Lessons learnt in connecting schools to the Internet

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This paper relates the experiences gained by the authors during the development and implementation of cheap and simple Internet connections for schools in the region surrounding the Central Queensland University in Rockhampton. In this paper we will discuss the problems, benefits, promotional strategies for gaining support of regional and school authorities, suggestions on how to manage regional projects, some of the steps needed to make sure that the connection is used and other observations we've made during the last year.

INTRODUCTION
The Internet and the Information Superhighway are two of the latest buzz words in technology and educational circles. There isn't a magazine, newspaper, conference or journal that hasn't carried something about the Internet and in many cases the benefits it offers educational institutions. All this hype is deserved. The Internet is one of the most exciting things to happen in education for a long time and promises to revolutionise the way in which people learn and teachers work. (Isn't that what they said about over head projectors?)

The way is not easy. The Information Highway and the Internet are littered with traffic jams, battered wrecks and lost motorists bamboozled by the complexity of the new world and lured into unsuspecting deadends by charlatans and well meaning novices (including some major computer manufacturers).

The Central Queensland University Public Access Network (CQ-PAN) project is a research project within the University's Department of Maths and Computing. One of the outcomes of the CQ-PAN project is the provision of cheap and simple to use Internet connections to schools in the local community. In this paper we will relate the experiences, knowledge and observations made during the last year of connecting schools to the Internet.

WHAT CQ-PAN HAS DONE
Since late 1993 the CQ-PAN project has accomplished the following for local schools:

- developed a cheap, simple off-line system that can provide access to Internet e-mail and news to an entire school body;
- provided on-line Unix accounts with Internet access to a small number of local school teachers;
- installed the off-line system into four Rockhampton schools (three high schools and one primary); and,
- started development of an on-line system that will provide full IP (the school machine becomes a full part of the Internet able to do almost anything) access to local schools at minimum cost.

It is hoped that by the end of 1994 the majority of Rockhampton High Schools will be connected to the Internet using the off-line system. At some stage in 1995 we plan extending the system to schools in the wider Central Queensland area by making use of the University's branch campuses in Mackay, Gladstone, Bundaberg and Emerald.

IT IS FREE!
For no charge the Central Queensland University provides the Internet connection, modems and a server machine located on the University campus that are used by the schools to gain their Internet connection. The CQ-PAN project team provide the software, documentation and training necessary to use the Internet.

All the software used in the CQ-PAN project is in the public domain. However much of it is difficult to use or is not designed to work together as an entire system. The CQ-PAN team members incorporate the public domain software into an easy to use, working system. All the team members of CQ-PAN are computing students from the University working under the direction of computing academics. The students take part in the CQ-PAN project as part of their final year project work.

THE OFF-LINE SYSTEM
The way in which a 'normal' Internet account works means that when the user is reading and replying to e-mail they are 'connected' to the Internet (usually by a modem). This means if you want more than one person connected to the Internet you have to have more than one modem. This is not a good situation for schools.

With the off-line system there is no direct human interaction with the Internet. When users are reading and replying to e-mail the information they are using is stored on a local drive. They are not connected to the Internet. The connection to the Internet is kept separate from the act of reading and replying.

Each day the school dials up the University computer and the two computers automatically exchange incoming and outgoing e-mail and news. The exchange of information can be timed to occur at anytime of the day. This ability can be used to make use of cheap STD rates if necessary. Thus schools are able to distribute mail and collect new mail during a school's day (off-line) and students and their teachers are able to collect mail at times convenient to the school's day.

The off-line system is the cheapest and easiest way an entire school can
gain access to the Internet. The current version of the system only provides access to electronic mail and Usenet news. However students and staff tell us this is adequate for their current needs and that such a system allows schools to use e-mail within school programs in existing circumstances with existing equipment. It also provides a valuable but affordable experience for schools and teachers who wish to ‘wet a toe’ to see if entering the sea of Internet information and communities has educational potential.

To use the system the school must have an IBM PC with at least ten Megabytes of disk space, a 2400 bps modem (though faster is better) and a telephone line. One of the current schools has used the system with an XT, a 2400 bps modem and a telephone line shared with the school’s fax machine.

Students and teachers read their e-mail and news at their convenience using a simple to use MS-DOS based news reader that is freely available on the Internet. Most users find the interface simple and logical to use and this means they can be reading and sending e-mail and news in the minimum of time. Many of our initial difficulties were caused by unfamiliar or difficult user interfaces.

Using the off-line system it is possible for all of the teachers and students at a school to have separate Internet accounts. The system can be (and is currently) set up so that the user’s e-mail and news can be accessed using:

- A single stand-alone machine that serves as both the communications machine and the reader machine. Students and staff take turns at reading their own e-mail and news off this one machine.
- From many different stand-alone machines throughout the school grounds. The e-mail and news for the school is downloaded onto the central communications machine (the one connected to the modem) and then ‘sneakernet’ is used to distribute the information to the other machines. (Sneakernet means the information is copied onto floppy disks that are walked around to the various other machines.) The advantage here is that you have more than one machine at which users can read their e-mail and news.
- The school’s existing local area network to provide access to the information from multiple machines (the system is currently installed and working on Novell and Lantastic networks). The first school connected using the system currently has seventy-five Internet accounts used by both staff and students. Access to e-mail and news is gained using the school’s existing Novell local area network.

LESSONS LEARNED
The following observations and conclusions have emerged during our work on the project. The observations have been divided into a number of categories.

Computer mediated communications (CMC)
The criteria for computer mediated communications (CMC) are:

- CMC must be cheap: The cheaper it is the more it will be used. This is especially true when a school still suffers from CMC sceptics. It is easier for keen teachers to obtain administrative approval for something if it doesn’t cost.
- CMC cannot be volume or time charged: Exploring the net and experimenting are the best ways of becoming familiar with the net and then using it. Teachers need to be immersed in technology if it is to become a way of working for them and a source of learning in their classrooms. Being charged per minute for the experience is unlikely to create the freedom teachers need to gain the confidence of the system or the place for children to play with information. Most Queensland teachers have had some experience with the time charged Keylink system. Numerous teachers have mentioned their ‘fear’ of running up large bills while using the Keylink system. We note that amongst local schools Keylink is now used very little if at all and this is one of the contributory factors.
- There is evidence Australia wide that time based charging has contributed to a decrease in the use of telecommunications in schools. (Williams & Bigum, 1994)
- CMC must be easy to use: In our first experiences, we provided ‘raw’ Unix accounts with Internet access to two local school teachers. The large learning curve involved meant that one of the teachers was unable to climb the curve and soon stopped using the system. The other teacher (one of the authors) spent too much time trying to master the intricacies of the Unix interface, its commands and the Internet before any meaningful activity took place. We quickly learned that teachers and students need to be able to use the system seamlessly if meaningful work is to happen in a short time period.
- There must be a significant variety and population in the on-line community: Schools using Keylink and other ‘closed’ communications systems are discovering that the small populations and limited information resources do not create a momentum of activity needed to sustain a ‘busy’ on-line world. (Williams & Bigum, 1994) The Internet has more than 30,000,000 people from around the world and gigabytes of information on almost every topic imaginable. It is the biggest computer network in the world. Australian teachers and students need to be connected to their peers from around the world rather than being enclosed in artificial electronic fencelines. One of the first uses of the system was by the Japanese language class at Glenmore High. The class organised an e-mail exchange with a native Japanese speaking class using the Internet. This type of project would not be possible using a ‘closed’ system.
- A significant local population is also important: Although the schools currently using the CQ-PAN system can access the world, they have been keen to connect to other local schools and encourage cross community communication. Further this would enable local teachers to share experiences, encourage each other to maintain involvement when the going gets tough and to discuss the curriculum issues about using telecommunications in classrooms.
- Encouraging teachers and helping them to get started: When trying to organise an Internet connection for a school the educational rationale needs to be sold, principals need persuading about costs and teachers need to be supported as they confront their fears about yet another new technology. The following are some of the strategies and arguments that have emerged during discussions with participants during the last year.
- Talking about the Internet doesn’t sell it, using it does: Early in our
project, discussions about the Internet and its benefits were held with the local primary school principals and no interest was generated. Soon afterwards one of the principals and a teacher were given a demonstration of the offline system. They are now one of the schools connected.

- Start with at least one very keen and capable teacher as your infiltrator. In the case of CQ-PAN we generally approach one teacher at a school and offer them Internet access. The understanding is that they will become the Internet evangelist and expert for that school. We generally choose the teacher with the highest level of computing knowledge (generally the computing teacher) as it is easier to get them up to speed. This may not always be the best choice but so far it has been.

- The Internet is a teaching tool: It can be used for a variety of activities and projects that enhance teaching. The methods by which the Internet can be used for teaching is the topic of numerous papers. Teachers have been sold on the educational potential of telecommunications for a long time and now demand more services and opportunities. Curriculum-based, short-term telecommunications projects have been used to support curriculum activities in Australian schools for more than a decade (Williams & Green, 1990). Electronic information services are popular with teachers looking for curriculum materials (Leonard, 1991). Now the vast resources and large teacher and student populations of the Internet are attracting Australian teachers whose classroom experiences inspire their peers (Huston, 1994). Teachers are the best advocates of inspired practice.

- The Internet is a professional development tool for teachers: The major use of our system at the moment is by teachers using it to communicate with other teachers to share ideas and experiences. In a future where state-based services are decreasing, telecommunications offers a solution for teachers to connect to each other. Using the Internet means that teachers do not have to restrict their professional development to local sources. Australian students will benefit from the globally aware teachers.

- The Internet is an administration tool: If every teacher had an e-mail address Departments of Education, other school systems, professional associations and others could distribute information quickly and cheaply to all teachers. One of the major justifications used by business to obtain an Internet connection is that it can reduce communication costs (‘faxes’, ‘memos’ etc.). The same can apply to the school system.

- Start by using existing infrastructure and build up: Most schools cannot afford a large investment especially for a new ‘unknown’ technology. By providing Internet access at no cost and by using existing school computing resources it is easier to get the schools interested and online. Once the system is being used and the benefits of the connection can be seen, making the case for greater investment becomes easier.

- Keeping the momentum in this project: All projects are relatively easy to begin. Maintaining school and teacher enthusiasm has proved to be a challenge.

- If the system is difficult to manage, it won’t be used: At Glenmore High school the children are more excited about CMC than the staff. The teachers involved tell us that students have better and more regular access to the computer lab than teachers and so Internet experiences are part of their daily routine. Staff without good access in their staffrooms do not have the same ‘working’ habits. Both staff and students need easy and regular access to the Internet from an environment they find non-threatening. The optimum (if not practical) arrangement is to have computers (with Internet access) in every classroom and staff room. Full school networking is becoming an important concept for connected schools. If the Internet is being used in an English class the students should be able to use the Internet in the English classroom. It becomes ‘too’ hard if they have to go to a central computer lab. In addition staff will use the system more if they can access the Internet from the staff room.

- The teachers must be comfortable and capable with the system: If teachers don’t like using the system they will not incorporate it into curriculum. If it isn’t incorporated into curriculum students will not learn about the connected world. Teacher training is an essential first step in the professional development of teachers.

- The Internet is a very big place: The most asked question from new users of the Internet is ‘How do you find things?’ The variety and size of the Internet can sometimes be frightening to a new user. It is essential that new users be given training and pointers to interesting and relevant sources of information.

**Running an on-line project**

Running a specific project that uses the Internet is one of the best ways of getting benefits out of the Internet resource. There are numerous examples of the types of projects that have been undertaken (Huston, 1994). The following is a set of guidelines that we’ve developed as a result of our experiences.

- Don’t reinvent the wheel: Do some research to make sure a similar project isn’t already being run. In some cases you might be able to join a project that someone else is organising.

- Think the project through: Before starting a project it is important to know the aim of the project, the intended audience and the type and frequency of contact that is required. It is also important that you be sure that the Internet is the best way to implement the project and that you are not using technology for technology’s sake.

- Maximise the amount of participation: If your project only involves one school it doesn’t take much for the project to fall apart. If the project involves multischools the project can survive one or more schools going off the air.

- The project supervisors must be in regular contact above and beyond that available to students: It is important that the teachers responsible for the project be able to handle administrative details about the project quickly and effectively.

- Choose appropriate mailing lists and/or newsgroups to announce your project: Knowing the audience for your project is the first step. The next step is discovering where that audience lives on the Internet. Identifying where a large collection
of your audience resides and
announcing your project there
increases the chance of getting it off
the ground.
• Make the communication process
simple and quick for both staff and
students
• Fix time deadlines for replies: There
is nothing worse than waiting for a
reply that is late. At the beginning of
the project specify that some form
of communications must occur at
least once every ‘x’ days. Some type
of fall back communication method
(telephone, fax etc.) must be decided
upon in case the Internet connection
is not working.

Some of the problems that affect projects include
• School holidays: Schools in different
states and countries have different
holidays. June, July and August are
good times to organise a project with
classes in the United States as
they are on their summer holidays.
At the start of the project all parties
must be aware when other parties
will be on holidays and as a result
out of contact.
• Internet access: In many cases school
teachers don’t have direct access.
They have access through a friend,
husband or other avenue. Placing
extra people in the chain increases
the time taken to traverse it and
increases the chance of it breaking.
• Overworked teachers: Projects take
time to supervise. That time has
to come from somewhere. Define the
time commitments for teachers so
they can take this into account in
their daily planning.

COMMENTS ON SCHOOL ACCESS TO
INTERNET
Not another network!

There are many commercial service
providers entering the network access
market. Even state Departments of
Education are trying to enter the race.
In many cases these new ‘providers’
are attempting to re-create a network
structure that already exists in this
country. There is no need to create a
new network. All Australian schools
should have Internet access.

Using any network other than the
Internet
• Limits what a school can do: The
new network can’t compete with
the size and variety of the Internet.

• Fragments the on-line school
networks: Schools on different
networks will find it hard if not
impossible to talk to each other
(sending and receiving Internet
email from a Keylink account is a
nightmare). The primary aim on
connecting schools to a network is
so that they can communicate. To a
certain extent it is not important
that all schools have exactly the
same level of Internet access. It is
important that they all have access
(and as of a high a quality as
possible).

A CENTRAL AUSTRALIAN INTERNET
RESOURCE CENTRE
In almost every use of the Internet by
the schools using the CQ-PAN system
they have made use of American
content and projects. While the level of
Australian involvement on the Internet
is increasing there is still no central
location that is seen as the gathering
point for Internet users from Australian
schools.

Such a central resource centre could
act as the first stop for Australian school
users on their trip in cyberspace. A
place to store information or pointers
to information about the use of the
Internet by other Australian schools, a
list of projects, information on how to
get connected, war stories, professional
development resources, suggestions on
how to do things and other relevant
information is greatly needed.

There is no need for this centre to
be centrally controlled. The Internet is
based on a system of responsible,
multiple co-operation and central control
breaks one of the tenets of the Internet
system.

GOVERNMENT COMMITMENT TO
CONNECTING SCHOOLS
The connecting of schools is currently
happening in an ad hoc manner. Schools
in areas with friendly Universities, large
amounts of money or special personal
connections are getting Internet access
while others are missing out. It is
important that a class system dividing
the information haves and have nots
does not develop. Governments and
especially Education Departments need
to recognise the benefits of Internet
access and make a commitment to
providing appropriate access to all
schools.

CONCLUSIONS
Getting a school onto the Internet is not
easy. It needs a combination of technical
and educational skills, computing
resources, commitment, talent and
experience. In many cases the schools
can provide much of this themselves.
The missing link to widespread use
of Internet in schools is the lack of on
ramps for schools. There are various ad
hoc mechanisms by which schools can
gain a connection but there is no
Australia wide provider of Internet
access for schools. As articles in this
issue of the Journal of Australian
Educational Computing illustrate, there
are calls for governments and school
authorities to show leadership and
innovation. Until now there has been
little energy devoted to connecting
Australian schools, their teachers and
their students.

Even with its difficulties, connecting a school to the Internet is a
task that brings a wonderful sense of achievement and provides a very
important resource to schools. Watching the faces of a class when they
start reading their first international e-mail is fantastic. The main lesson we
have learnt from connecting schools to the Internet is that it is well worth the
effort!

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