

A U S T R A L A S I A N

WHEELS



for the mind

AUC Academic Conference

International and Australian delegates meet at the University of Melbourne for the 5th Conference

Virtual patients

The doctors, dentists, physiotherapists and scientists of tomorrow learn better with teaching innovations of today

Countrywide

Rural students embrace web-based learning but infrastructure is slow to catch up

FAMILY Matters

A new curriculum teaches genetics and genetics counselling with an interactive program

People of the Rivermouth

A CD ROM project presents the historical texts of the Anbarra people of Arnhem Land

Round UP



CHARTING A PATH TO SUCCESS



Adrenaline Charts Pro is a versatile tool for creating static and dynamic professional-looking charts. With an interactive 3D engine, Charts Pro assists the user to create shaded charts which can be manipulated in real-time and published as high quality output.

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An extensive tool set includes such features as axis stretching, perspective control and multiple coloured point lights. The Object Attributes tools allows rotation and scaling of



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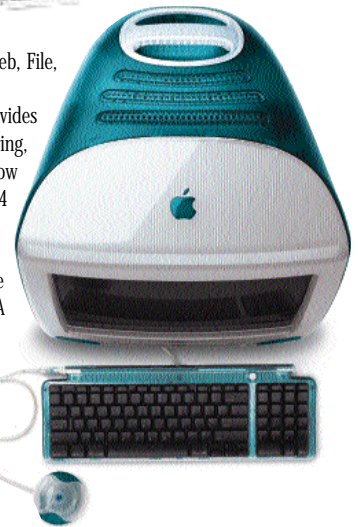
For more information and to download a demo, contact <http://www.adrenaline.ca>

AT YOUR SERVICE

AppleShare IP 6 is a complete set of LAN and Internet services which includes everything needed to set up Web, File, Mail, and Print servers, as well as FTP.

New to version 6, AppleShare IP provides built-in support for Windows file sharing, and the AppleShare IP Mail Server now supports the Internet standard IMAPv4 protocol.

Support for these open standards means that AppleShare IP is fully compatible with Macintosh and Windows clients. A single administration console makes it simple to manage AppleShare users, groups, passwords and security.



OS 8.5 GOES MULTILINGUAL

The recently released Mac OS 8.5 is the first mainstream operating system available in eight major languages.

Mac OS 8.5 is a powerful upgrade for all PowerPC Macintosh users.

More than 70 new features and technologies are in Mac OS 8.5, including:

- Sherlock, the personal search detective that allows users to find information on their Macintosh and the Internet quickly and easily
- Improved network copy performance
- PowerPC-native AppleScript that is up to five times faster, provides control of nearly all aspects of the Mac OS and includes the ability to attach scripts to folders for easily automating tasks
- A simplified installation process that allows most customers to upgrade in less than 15 minutes
- QuickTime 3, the latest version of Apple's software for digital media publishing and play-back
- Multilingual Internet Access for viewing websites and e-mail messages from around the world in almost any language.



Sherlock: The "Find" feature has been super-charged with Sherlock, which allows users to search for any information on their computer or the Internet and quickly receive a list of results ranked by relevancy. When searching the Internet, Sherlock utilises powerful search engines, such as AltaVista, Encyclopedia.com, Excite!, Infoseek, and Lycos. Additional plug-ins for other popular Internet sites will soon be available through Apple's website <http://www.Apple.com> Sherlock can find information on a user's computer by the document's title and content. Sherlock can summarise documents to one or two paragraphs.

For more information, visit Apple's Mac OS website <http://www.apple.com/macOS>

POWER TO THE PEOPLE

The iMac has become the fastest selling Macintosh, especially among first-time customers.

Offering simplicity, power and design, the iMac provides fast and easy access to the Internet.

More than 1,000 new Macintosh software programs and upgrades have been announced since iMac was released earlier this year.

The iMac has been popular with students, educators, designers, scientists, engineers, business people and consumers.

BETTER NETWORKING

For those who manage a network of Mac OS-based computers, Apple Network Assistant 3.5 software has the tools to keep workstations running efficiently and users productive.

Apple Network Assistant 3.5 software is an all-in-one solution for remote assistance, system profiling and configuration, and software distribution on Mac OS-based systems.

Apple Network Assistant 3.5 provides help to end users, gets system profiles, reconfigures system settings, and distributes applications across hundreds of computers, all from a central location, over both TCP/IP and AppleTalk networks.

Apple Network Assistant features include:

- five levels of administrator access
- support for TCP/IP and AppleTalk networks, and Text and voice communications.

A trial copy can be downloaded from <http://www.apple.com/networking/ana>



editorial

FROM THE EDITOR'S DESKTOP



What a busy period it has been since the last edition of Wheels for the Mind, and as I reflect on what has happened during the past six months, I am very pleased to report that the AUC and Apple are alive and kicking.

The fifth Apple University Consortium conference held in Melbourne from 27th - 30th September is an excellent testimonial to that fact. For educators, administrators, programmers and multimedia designers the conference was a forum of opportunities to explore "The myths and realities of flexible learning".

Over 260 delegates from the AUC's 20 member institutions in Australia and New Zealand attended the conference and listened to a collection of local and international speakers delivering papers on development tools, learning strategies and new computer-based curricula.

In all sessions the focus was not simply on devising high-tech projects for the sake of new technology, but it was on how to achieve better education and the capacity to measure effective outcomes. In the words of Kristina Woolsey, a keynote speaker at the AUC Conference, educators no longer need a hardware and software "Wishlist" because increasingly solutions to better education are found "out of the box". The quest today is to make

use of that technology and to make it mainstream.

In a special section of this edition of Wheels for Mind, you will find a collection of articles about this year's conference. I urge you to read these and to consider attending the next AUC conference.

Another major event to occur since the last edition of Wheels has been the release of the iMac. The event has been successful not just because of the "out of box" experience that the iMac provides, but because it restrengthens Apple's position as a major player in the education market. No other machine has brought such applause by the market, and no other machine has helped to address the financial issues that have surrounded Apple for the past twelve months.

The turnaround has been so convincing that other Universities are now reinvestigating the benefits of membership of the AUC, and I'm sure that this can only be good for the computer industry, the art of education and Universities.

Peter Sharpe
Editor

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AUC MEMBER UNIVERSITIES

AUSTRALIA

Australian National University
Curtin University of Technology
Edith Cowan University
The Flinders University of South Australia
The University of Adelaide
The University of Melbourne

The University of Sydney
The University of Tasmania
The University of Wollongong
University of Technology, Sydney
University of Western Sydney
The University of New England

NEW ZEALAND

Massey University
The University of Auckland
The University of Otago
The University of Waikato
University of Canterbury
Victoria University of Wellington

AFFILIATED UNIVERSITIES

Australian Defence Force Academy
University of Canberra



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Cover photograph: Sherene of the Anbarra people, at Blyth River in Arnhem Land, Northern Territory.

Virtual patients the first step for today's **DOCTORS & DENTISTS**

Better doctors, dentists, physiotherapists and scientists is the objective of an innovative program at the University of Melbourne, as Calvin Miller reports.

One of the key issues confronting medical schools is how they can produce better doctors but with less government funding. The largesse of the past has evaporated but not so the pressure to train students to the highest standards of Western medicine.

Students must become familiar not simply with the basics of anatomy and physiology, but also with increasingly sophisticated concepts as advances in basic sciences are introduced into curricula. On top of these challenges, they must become comfortable with the increasingly high-tech environment of modern medicine.

Equally, these are challenges for their instructors. The old truism that "a lecture is the maximum amount of writing transported onto a blackboard with the least amount of information reaching the brain of the student" simply isn't good enough for today's curricula.

Something has to change, and something has.

Dr Peter Harris believes that the curricula of medical, dentistry and physiology students at the University of Melbourne has moved in the right direction with the dramatic expansion of its computer-based multimedia program.

The prime objective is to focus computer-assisted teaching on those subjects which students find most difficult.

"Our new lab of 51 G3 Apple-Macs seats 100 students who interact with teaching programs in a variety of core subjects," said Dr Harris, Assistant Dean for IT and Multimedia in the Faculty of Medicine, Dentistry and Health Sciences.

"This is our first year of a six-year plan that differs from other web-based curricula in Australia.

"In the new curricular we have been developing, we're moving away from conventional ways

of teaching with lectures and more into a integrated, problem-based learning approach.

"Under the control of a web server, students have access to a wide array of library resources and the "Topclass" web-based learning framework.

"The multimedia tutorials are in-depth, challenging and realistic. As one example of many in clinical problem-solving, the student can call up numerous doctor-patient scenarios where the student can take the position of the patient or the interviewing doctor, and then assess the outcome of the consultation.

"In addition to the main computer lab, we will soon have 15 problem-based learning rooms, with another 10 rooms to open next year. These special rooms will accommodate up to 250 students in groups of 10 students per room, plus their tutors.

"In this style of classroom, students set their objectives for each week and undertake self-directed activities that they learn and organise themselves."

The theory sounds good but are taxpayers getting their money's worth?

Are the lecturers and tutors getting returns on their investments in time and effort?

Are the students really learning any better?

They might get better grades and the pass-rate may be higher, but are they better doctors, dentists, physiotherapists and scientists?

After all, the economic catchcry of the 90s has been "precise measurement of outcomes", and this is the type of program that has every Doubling Thomas demanding proof of success.

Dr Harris is convinced that the students are learning better and that the outcomes have improved, in comparison to older teaching

of money, and we must be careful said.

On developing a one-hour tutorial, money has been well spent.

On traditional teaching methods, we have students who have failed to grasp basic concepts. Traditional methods have failed to incorporate them into their own view of the world in general.

However, the interactive programs have the ability to engage and challenge the students far better. As the students are in small groups of two or three, they can struggle with difficult concepts at their own pace in front of the computer.

"We have a psychologist on our

Third-year dental student Peta Leigh receives a tutorial in usage of the G3 from Dr Peter Harris.



team who evaluates the delivery and effectiveness of the multimedia programs. This is a new and important job as we learn how to assess outcomes.

"We have had strong and positive feedback from students that computer-aided models are a powerful means of learning.

"Instead of having a teacher leaning over their shoulders, they are able to work out problems with one or two friends, and consequently feel less inhibited about making mistakes.

"The result is greater confidence. For example, if a student administers a complicated drug regimen to a simulated patient, there's no danger of a fatality. The students can find out exactly what they did right or wrong."

Dr Harris has had considerable experience with the more traditional forms of teaching being consistently ineffective. For 10 years, he gave classes on peptic ulceration. By the end of a class, only 15% of students could effectively complete tasks concerning clinical treatment of the condition.

However, with the aid of the computer-based learning, all students were able to become engaged in working out solutions to the clinical problem.

"With the implementation of our new interactive computer programs, we have found that long after the students finish an exercise, they continue to consider and discuss it," he said.

"We have formal evidence that students continue to incorporate information into the rest of their course work for a longer period.

"Consequently, their depth of understanding is enhanced compared to the more traditional setting of listening to a lecturer in the classroom and jotting down notes.

"A lecturer may present more material to more people in a lecture theatre, but what is getting through to the students? How much information is being retained? Not much, research shows.

"Computer-aided instruction puts an intellectually challenging, multidisciplinary approach in front of students who can then learn at their own pace. The programs give tests, and the web server keeps statistics so that students can compare their performance against other students in the same or previous years.

"Due to the expense of this type of learning, we have targeted only those concepts that we know are particularly difficult to learn. Also, it is crucial that the multimedia program be as challenging and interactive as possible.

"The interactive computer-based components of the courses are integrated with other more traditional teaching methods that are not computer based."

Ultimately, as students progress through the years and graduate, they will have access to the web server from their hospitals, surgeries and homes.

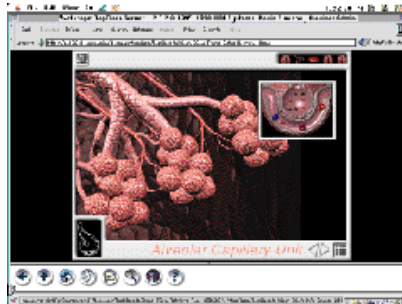
Such access is particularly important because the learning modules will be continually up-dated, allowing the healthcare professionals to up-date their knowledge.

The needs for continuing education and improvement of learning skills are underscored by the estimate that, within 10 years of graduation, about half of the factual information students learnt during the course is out of date.

As many of the students are from overseas, and other cultures, their training in "how to study and learn" has typically been different.

"We have to help them develop learning skills that will last them the rest of their lives." Dr Harris said.

"They have to realise that the knowledge base of their discipline is constantly changing, so they must learn how to find the latest information, how to evaluate it, what importance to put on it, and how to incorporate it into their daily practice.



"Gas exchange in the capillaries of the lungs" was created by Andrew Bonollo using 3D Studio Max and delivered as Shockwave applets within web pages using the Topclass learning framework.



"Gastric acid secretion" is a Supercard simulation created by Debbi Weaver that allows students to construct an animated model of an acid-secreting cell from the stomach. Incorrect answers generate feedback screens to help with progressive learning and progress to an acceptable solution.

"Our fundamental long-term aim has to be the training of people who will be better doctors or dentists or scientists.

"Our selection process should produce a group of students who are better able to respond to persistent changes in information and the bases of science and medicine. It is likely that our new curricula will help us do that."

The faculty's program in basic and clinical sciences also includes the development of 20 multimedia projects by 60 educators, authors, multimedia designers, and programmers working closely together in the development, implementation and testing of each project.

"The G3 machines are powerful and versatile enough to run both Mac-based and PC-based programs, and complex simulations and animations," Dr Harris said.

"In older computers, students were frustrated working with a slow simulation, but the G3s have the necessary speed."

As a measure of the University's commitment to the development of

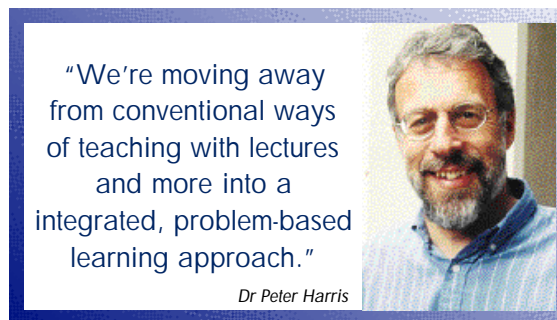
interactive regimen, development funds of \$1 million have been available for 1997, \$3 million for 1998 and \$3 million for 1999. The funding for Dr Harris and his team is \$900,000 for 1998.

Dr Harris is clearly up-beat about the new program and its future. Together with colleagues, he has delivered several papers at educational conferences on the curricula's effectiveness.

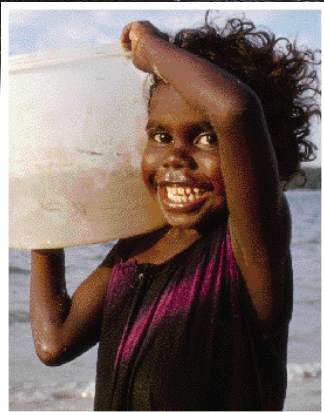
"When students face the challenges presented by the computer-based modules," he said, "the outcome is in their favour.

"Harder subjects are learned faster. That's the undeniable result."

For more information, contact Dr Harris on p.harris@physiology.unimelb.edu.au



People of the Rivermouth



The Blyth River of central Arnhem Land flows out to the Arafura Sea. The people whose traditional lands lie at the junction of the river and the sea call themselves "Anbarra" - people of the rivermouth.

A CD ROM project titled "People of the Rivermouth" aims to publish some of the results of a four-decade long relationship between the Anbarra and a number of scholars from various fields of study.

In particular, "People of the Rivermouth" is centred on a sequence of extraordinary "texts" which were dictated to anthropologist Les Hiatt in 1960.

Les first went to Arnhem Land in 1958, the year after the government settlement of Maningrida was established.

By then, most of the people from the surrounding area, including the Anbarra, had gravitated towards the new settlement, and he began his studies of traditional kinship there.

Hiatt principally worked with two Anbarra men, Angabarabara and Gurrmanamana.

To help their discussions, Les made a number of wooden blocks with stick-figures drawn on them to represent relatives of different ages and sex.

As Les remembers, came the one of his mentors, Gurrmanamana, "took over blocks" and began to contrive scenarios involving these "characters" which sought to explain to the young anthropologist the intricacies and responsibilities of Anbarra kinship.

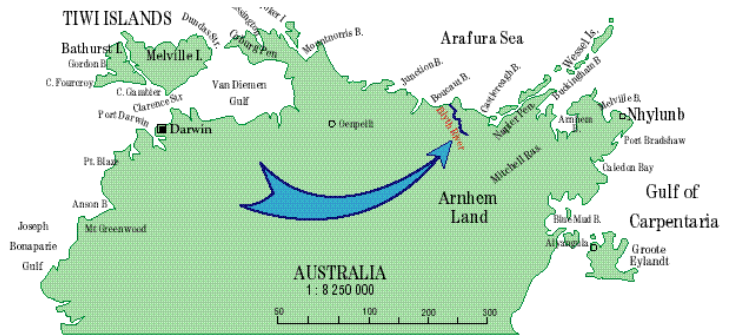
Gurrmanamana gave each scenario a context from life: birth, a marriage arrangement, elopement, a recent death, and

He devised the kinds of conversation which might take place within such a context, for instance the dialogue between those relatives responsible for deciding the bestowal of a young girl in marriage.

These are archetypal characters, Anbarra Everyman and Everywoman.

They read as the product of a profound insight into the workings and subtleties of one's own society.

Over little more than a month, in what can only be described as



an act of creativity, Gurrmanamana envisaged 18 of these scenarios, in effect spanning the life of an Anbarra male from conception to death. He dictated them to Les in the Anbarra language of Gidjingarli.

They were to wait many years before being fully translated into English. Indeed it was not until he retired from the Readership in Anthropology at Sydney University that Les turned again to the texts and was reminded of their creative worth.

Les maintained close relations with the Anbarra throughout the intervening years, continuing his research work and also encouraging others to work in collaboration with the Anbarra families.

Other researchers have included, Betty Rhys Jones, Annette Hamilton, garet Clunies-Ross and Stephen Vild.

They have worked in fields as varied as archaeology, music, and studies of child-rearing.

As a result, a body of research material is in all media that has been developed through these relationships. There are books and academic papers, music recordings, many graphs, and a film in 1980 "Waiting for Harry".

The Anbarra conduct an elaborate sequence of mortuary rituals. The final ceremony, often carried out many years after a death, requires the remains to be placed inside a painted coffin made from a hollow log.

"Waiting for Harry" records the ceremony for one of Hiatt's first mentors, Angabarabara, and it has become a classic of anthropological film making.

In 1994 the maker of that film, Kim McKenzie, of the National Museum produced the award-winning "Encyclopaedia of



From left to right: Kim McKenzie, Sam Gumugun and Frank Gurrmanamana, Kopanga, Blyth River, 1982

Aboriginal Australia" on CD ROM. Les and Kim began to see the potential for computer-based media to bring together some of the Anbarra material in a way that had hitherto not been possible, and to make it accessible to a wider audience and readership.

The CD ROM will allow the texts to be read and heard in both Gidjingarli and English, and they will provide the basis from which much other Anbarra material can be reached.

The project is having to confront many issues regarding an effective "interface" appropriate to this material.

These are made all the more acute by the project's intention to make the material as accessible as possible for both educational use and as a record of a long and complex relationship between the Anbarra families and scholarship.

"People of the Rivermouth" does continue the long tradition of collaboration with the Anbarra.

Enormous Pride

It has the continuing support of Frank Gurrmanamana, now an old man, and also enjoys the participation of one of his daughters, Betty Ngurrbangurba, in the production team.

Frank is a man with enormous pride in his Anbarra society.

At the conclusion of the film "Waiting for Harry" and the ceremony it concerns, he says: "Now men everywhere will see my sacred emblems.

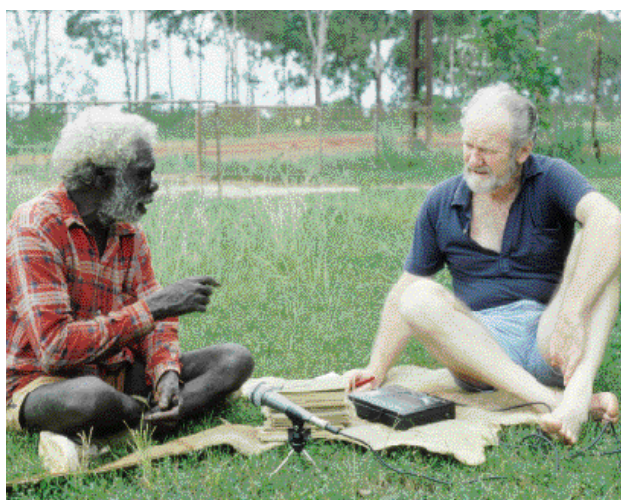
"All is now finished, and I am filled with pride."

All those involved in "People of the Rivermouth" hope the same will be felt about this project.

The Australian Research Council has partially funded the "People of the Rivermouth" project to develop the material for the CD ROM. The funding is being administered by the Academy of Social Sciences in Australia.

The National Museum of Australia is also a contributor to the project as is the Australian Institute of Aboriginal and Torres Strait Islanders Studies. The project is based both at the Bawinanga Arts and Culture Centre, Maningrida, and at the Department of Archaeology and Anthropology, Australian National University. It is intended that the project will play a role in the exhibitions of the new museum when it opens in 2001.

For more information, contact Kim McKenzie at kim.mckenzie@anu.edu.au



Frank Gurrmanamana and Les Hiatt working on the "Jaborr" texts, Maningrida, 1986.



From the AUC Chair

THE FUTURE OF THE AUC

At the AUC, our mission is to enhance and increase computing technology on campus, provide low-cost computing to the University community and, in conjunction with Apple, further develop Apple products and share experiences amongst other tertiary education institutions.



Stephen Price

The AUC is a special and valuable collaboration in these competitive and changing times. I'm delighted to welcome the University of New England as a new AUC member, and I look forward to working with the Executive, Apple and the New Zealand AUC to strengthen and revitalise our trans-Tasman collaboration. There is strength in numbers, and the stronger the AUC is, the better it can deliver benefits to members.

The AUC has been around for nearly 15 years. When it formed, the notion of routine and universal use of computers in universities was courageous, and evangelism was a key theme, as was establishment of a reliable, expert and viable supply channel.

Times have changed, computers are ubiquitous, and we face quite different challenges as we approach the millenium. The AUC, to remain valuable to stakeholders, must continue to change and adapt, and even to re-invent itself.

The AUC Academic Conference, together with the AUDF and our training programmes for support, programming and computer-supply staff, is part of our continuing effort to make sure that we add value, and are seen to add value, for all those who use Apple technology in AUC member Universities.

There is strength in breadth: the more people we can reach through programmes focussed on different stakeholder segments, the more value we add. We move into 1999 with optimism, as does our partner, Apple.

May I wish all readers an innovative and successful New Year.

Stephen Young, Chair
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THE 5TH AUC ACADEMIC CONFERENCE

With "Flexible learning – exploring the myths and realities" as its main theme, the 5th AUC Academic Conference brought together delegates from Australian and New Zealand member and affiliated universities, plus overseas guests. Held at the University of Melbourne from 27-30 September, the 260 attendees had the opportunity to meet with colleagues and discuss a wide range of educational and research interests in computer-based curricula and information technology. The articles on pages 8 to 12 are representative of the many important topics covered at the conference.

AUC Academic Conference 98

Countrywide

Rural students are ready but are waiting for the communications infrastructure to improve.

People in rural Australia will become enthusiastic adopters of web-based curricula but the communications infrastructure must first improve dramatically, according to Professor Stuart Cunningham of the Queensland University of Technology .

Professor Cunningham said that problems with bandwidth, speed and on-line reliability had to be solved before virtual university or training courses would become practicable.

"I have no doubt that country people will embrace web-based learning, but there are serious problems with glacial wait-times to access the web because of limited and unreliable infrastructure," Professor Cunningham, Head of the School of Media and Journalism, said.

"There is serious inequality of access between city and country which needs to be addressed quickly and decisively.

"Australia is facing some big challenges in getting the bandwidth and platform stability to rural areas. Government policy regarding Telstra will be a key factor in assuring that country people have equal access to the Internet.

"In contrast, the US has a sophisticated infrastructure developed throughout the country, even in sparsely populated regions. There isn't the extent of our disparity between metropolitan and non-metropolitan areas."

Professor Cunningham said Australian regional universities had a tradition of distance education that would facilitate a greater move toward web-based courses. Universities had to respond to the needs of students and prospective students who needed to have flexible learning options so they did not have to attend campus.

"As one example, at the University of Southern Queensland, three-quarters of the enrolments are distance-education students," he said.

"Various pressures of time, income, costs, family and work will continue to force a demand for virtual courses and infrastructure improvements."

Professor Cunningham gave the example of Western Governors University in the US which consists of 17 participating states (with extensive rural populations) and Guam. About 200 courses are offered on-line.

Although the program just started in June and enrolments have been disappointing, Western Governors University has shown what can be achieved in establishing on-line curricula.

"In its strictest form, these courses mean that a student never has to meet another student, go near a campus, or even visit a library," Professor Cunningham said.

"While the student's lack of direct contact can have limitations, the positive aspect is that many options and new opportunities open up.

"Country students will have greater opportunities for university places, as long as they pay, and indications are that people are prepared to pay.

"Government will most likely continue to decrease its funding. In the early 1980s, 90% of university funding for student throughput was funded by governments. That figure has dropped to 59%, and by 2010, the prediction is that funding will drop to at least 50%.

"The decreases in funding have put greater pressure on departmental budgets and resources.

"Consequently, although students will have to pay, virtual courses will be cost-effective and affordable options."

Professor Cunningham said that students' and instructors' interest in on-line courses was increasing, but

transition would continue to be gradual.

"In Australia, we're getting closer but still require major shifts in paradigms of technology, copyright, Internet providers, competition-vs-cooperation, and other cultural issues."

"I have no doubt that country people will embrace web-based learning, but there are serious problems with glacial wait-times to access the web because of limited and unreliable infrastructure."

Professor Stuart Cunningham



For more information, contact Professor Cunningham on s.cunningham@qut.edu.au



Mark Brown

New Teachers for a **NEW AGE**

On-line teaching experience at AUC-affiliated Massey University

Student teachers in New Zealand are crossing the international date line to gain on-line teaching experience with students from the Sinkutview Elementary School and the Nechako Electronic Bussing Program in the province of British Columbia in Canada.

The trans-Pacific teaching project, described as "virtual practica" by Mark Brown from the Department of Learning and Teaching at Massey University in New Zealand, provides an on-line learning alternative for up to 800 students.

It is a recognised and accredited distance-education alternative for school-age students residing in all districts of British Columbia.

The project began in 1996 as an experiment and underwent further development in 1997.

"The project was designed to further our understanding and skills of using new computer-mediated communication (CMC)," Mr Brown says.

"In theory, the new technology offers a way of reflecting on teaching practices. On-line teaching experience has a role in preparing good student teachers."

Mr Brown, who is interested in linking contemporary learning theory to new technology, argues that teachers should learn how to use new technology while avoiding the technocentric approach.

"There is often the tendency to teach about the technology rather than technology's integration into a meaningful curriculum context," he says.

"Although teachers need on-line experience, effective on-line teaching depends first on the skills and knowledge of the teacher regardless of the technology.

"Good on-line teachers need to be good teachers in the first place. The experience provides a compelling reason for learning to use the Internet, while at the same time offering an insight into alternative classroom settings. This, in turn, encourages apprentice teachers to think critically about their role in the classroom.

"It also helps them to explore the interface between new educational technologies and contemporary learning theory. Furthermore, the on-line connection of novice teachers with successful classroom practitioners is a mutually beneficial experience.

"Virtual practica offers both beginning teachers and experienced teachers a unique opportunity to prepare themselves for the challenges of learning

in the communication age."

Some of the guiding principles, according to Mr Brown, are "not to use CMC just to be doing it." Rather, "CMC must promise more than the alternative possibilities" and "CMC must be linked to specific curricula activity."

"As on-line teachers need to be good teachers in the first instance," he says, "they must have a sound understanding and a well developed, contemporary philosophy of learning.

"The teachers must know their subject well, have a capacity for self-criticism, and have the ability to evaluate outcomes.

"Their understanding provides the lens through which self-criticism and cultural evaluation of outcomes is made possible."

Student teachers have responded favourably to the practica, with most providing highly positive feedback about their experience.

As one student teacher stated at the end of the project: "It was such a cool feeling. These kids just seemed so open and enthusiastic about the whole project. For me, it felt like a real honour to be allowed to share their educational experience."

The practica also helped student teachers to become more confident and competent at using the new technologies.

As one student said: "I'm more confident with the use of the computer and especially the different programs. Before, I was really computer illiterate, but now I'll give it a go. It's definitely changed my attitude toward the computer. I was scared of it before."

The project was also successful as a teaching experience, as evidenced by the comment from another student teacher: "We gained a great deal of satisfaction from creating a fun and fascinating project within a realistic learning environment, which was confirmed by the parents."

For more information, contact Mr Brown at M.E.Brown@massey.ac.nz



Mr Brown with student teachers.

From NEW ZEALAND to CANADA – the main issues

Having collected data from the project in the form of archived e-mail, a reflective journal, student questionnaire, and focus interviews, Mark Brown pointed out some of the technical, organisational, communicative and pedagogical issues and factors that arose in the project.

TECHNICAL
Teachers and students encountered hardware and software compatibility problems, such as e-mail attachments and downloading-of-images problems across platforms and software. Lack of basic computer literacy skills were encountered. Access to computer lab facilities were also a problem.

ORGANISATIONAL
Establishment of timelines was an important issue. For example, scheduled assignments, holidays, and similar issues had to be taken into account. Expectations needed to be clarified to teachers and students about the frequency and amount of e-mail and weekly report summaries. Roles and responsibilities of both teachers and students have to be explicit.

COMMUNICATION FACTORS
The project faced two key problems:

- the highly time-consuming nature of on-line teaching
- time differences between New Zealand and Canada.

The importance of sensitivity to cultural and religious differences and expectations had to be considered. Etiquette and security issues were important.

PEDAGOGICAL FACTORS
While Internet-based resources were useful, it was important not to overlook non-web resources. Teaching strategies have to be more flexible and not rely on too much text in e-mail. Assessment and feedback issues have to be considered and developed.



Applying Internet technology at the OPEN UNIVERSITY



Blaine Price, chief systems strategist at the Knowledge Media Institute, UK.

The Open University is one of the world's leading distance-teaching universities that, with the help of Blaine Alexander Price, the chief systems strategist at the Knowledge Media Institute, has been moving to global Internet deliver y.

"The humour which often accompanys face-to-face teaching is also very important.

"Our experience has highlighted the fact that the technology used to deliver distance teaching is still unstable and needs backup systems so that presence is not lost."

Another finding was that during synchronous conferencing, which constituted tutorials, a way had to be found for the teacher to take control when necessary and not let students 'ramble on'.

"Time is limited and must be used wisely," Blaine says.

"From an organisational point of view, structure and planning are crucial because it is going to be almost impossible to change

course material in mid-stream for such a large body of students located around the globe."

Blaine is optimistic about the experience: "We believe that many of the techniques which we have employed both globally and locally are applicable to institutions everywhere.

"Our initial evaluations have shown significant improvements in the efficiency of the university administration and the experiences of students and tutors."

For more information, contact Mr Price at B.A.Price@open.ac.uk

This is a significant shift from the Open University's large scale distance-teaching program which has been based on postal delivery throughout the UK and Europe.

Given that the number of students who undertake the Internet-based courses at the Open University is enormous – from 6,000 to 8,000 – the approach has been to enable students to continue to use their own software and hardware where possible.

The system design has supported low-end machines so that students do not have to buy new computers or learn to use new software, and can thus focus on their study rather than on learning new technology.

All the components of course delivery, such as lectures, tutorials, assignments and examinations, have been done on the Internet using e-mail, synchronous and asynchronous text conferencing, audio and video conferencing, audiographic whiteboard, prepared web pages, and electronic document mark-up and tracking systems.

E-mail and text conferencing have been the mainstay of Open University's electronic teaching.

According to Blaine: "E-mail has been most effective in supporting one-to-one relationships and provides the flexibility to read and compose off-line at any location.

"Text conferencing, on the other hand, has been effective in giving structure to discussions, which also enables group authoring with full record of the evolution of discussions".

Effective distance teaching to students, however, has required face-to-face tutorials, telephone conversations, and television and radio broadcasts, including synchronous and asynchronous interaction with live internet audio/video/graphic events.

"Synchronised audio/video is crucial," says Blaine, "and audiographic whiteboards are also most promising.

"One of the lessons we've learned is that there is no substitute for face-to-face presentation.

"Students need to see their teachers in order to learn effectively.



Giving large scale presentations via the Internet

High bandwidth wireless internet for local schools

While the experience of distant teaching conducted at the Open University has been on a global scale, the university's newest project has been at the local level using high-bandwidth wireless Internet for local schools.

"We have started linking local primary and secondary schools to the Internet with high-speed low-cost wireless connections to the university's backbone," Blaine Price says, "providing fast access to the Internet as well as the university's high-speed servers and caches.

"This has allowed students to access topic-focussed Internet resources worldwide, including live video sites to study volcanoes or the Earth's rotation.

"This also makes it feasible for students at different schools within the same area to collaborate using medium-quality video conferencing.

"None of these would be possible via ordinary dial-up or even ISDN connections because of the bandwidth required and the normally long delays reaching web sites on other continents at prime time."

Eco challenges for students



Professors John Hedberg (left) and Barry Harper.

The multimedia revolution in the education sector has created new challenges for the development of learning software, both in terms of design and how students can manipulate the environments that software packages support.

At the University of Wollongong's Interactive Multimedia Learning Laboratory, Professor John Hedberg and Associate Professor Barry Harper have met this challenge with three award winning software packages that support flexible thinking with interactive multimedia. These powerful teaching tools enable students to think creatively by actively engaging with the software generated environment, by measuring and manipulating variables, and by testing the results of such changes.

Investigating Lake Illuka and Exploring the Nardoo River System are two CD ROM packages designed for students in the field of ecology. Based on a constructivist model of learning, students are provided with real contexts, data collection tools and knowledge construction tools enabling them to explore and collect data about environmental problems.

Designed primarily for high school students, Investigating Lake Illuka provides resources on the various ecosystems of the lake in text sound and video. Students explore this by using the built-in "note book" to record physical, chemical and biological measurements and collect information about individual animal and plant species and view footage of news reports and expert and local views on a variety of issues.

Developed as a collaborative partnership with the NSW Department of Land and Water Conservation, the imaginary Nardoo river system package goes further. It also encourages students to test solutions to water management problems using three simulators: a household water-use simulator, a blue-green algae simulator, and a dam management simulator. Using a personal digital assistant (PDA) developed by Wollongong's Interactive Multimedia Learning Laboratory, students can gather and record data from four time zones, ranging from pristine environment through to the present day, and at four regions along the length of the river catchment area, and then simulate conditions by altering variables.

Both packages have been bought by schools in Australia and the USA and are even bundled into the new Apple iMacs. They can be bought at \$185 each from Interactive Multimedia Pty Ltd <<http://www.impty.com>>.

A third package, StageStruck, is an interactive CD using sound

files, video animation and texts (including information on Australian performance artists), designed to teach students aspects of drama from a director's point of view, including production and some theatre management skills. Students using a Scrapbook organise and manipulate both given scripts and their own scripts, props, costumes, actors, voice intonation and movement to create animated performances on a simulated stage set at the Sydney Opera House.

Developed in conjunction with the National Institute of Drama and Art (NIDA), Opera Australia, Australian Ballet and Sydney Opera House, the CD is one of a collection of 10 titles on different aspects of Australian life and culture from an educational perspective that will be distributed freely to schools as part of the Federal Government's initiative *Australia on CD*.

While these are indeed powerful teaching tools, Professors Hedberg and Harper also recognise that there are still problems to be addressed. For example, they found that the ecological packages need to be augmented with argumentation and analysis tools that would enable students to identify problems for themselves and to evaluate and analyse the different sources of information and key ideas of various arguments. They would also like to develop more sophisticated representation of contexts using 3D models of the world.

The potential that these packages have for many areas of the curriculum is enormous. The ecological packages could presumably be transformed into tools investigating such diverse areas as communications, media studies and sociopolitical analysis of policy alternatives. Similarly a slightly transformed StageStruck might be used to simulate sports coaching or organisational behaviour.

If learning is an active process merging knowledge and experience in an active and imaginative way, then these tools – and especially the concept of the PDA – are useful to students and educators. Their power stems from the interactive and flexible design which allows students to construct, manipulate, and gather information about, environments relevant to their field of inquiry.

As Professors Hedberg and Harper note: "The challenge for researchers is to demonstrate for developers how to capture these opportunities and support the intrinsic motivation of learners to explore their own world and the variety of viewpoints within it."

For more information contact Professor John G Hedberg at John_Hedberg@uow.edu.au and Professor Barry M Harper at Barry_Harper@uow.edu.au



The potential that these packages have for many areas of the curriculum is enormous.

the world is the CLASSROOM

The future in learning is here, Dr Kristina Woolsey of Apple told the AUC Academic Conference.

Dr Woolsey says that technological innovation is opening up new opportunities to create a global culture and the devices which we have are competent for the task.

She has been at Apple for 14 years and is currently in the Learning Technology Group at Apple Computer, Inc., in Cupertino, a part of the Education Products and Solutions Marketing Department.

She has made it her task to give voice to the needs of kids, teachers and technology developers so that tools for learning in the new global culture can be readily developed.

She describes this new culture as "an interconnected web" created by the new communication media.

"The world has become a complicated place," she says.

"The question is not whether we should use technology but rather how to use it.

"Moreover, it should be available to everyone.

"Virtually every kid can have a computer and be on-line."

Dr Woolsey says that culture and civilisation depend on tools to develop technology and that the computer is "a tool to augment the human intellect."

"Learning in such a new technological environment is, of course, still learning," she says.

"A lot of learning happens at the fuzzy edges, not only in the traditional classroom.

"Kids learn everywhere they happen to be."

The challenge that Dr Woolsey and Apple have set themselves is to develop tools which:

- can go beyond the walls of the classroom
- allow kids to learn in context
- record, organise, present, communicate and provide immediate, relevant feedback.

Cocoa is an interactive media authoring tool for children aged eight or above and adults.

The basic features of Cocoa can be learned in less than 20 minutes. Introduced about two years ago, Cocoa allows children to build simulations, games, and interactive worlds on their computer and share them quickly and easily on the Internet.

According to Dr Woolsey, Cocoa teaches children logical reasoning similar to that needed for programming, without requiring the child to learn a complicated programming language.

Cocoa lets authors add interactivity and animation to their web pages using a unique "show me" interface.

Characters and objects can be created and placed into simulations such as games, animations, non-linear stories and interactive worlds.

The characters and objects act and relate to each other according to rules shown to them by the author.

As a simulation is run, the objects find themselves in different situations, and the author shows them how to react to these situations.

Their reactions involve movement, animation, playing sounds, and creating or deleting other objects. When these worlds are embedded in web pages, a completely novel experience can be generated every time the web page is visited.

Using drag-and-drop and a built-in painting tool, programming is accomplished by simply demonstrating an object's desired reactions. The system then automatically writes all of the code and allows the user to see the code. The implication is that it can be used for teaching introductory programming.

As Cocoa can be used by adults and children, it lends itself to the teaching of problem solving. It can also be used by teachers as a customisable teaching aid and by curriculum developers who need to provide interactive CDs as an adjunct learning tool to traditional textbooks.

With Cocoa, children can leverage the World Wide Web to build a huge, ever-evolving interactive story, completely designed and implemented by kids telling the story differently every time. By sharing Cocoa worlds they have developed across

the Internet, authors can build a library of characters and rules from which increasingly sophisticated simulations can be built.

The Cocoa project has been spun out of Apple and is the basis for products from a new company, Stagecast, directed by Larry Tesler, formerly Chief Scientist at Apple.

The new Apple Hypernotebook prototype application is another tool being developed by the Learning Technology Group to answer the challenge of learning at the "fuzzy edges".

"A lot of learning takes place in conversations," says Dr. Woolsey, "and Hypernotebook harnesses interactive technology to resource these conversations for learning.

"It uses a Web proxy server architecture to allow students to participate in a private discussion among themselves tied to any page on the Web as a whole.

"The discussion is available while the relevant page is displayed in a Web browser, and it can be seen only by subscribers to the Web proxy, which can be limited to students in a particular class or project."

The learning of new communication tools in a constantly evolving computerised environment requires a process which goes beyond the classroom, and these two examples show how this can be achieved.

"The question is not whether we should use technology but rather how to use it.

Dr Kristina Woolsey



Black Albatross earns its golden wings



When someone says "It can't be done," some people give up while others regard it as a challenge that must be pursued.

For computer experts at Black Albatross, a business set up by the Computer Science Applied Research Centre at the University of Otago, "can't be done" does not compute.

Based in Dunedin, Black Albatross started when the University of Otago entered a joint research agreement with Alliance Textiles to develop a system that would allow people to design a knitted garment and print a knitting pattern.

When Alliance Textiles had first approached other developers with a brief to create such a system, the company was rebuffed.

Staff at the university's Computer Science Department knew such a system was possible and were willing to give it a go. However, successful development would require a sophisticated set of tools. NextStep, predecessor to OpenStep and now Rhapsody, provided such the operating environment they needed.

Early assessments indicated that not only could Alliance Textiles' requirements be met, but that with the tools provided in the NextStep environment, it could be done in half the time of the other popular environments of the day, such as Windows, NT and Macintosh System 7.

The project was partially funded by the Foundation for Research, Science and Technology's Technology for Business Growth program and was completed early in 1995.

Customers were enthusiastic about this new way to select knitting patterns and the chance to see the effect of substituting different colours within a selected knitting pattern. Alliance Textiles was impressed with the product and funded further development. The internet version has received numerous kudos.

The Internet and World Wide Web quickly became integral components of the business strategy.

WebObjects, plus the experience gained developing in NextStep, opened up new opportunities.

Black Albatross manager Sherman Simpson said that the company's goals are to work with business to apply computer-based technology.

"Our objectives are to develop and market the results of research done within the Computer Science Department," Mr Simpson said.

"Recently, we joined with other companies in Dunedin to form Zone 51, a cooperative which offers a range of multimedia services.

"Our role in Zone 51 is that of technology enabler. Each of our projects involves the three Rs: research, reputation and revenue.

"We consider a project based on its research potential, its ability to contribute positively to the University's reputation and its profitability.

"We provide a business model for the technology transfer function of the University."

Black Albatross clients range in size from a Fortune 100 insurance company to a local retail outlet.

While not all of its work is in the public eye, good examples of WebObjects technology (developed for OpenStep by Next, and subsequently purchased by Apple) are at the Toyota web site, www.toyota.co.nz, Lexus at www.lexusnz.co.nz and at Hair Care Market's web site, www.haircare.co.nz

"When we took on the Toyota commission, we needed a high-speed data transfer capability, so we implemented our own Internet site complete with our own T1 line," Mr Simpson said.

"The spare bandwidth that this provided was offered, initially, to students as we setup as an Internet Service Provider. We have continued to expand this capability and have 16 dial-up lines supporting an increasing number of users.

"We recently worked with the Division of Science to create an Online Advisor application to aid students in course selection.

"We hope that this application will eventually link directly with the University's central course calendar database. In the meantime we provide the students a different means of course investigation.

"The system prompts the user to enter keywords depicting certain interest areas. Behind the scenes, course coordinators are encouraged to create course records that include specific contact information, related

web pages, and a list of keyword 'triggers'.

"If the student enters in a set of search criteria that does not find a hit, the application coordinator receives an automatic e-mail notification of the failed search and would then attempt to identify the likely course or department coordinator to update the database.

"The student has the option of getting direct feedback from the coordinator as well. In this way the database actually 'learns' more about the linkages between interest areas and course offerings."

To see examples of Alliance Textiles' project, visit www.aky.co.nz

For more information, contact Sherman Simpson at sherm@albatross.co.nz



Sherman Simpson



Art far beyond the cave and the colour lithograph

With the advent of low cost visual computing, the computer has become to the artist what the word processor is to the writer , and the spreadsheet to the accountant: a space for developing, exploring and manipulating visual concepts.

The Tasmanian School of Art at Hobart is one of the leaders in Australia in developing research programs and research degrees in the visual arts. Increasingly the computer plays an important role in this research activity.

To this end, the school is greatly expanding its computing research facilities with the installation of a dedicated laboratory of 20 iMac and G3 Macintosh computers.

The Macintosh has long been the favoured computer of visual artists, partially because of its association with the graphic and prepress industries, but largely because of its intuitive and flexible visual orientation.

With the iMac, for the first time visual artists have all their requirements met in an elegant low-cost package.

The visual arts have a long and rich tradition of experimentation and development of new media, and new forms of representation. From the cave to the colour lithograph, visual artists have been at the forefront of experimentation and development of the technologies of image production and reproduction.

In the 20th century, this tradition of experimentation has continued with electronic and digital technologies as they have emerged.

Due to the rapid development of the personal computer in the 1990s, computing is shifting from the numeral and verbal, to the visual and aural, the domain of the artist.

The School of Art had one of the first art-related web sites up and running in early 1994 (www.artschool.utas.edu.au) and has hosted a number of web-based art projects.

The Digital Art Research Facility, DARF, (www.artschool.utas.edu.au/DARF/) was formed in 1995 with the mission of exploring and expanding the aesthetic potentials of the digital medium. It has been successful in obtaining both large and small Australian Research Council grants for its research.

DARF's primary focus has been on integration of digital technologies with traditional media and art methodologies through an exploration of the large-format digital print and multilayered printing processes. Other research projects include stereoscopic still and moving images, lenticular 3D imaging, 3D animation and Quicktime VR web sites, digital video and interactive installations.

'Computer Art' is not about to replace or supplant the aesthetic qualities of traditional media, nor do all artists wish to utilise its media-manipulation potential. However, the new laboratory is recognition that the computer has become an important tool for the visual arts.

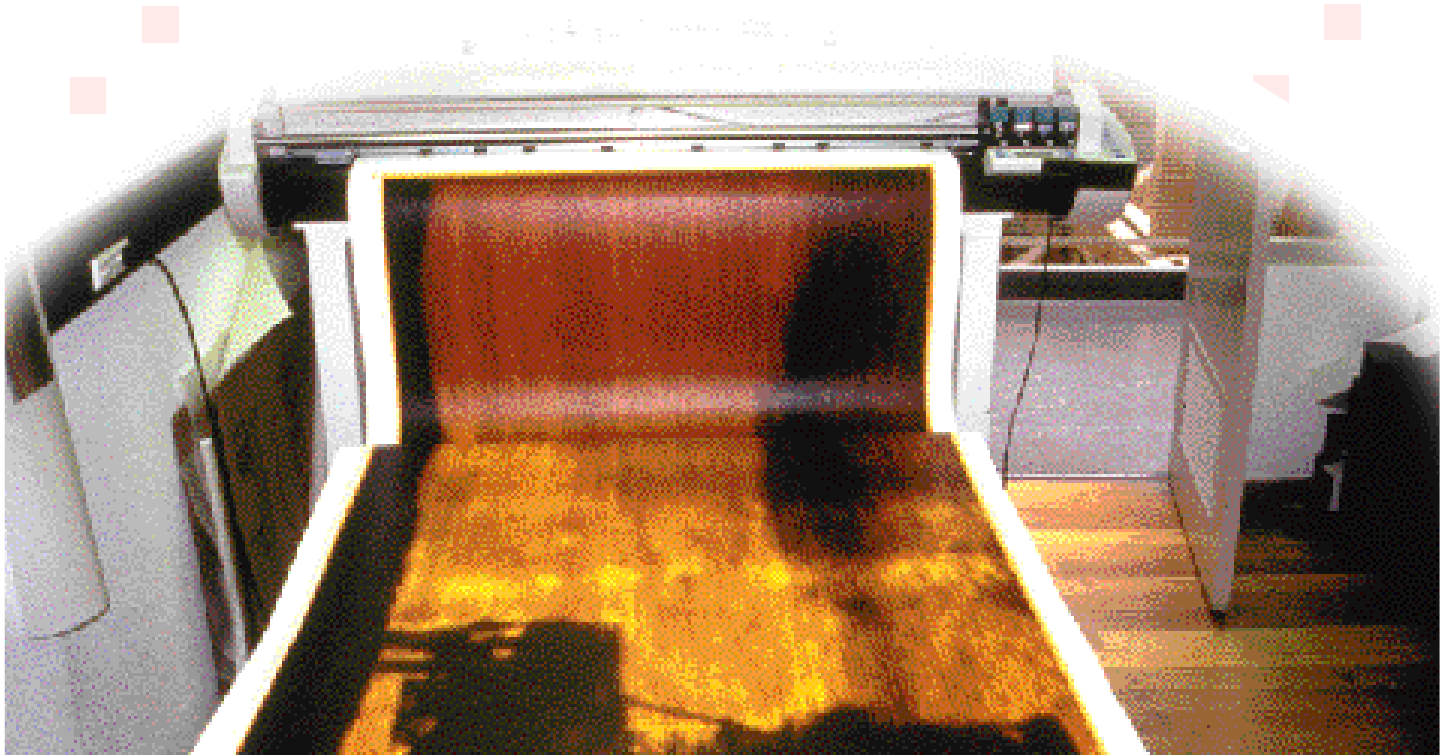
The facility will allow staff and postgraduates undertaking research to undertake a range of activities: from prosaic word processing and utilising the world wide web for research, to digital imaging which has become a widely used process for developing or exploring imagery among a range of media with applications in photography, painting, printmaking, drawing.

Often the computer is used to replace a process previously done in a darkroom or on a photocopier.

Continuing the tradition of innovation, other researchers will utilise the computer for novel and (undreamt of, in the mind of their creators) applications, pushing the boundaries of what is technologically possible and exploring what may become future modes of visual communication and interaction.

Bill Hart, Tasmanian School of Art, University of Tasmania

From the cave to the colour lithograph, visual artists have been at the forefront of experimentation and development of the technologies of image production and reproduction.



FAMILY Matters



Dr Sylvia Metcalf

A new curriculum for medical students provides an opportunity for an interactive computer program which teaches genetics and genetic counselling. Amanda Tattam reports.

The rapidly changing world of medical genetics is a challenging one for educators and others involved in patient education and counselling.

Every week, medical researchers map a new gene. Such research has led to tests being available for over 100 chromosomal and single gene disorders. This is resulting in a growing community awareness about inherited disorders and a thirst for knowledge.

For Dr Sylvia Metcalf, Senior Lecturer in Medical Genetics at the Department of Paediatrics, University of Melbourne, the introduction of a new medical curriculum next year provides an ideal opportunity to develop an interactive computer program to teach genetics to medical students and, eventually, to anyone interested in the gene revolution.

Dr Metcalf, who also works in the education unit at the Murdoch Institute (a human genetics research organisation based at the Royal Children's Hospital), believes the need for flexible medical genetics education is now more important than ever.

"Some of the concepts in genetics are tricky to teach in a didactic way," she says.

"I looked at what was out there already, and there is a lot of information on the web. Some of it is good and some, not so good.

"The genetics programs that are available deal mainly with basic science and are not very interactive.

"Our program combines the clinical side with genetics, basic science, ethical issues and counselling."

Students will be able to study genetic diseases which are commonly found in Australia and Asia. These include cystic fibrosis, which has an incidence of 1 in 2,500 in Caucasians, thalassaemia (1 in 400 in people of Italian, Greek and Middle Eastern, South East Asian origin), Huntington's disease (1 in 10,000), Down's syndrome (1 in 700), and Duchenne muscular dystrophy (found in 1 in 3,500 boys).

The program includes three modules:

- clinical diagnosis, which looks at symptoms and common signs of a condition, family histories and molecular basis of the disease
- laboratory diagnostics, covering DNA and pathology testing and the analysis of results
- counselling and ethical issues, providing simulated counselling sessions and real life scenarios.

Dr Metcalf, together with Mr Andrew Bonollo, a programmer and graphic artist in the university's Medical Faculty Biomedical

MultiMedia Unit began work on the prototype earlier this year. They anticipate that it will be delivered by CD-ROM and the Web with a companion handbook if necessary.

The Macromedia Director 6.5 Multi Media Studio was chosen for its flexibility, because it features graphical sprite objects, multiple views with zooming, and it has the ability to animate up to 20 objects at once. Photoshop is being used to create the graphics and the program will have cross-platform application.

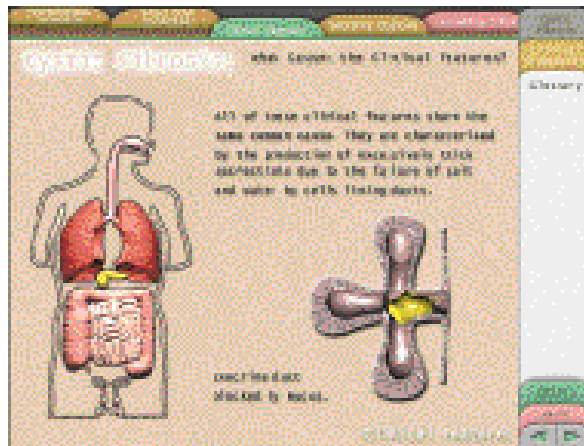
The aim is to provide students with flexibility, with each module taking between 30 to 60 minutes to do, says Dr Metcalf.

Users can revisit the site on different occasions.

"The student may want to focus on a single disease," she says, "and they can do that with ease of movement.

"Students will also be expected to 'fill in the blanks' on a family tree by dragging and dropping their answers to work out the pattern of inheritance."

Multiple-choice questions at the end of each module will allow for self-assessment, and a glossary will guide users who are unfamiliar with new terminology.



A variety of problem solving exercises will be featured in each module. This is a reflection of the philosophy behind the new medical curriculum, which is based on a critical thinking and a problem solving approach.

Counselling: Module 3, with its videos of simulated counselling sessions and real life scenarios about ethical dilemmas gives students the opportunity to immerse themselves in the sensitive topics at their own pace.

Originally, genuine counselling sessions were to be videoed and used. However, according to Dr Metcalf, the unpredictable nature of the sessions have made this impossible.

Rather, scripts based on real experiences will be used, with actors and genetic counsellors. For example, there is the case of a Middle Eastern man who said he wanted a boy and demanded that his wife be tested for the sex of the child, saying that otherwise the pregnancy should not go ahead.

"There are no right and wrong answers with these scenarios," said Dr Metcalf.

"They will be particularly useful in helping students to understand communication skills in a counselling context.

"Students can explore how they would answer questions.

"The video clips focus on the basis of communication: body language, verbal and listening skills.

"This will also be relevant for other areas of medicine."

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