

"no getting into the control panels (Year 4 girl);

"never bang on the keyboard, don't break the computer" (Year 3 girl); and

"only two people can use one computer" (Year 6 girl).

Frequency of computing varied in the home and school environments. 73% of the children in this survey used their home computer two or more times each week. Only 20% of children said that they used a school computer two or more times each week. The length of time the children used the computer at home was generally more than the time they were allowed at school. Equally important to the children was the fact that they had more control over the amount of time that they spent using the computer at home.

70% of children said that they used their home computer by themselves. At two schools, computer use was structured in ways to allow students to have a computer to themselves, at four schools computers were shared by small groups of students and at three schools computers were sometimes used by single students and small groups.

6. Appendix A : Interview Schedule

UNIVERSITY OF WESTERN SYDNEY
Macarthur

Thank you for coming to help us. I am _______________ from the University of Western Sydney. We are here to ask some questions about how computers are used at home. There aren't any right or wrong answers. I have some questions that will take about 20 minutes. I am taping your answers so we don't miss any important information. Is this O.K. with you?

Admin Details

Name	ID	Date
Sex	Class	Time
School		

How many brothers and sisters do you have?Who is the eldest? How old? Next? Age? etc	m/f	m/f	m/f	m/f	m/f
No of adults / parents at home? (if split families- prompt for both homes) (check for other adults in house)	mum	dad	other		
Do your parents use a computer at work (place of work) ?	mum yes/no	dad yes/no	other yes/no		

Home

How many computers do you have at your house? Working? Being used?	yes/no/dont know yes/no	yes/no/dont know yes/no	yes/no/dont know yes/no
Can you tell us a little about your computer /s? Type? Appearance? (check none are games machines or toy computer etc, check for a mouse) Do you use this computer?	desk/lap	desk/lap	desk/lap
How do you work the computer?			
Who owns the computer/s at your house? (self, dad, mum, family, brothers, sisters, other, shared, loaned)			
Where do you keep the computer/s at your house? (shared: loung,dining, hall, kitchen, family,) (whose study? whose bedroom)			

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How often does the family buy new programmes/software. (check for special occassions, Birthday, Xmas etc) Who decides what to buy? What was the last programme the family (___________) bought? Why?			
Is there a printer at home? (if more than one computer - attached to which computer?) Black&White/Colour? Are you allowed to use it?	Yes/no B&w/col Yes/no	Yes/no B&w/col Yes/no	Yes/no B&w/col Yes/no
Is there a CDROM attached to the computer?	yes/no/dont know	yes/no/dont know	yes/no/dont know
Is there a modem at home? (check that they know what a modem is)	yes/no/ dont know		
Who uses the modem ? What for? Are you allowed to use the it?	Yes/no		
Is there a games machines at home as well as the computer?	Yes/no Sega Nintendo Game Boy Other		
Do you use the games machine more or less than the computer? Why?	more/less/same		

Other People

Who else uses the computer at your home?	all, dad, mum, brothers, sisters, other
Anyone who doesn't?	dad, mum, brothers, sisters, other
What do your parents/adults in the family use the computers for? anything else?	dad - work / games/ other? mum - work/games /other?
What do your brothers and sisters use the computers for? anything else?	
Who uses the computer most at your house?	

General

Did you first learn to use a computer at home or at school? Can you remember the first thing you learnt on the computer?	home/school

How long ago was that?	So long cant remember	Several years	about a year	less than a year	a few months	a few weeks
if first at school ask about home How long have you been using a computer at home?	So long cant remember	Several years	about a year	less than a year	a few months	a few weeks
How often do you use the computer at home?	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than once a week	hardly ever
Have you watched less TV since you got the computer?	yes/no					
Do you talk about computers with your friends or family?	yes/no / depends/ dont know					
Do you mostly use the computer alone or with other people?	alone/with others					
When you do use it with someone else who?	who?					
At home ...When you first started using the computer how did you learn? who helped you? who helps you now? why is that person the helper?	can't remember - so long ago / dont know taught / watched / fiddled-used/read/ don't know dad, mum, brothers, sisters, others dad, mum, brothers, sisters, others					
When something goes wrong with the computer can you usually fix it yourself?	yes	mostly	sometimes	depends	no	
What rules are there at your house about using computers? What happens if every one wants to use the computer at once? Are there any special rules about who gets to use it or what types of use get first priority?						

Uses-Games

How often do you play games on the computer? (not the games machine)	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than once a week
Which is your favourite game? (on computer or games machine) Why?					
How do you learn to play a new game?	play it, read, watch ...who?, taught ...by whom?				
How do you get better at it?	practice, read, share, ask				
What do you learn from playing games?					

Uses - Non Games

Do you use the computer for writing?	yes/no
What do you write? Do you write stories separate from the ones you do for school? How do you write your stories? on paper first or straight into the computer? Do you print out your stories?	stories/letters/signs/party invitations yes/no paper/computer/both/depends on? yes, no depends?
Describe how you did your last piece of writing.	
What program/ software do you use for writing?	
Do you use your computer for drawing, painting or making things?(names of programs)	yes/no
What do you draw or make?	
Do you do projects using the computer? to get info? to present info? (Check that student knows what a project is.)	Yes/no Yes/no Yes/no
What progams/software do you use to do your projects?	
Describe how you did your last project using the computer?	
What other homework can you/ do you do using the computer?	
Do you use any other programs ? What type? What for?	
What do you learn from using the computer?	

At School

Do you think you 'do better' at school because you have a computer at home?	yes/no/same
Do you use the computer/s at school?	yes, no

What programs do you use? What for? Do you do anything else with the school computers?							
How often do you use the computers at school?	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than once a week	only three or four times a term	hardly ever / never
How long is each time at the computer?							
How do you get to use them / have a turn? -rosters? groups?							
How did you learn to use the computers at school?							
When you need help who do you mostly ask?	teacher m/f monitor friend group member classmate m/f?						
What happens if something goes wrong with the school computer?							
What rules are there at school about using computers?							
Do you use the computers at home and school for different things? what things?	yes/no						
Do you ever use the computers at school to do projects ?	yes/no/ depends						
What other differences are there between using the computers at home and at school							
Do you prefer to use the computer at home or the computers at school? Why?	home/school						
What do you learn from using the computers at school? (if "nothing" ask why do we have computers at school?)							
Is there anything else you would like to say about using computers at home or at school?							

Is there anything else you would like to ask about what we have been doing here?