A WAY FORWARD TO TEACH AND LEARN WITH (NOT ABOUT) COMPUTER COMMUNICATIONS

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ABSTRACT

Computer communication systems, and electronic mail systems in particular, are a potentially powerful tool for both teachers and students. One of the major reasons why their potential is not fulfilled is the limited access which users have to the systems. In general, few schools have entertained the idea of having every computer in the school available as a communications tools, in the same way as they might be word-processing or database tools.

In two schools and a teacher education institution, bulletin boards which operate in local-only mode, were set up in order to explore a practical solution to the problem of access. One aspect of how these systems came to be set up is an interesting example of student project work in the senior secondary school.

These computer communication systems have had a very positive reception from the students. Systematic use within the schools' curriculum is far from having been fully explored. Survey evidence from one of the groups of students who used a system suggests there might difference between boys' and girls' use and appreciation of computer communications.

Problems and benefits of the approach used, along with a description of the systems is provided, so that schools can be encouraged to explore these types of systems. Some suggestions of how system can be designed to facilitate socialization to the online environment are made. Research directions on students' use of computer communications systems are also outlined.

INTRODUCTION

There is an ever increasing number of classroom ideas, suggested teaching methods and specific projects which are concerned with the use of computer communications in the classroom. Sources for these include Andres, Jacks and Rogers (1989), Reil (1990) Rogers, Andres and Jacks (1990) and Reil (1992/93). More are constantly being suggested in the on-line discussions among educators, such as the K12Net conferences (Eisenberg, 1992; and Rose, 1993). There is also a wealth of suggestions as to how teachers may make valuable use of computer messaging and file sharing in their activities outside of the classroom, such as described by Tuovinen (1989). In all these sources, there is a consistent emphasis on learning _with_ technology rather than learning _about_ technology.

Certain technical factors (described below), however, tend to
limit computer communications activities to being more of a novelty than an integral part of the teaching/learning process (both in and out of class), cause frustration for teachers and students alike, or cause the classroom activities to be unnecessarily focussed in the particularities of the technology, rather than the activities which the technology can be used to support. Teachers who endeavour to enhance their students' work with computer communication activities often adopt particularly creative approaches to deal with the limitations of the technology and their classroom activities, but it is not always easy to maximize direct hands-on experience with the online world for all students. The primary motivation behind the work which this paper describes has been that there must be cost-effective ways in which all students can be given direct hands-on experience.

In times to come, each computer in a school may well have full Internet connectivity (Carlitz, 1992), but in reality, there are a multiplicity of resourcing issues at the local, regional and national levels which need to be addressed before this becomes a widespread reality. It is sufficient to note that such connectivity is not just around the corner. The system described is a cost effective way of bringing something of that ubiquitous access to the classroom which makes them available to users in a way which enables the focus to be on using the technology for various activities without much concern for the lower-level operational details. In this scheme, opportunities are still provided for teachers and students to learn about the technology through setting up and maintaining the system.

In this paper, the implementation of such systems is discussed. With significant barriers to access (described below) largely overcome, it is possible to look into what might be the next layer of issues for students, individual teachers and schools as a whole. This work is in its formative stages, and the initial evaluation which is reported was considerably ad-hoc, but some valuable learnings stand out. Certainly, the way is now clear for a more systematic and wide-spread trial of these systems, evaluation of their use, and the outlining of intended future directions.

ISSUES IN USING COMPUTER COMMUNICATION SYSTEMS

The majority of difficulties encountered by users of computer communications systems are because they are chiefly available to teachers and students by dial-up (using a telephone line, modem and communications package). The author would not like to give the impression that dial-up is some sort of now-primitive skill which should be expunged from a teacher's technical repertoire. It will remain necessary to access certain services, particularly online databases. However, a sole reliance on dial-up to send electronic mail or participate in computer conferencing places a number of barriers in the teachers' and students' way, and while these are not insurmountable, there is no doubt in the author's mind that the combined effect of these has meant that computer communication has neither been explored fully nor allowed it to reach its potential in the vast majority of classrooms. It is a means to removing or reducing these barriers which this paper addresses first of all. Ahola-Sidaway, MacLean, & Treuhaft (1990, p. 70) provide a useful framework to consider these barriers, which is expanded on as follows:

* Cost. This must be considered when schools, with limited
budgets, consider connecting to time-charged services (such as Compuserve), or to other services at a non-local phone call rate. The need to make a call for each new logon is as much an encumbrance as it is a cost consideration. It could be argued that making a phone line, modem and computer with terminal program readily available would go towards alleviating this problem (e.g., Chandler, 1989, p. 66), but there are cost considerations with the possibility of unauthorized calls whether time-charged or not.

* User interface. The complexity of using communication software and modems experienced by many people makes it quite possible for the ultimate goal of "teaching and learning with a computer systems" to be obscured by the other factors, which are artefact of the technology, not of the intended learning objectives. It also means frustration for teachers and students alike due to the learning curve imposed by the current state of technology in the classroom. There is still a myriad of obstacles to overcome in preparing to use computers, modems and phone lines in meaningful ways in the classroom (Rogers, Andres and Jacks, 1990). The figure 1 outlines the technical obstacles which must be overcome by the intending user of an on-line system. The larger the box, the more significant the step towards ultimate goal of "teaching and learning with a computer computer communications system". The arrows describe the typical passage towards this ultimate consideration, the double arrows indicate the considerable interaction between one step and the precursor.
Interaction Between These Systems

Operating the Computer and Terminal Program

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Connecting the modem

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Navigating the Online System


Using the terminal program to configure the modem to achieve a successful connection

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Socialization: Learning to 'think' and 'talk' with an online community

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Teaching and Learning with (not about) a computer communications system

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Figure 1. The Stages One Must Progress Through in Order to Use a Dial-Up Computer Communications System in Education

According to Ahola-Sidaway, MacLean and Treuhaft (1990, p. 70), acquiring competence with computer communications is more than learning a few basic skills. It necessarily involves moving through the stage of rough navigation (which keys to press) to being confident to 'think', 'work' and 'talk' in the virtual, online community. This takes a knowledge of the basic skills, but also time to experiment and talk with others (both face-to-face and online) about their experimentation. Without this working knowledge of the online world, a consideration of how to teach and learn in the online world which is not shallow will not proceed. The inexperienced user must learn to ask the right questions; locate the general source of a problem; solve minor, yet essential, problems; and acquire an increasingly sophisticated set of skills. A helpful, local technical-support person can assist with much of this, but most important is time to work online. If a user is forever bothered by such things as not being completely sure of how to connect a modem or use a terminal program, of modem connections falling out, or being baffled by how to do a file transfer - in short, problems with
any of the steps in figure 1 except those in the boxes down the right hand side - or indeed any other hindrance described in this section, it is unlikely that teaching and learning with computer communications will not be fully explored. The type of system described in this paper means the user need only be concerned with the 3 steps presented in the right-hand column of Figure 1.

* Number of access points. The availability of computers, modems and telephone lines is constraint which many individuals face, and it becomes a much more significant constraint when entire classes are engaged in computer communication activities. It is inconceivable that a class would be able to have even one computer between two students (approximately 12 computers) simultaneously connected to a remote system. This is as much a problem when student teachers and in-service teachers are being introduced to computer communication, as it is in the primary or secondary classroom.

* the availability, access, and location of equipment, which includes, number of computers available, the cost of 'phone line installation and telephone charges, the cost of modems. (A technical support person may be able to assist by setting up or moving equipment, but this is a less than ideal situation.)

* the limited number of systems to which users can be connected. For instance, there are some 8 educational bulletin boards in Victoria, which are networked and can therefore provide much of the same information to their users. This represents a maximum of 13 simultaneous dial-in connections, and is perhaps minimally sufficient for one class in the whole state to be engaged in electronic messaging activities. There are also limits to the number of simultaneous users of commercial system such as Compuserve, though the number of connections is rather higher.

* Dynamism of the system. With the advent of networks such as Fidonet and FrEdMail, users of even the smallest system can participate in highly active discussions, which maintains users' interest and increases the value of participating in the various discussions. An advantage which goes hand-in-hand with this is that other users of the same network - across the street or across the world - become accessible, and so a large, reasonably homogeneous community of users is readily established. It is clearly important for a school-based communications system to be part of a network of similar educational systems to establish an extensive virtual community of users.

The process of moving from non-user to more experienced user, is a complex one, which is in concurrence with Ahola-Sidaway, MacLean, & Treuhaft (1990, p. 70). A critical observation is that the issues discussed above effect the motivation to access such systems. In the school setting, as discussed below, the above factors have been arranged so as to place as few inhibiting factors on use as possible. There have been few formalized extrinsic benefits except these. Some use of computer communication systems was enhanced by incorporating the use of the systems into formal assessment requirements in some school subjects. More important has been the desire of users to enhance their personal and lives, which is indicated by the sustained high level of out-of-class use of the system.
TECHNICAL DESCRIPTION OF THE SYSTEMS TRIALED

The systems which are described in detail below enable each MS-DOS computer on a network (such as Novell) to be available as a messaging and file-exchange tool, in the same way as it is available as they would be available as a word-processing, database, or desk-top publishing tool;

* provide a menu driven environment;
* have a range of security features available;
* are established as member systems of a network, enabling the transfer of messages and files;
* use computer equipment which is available in the school presently, with little additional expenditure;
* do not require permanent access to a modem or phone line.

As Salemi (1991, pp. 231-243) notes, bulletin board systems are no longer only domain of the hobbyist, but are being used for the implementation of wide area networks, and it was the bulletin board package RemoteAccess which was central to establishing the school-based systems. Initially, the Fidonet-compatible packages RemoteAccess (Milner, 1992), FrontDoor (Homrighausen, 1991) and IMail (Fabris, 1992), were chosen primarily because they were familiar to the author. Later, FrontDoor and IMAIL were replaced by Ezycom (Davies, 1992) because it offered functionality not otherwise available, and through the work described herein, it was possible to participate in the trialing of initial releases of this software, and to a certain extent have the package tailored to the specific needs of a school-based mail point (some simple additions to security features are the most notable examples). The above packages perform the necessary functions of a networked bulletin board system (see below), and with them, the features mentioned above could be provided. Particularly, RemoteAccess and Ezycom are network-aware for many systems, and is able to support multi-user access for local (ie not dial-in) users. The systems were established as either nodes or points within Fidonet, which is now briefly described.

The author would like to acknowledge that bulletin board operators have probably established similar systems to that which is described in this paper. If this is that case, he would gladly hear of any similar work which has been published and investigate the possibility of any multi-site evaluation work. However, contact with parties doing similar work elsewhere has not been forthcoming.

Fidonet

Fidonet is a network of many different bulletin board systems (BBS) which exchange mail and files with each other without the need for human intervention. The network began in May 1984, and extends to over 10000 systems today, and has its own set of protocols and standards (Bonine, 1987). There are also many networks (often referred to as other nets) which use Fidonet technology and nomenclature which are not strictly part of Fidonet. There is also a huge range of Fidonet-compatible products available for a wide range of platforms, whereas other networks of computers (such as PCRelay, FrEdMail or the Internet) tend to be more platform-specific, or not readily available to microcomputers. Hence, a Fidonet platform would provide a broad base from which to develop ideas to make computer communications
more available to teachers and students. A comprehensive and readable description of Fidonet and related terminology is found in Salemi (1991, pp. 231-243).

The majority of systems in Fidonet are nodes, which are individual dial-up systems. There are also points, each point being a separate system which communicates with its "boss node". The boss node holds mail destined for a point, distributes mail from a point to the rest of the network, and manages the list of point systems which call it. Point systems can be used by one or more local users, do not have to be on-line permanently, are never called by their boss node, but call their boss node to exchange mail every day or so, at the convenience of the point operator. This arrangement is ideal for the implementation of the school-based systems. The terminology "mail point" was coined for the school-based systems as they became established. (This has also been combined with the technical definition of a network being an "an inter-connected set of points" to be a useful play on words for explaining the term "network" to students and publicizing the mail point concept.)

![Abbreviated Fidonet Topology](adapted from, Salemi, 1991, pp. 242-243).

Figure 2. Abbreviated Fidonet Topology (adapted from, Salemi, 1991, pp. 242-243).

Note. The arrows indicate the direction of phone calls being made. The double headed arrow indicates the ability for both systems to call one another; the single headed arrow indicates that only one system can make the call. SECAP BBS corresponds to "Node 2"; the WHSC and SSC points correspond to the points as indicated.

Establishing a point system is an excellent way for students or teachers interested in dabbling with bulletin boards to get underway. A full appreciation of the elements of a networked bulletin board can be gained, without the restrictions of needing to have a phone line and modem dedicated to the one use, nor
needing to establish a user community to justify the system's continuation operation. As in the WHSC case, a home phone line can be satisfactorily used for the mail transfer, and the messages brought to the (main) bulletin board on disk.

Network Software

Each of the three systems was operated on an IBM/MS-DOS-compatible platform. The products mentioned below are all specific to the DOS platform, but software is certainly available for other systems. The use of a product for the Macintosh, MacWoof (Vaughan, 1993), is being trialed in a classroom setting at the time of writing.

A bulletin board system consists of three main modules: A bulletin board, a mailer, and a mail processor. Most frequently, these are available as separate packages by different authors. In this approach, what the system operator gains in flexibility tends to be lost in ease of configuration. One completely integrated package, released after the systems described in this paper were configured and trialed, is Ezycom. Initial impressions are that this package provides the same, if not more, functionality as the set of packages described below, but is greatly easier to configure initially.

The modules of the bulletin board system which were set up in the schools were as follows:

The *bulletin board* provides the user with an interface to perform the many tasks and functions are provided. The RemoteAccess package was used initially, until the first releases of the Ezycom package. Both of these provide menu-based environments which are very flexible because the system operator is responsible for designing screens and menus which are displayed to users, along with deciding which functions will be available to users. We look forward to the time when interaction with the system will be as intuitive as possible with a graphical user interface/point-and-click system, such as is described by Benton & Sosinsky (1990) and Withers (1993). In the time between the present and that time when software which does this and provides equivalent functionality as RemoteAccess or Ezycom at the same low cost is available, the development of screens and menus with the intention of providing an interface which any person can learn to use easily has to be a priority. The author agrees with a colleague, who remarked that "in contrast to many online systems, bulletin boards are people orientated services which set the standard for the interface". These are the reasons why our work has been restricted to Fidonet systems.

The development of screens and menus is an ongoing process of interactive and participatory design at all stages (Shneiderman, 1987, pp. 390–394) which, for this work is described by Chandler, Clement, Gesthuizen, & Hall (forthcoming). This is a time consuming activity, but since school-based systems can be virtually identical, the work needed only to be done once. Ezycom contains both a bulletin board and a mail processor (described below) and this has made the development of standard configurations for both these functions very manageable.

The *mailer* is the software which facilitates the exchange of mail between systems. The product used was FrontDoor which is available as a non-commercial product and is reasonably straightforward to configure. The FrontDoor package provides a
lot more functionality than is actually necessary to set up a point system, and this can be confusing to the novice. Unlike the bulletin board and the mail processor, most of the configuration details for the mailer are specific to the one system. Some standard files could be provided to enable FrontDoor to automatically dial the boss node to send and receive mail each time it was executed.

The importing and exporting of mail requires a *mail processor*. The mail processor can decompress incoming mail and "toss" it into the designated message areas, and it can "scan" mail messages to be compressed and then exported. IMAIL is available as a non-commercial product and is readily available and was used initially on the two school-based systems. The Ezycom bulletin board package contains a mailer processor, alleviating the need for IMAIL. Even though configuring the mail processor is another time consuming activity, the configuration for the school-based systems can be very similar, again saving time, something which Ezycom has made even more straightforward (as described above).

Other Software

A number of standard routines were developed for the school-based systems which made access to the point system easy for users and assisted with maintenance:

* a batch file so that users could just type "point" at the DOS prompt, and the mail system would run. This could also be called from autoexec.bat to minimize student access to DOS;
* a batch file to enable the backing up of the main configuration files so that the mail point can be setup anew from another computer if any problems were experienced. The archive could easily fit onto one floppy disk but did not backup the message base, but that was considered an acceptable risk (others may not consider it so, in which case a program such as PC Backup may need to be used);
* a batch file which initiated message scanning, the mailer, and message tossing in sequence;
* a program, called EZYOLS (Clement, 1992), which could detect (and optionally delete) obscene mail before it was sent to the wider network;
* a program which allows users to print messages they have read or written (without this, users must use the "print screen" key). (The package is yet to be released.)

Electronic Mail Facilities Provided

The conferences which were available to users of the system comprised mainly of the K12net group of conferences (Eisenberg, 1992; Rose, 1993), and in particular those conferences which were free-for-all chat amongst elementary and senior students (American nomenclature). Other Australian- and Victorian-only conferences were also available. In addition, because of special arrangement made with a local software developer, it was possible for students to send messages to users of an internet site, though a local gateway. (There are numbers of teachers and students overseas - most notably the USA and Canada -who have access to internet resources, especially electronic mail, on what are mainly institutional mainframes. See LaQuey (1990) for a description of the internet and associated resources.)
GENERAL DESCRIPTION OF THE SYSTEMS TRIALED

General Features

For each of the system operators, as well designing (or modifying) the system configuration, there was a considerable amount of on-going behind-the-scenes work. Initiating mail transfers with the boss node is the most obvious, but skimming through the messages to check if they contained obscene language or stories which would have to be deleted was felt necessary; this was made easier with the program EZYOLS. Validation of student names was considered essential, and adjusting security levels necessary.

RemoteAccess and Ezycom provide the capacity to issue a user-designed questionnaire to users, and this was used in the evaluation of the systems. The questionnaire used at SSC Secondary College provided the most valuable data, and the text of this survey is provided in the appendix. A log file of all users activity is also maintained, and this was useful in gathering certain information, and in a more systematic trial could be very useful indeed.

The bulletin board packages also provide an extensive security system. Users can be given access at a certain level, and what that level enables them to do is determined by the system operator. One reason for doing this is to give new users experience with reading and writing messages before they are in a position to send (potentially inappropriate) messages to the rest of the network.

SECAP BBS

History and System Configuration.

Since late 1989, an Educational Bulletin Board (SECAP BBS) has been operated at the Rusden Campus of Deakin University (then Victoria College). SECAP is the Southern-Eastern Co-ordinated Area Project for mathematics, science and technology education, one of a number of such projects which link primary, secondary and tertiary institutions along with industries, and initiated by the Ministry of Education in Victoria. The bulletin board was originally established as part of the project.

In July 1991 the system was configured so that it would be available to users on the each of the MS-DOS compatible workstations of the Novell network, as well as to external users by dial-up. This system also acted as the boss node for the other two systems which were configured as points. It was recognized from the start that encouragement for point operators would need to come from an already established system, and a good level of technical support would need to be provided. Both of these initially came through SECAP BBS, although it became a self-help enterprise as the level of expertise increased and online colleagues were established by the point operators.

Use of the System.

Several groups of university students have made use of SECAP BBS as users on local work stations. Students enrolled in method studies in information technology were required to read some
messages, write some messages and log on at least 10 times. Some 60 students taking educational electives introducing them to computers were introduced to bulletin boards, electronic messaging and file transfer using this system. Two groups of in-service teachers taking Graduate Diploma courses were also introduced to computer communications with this system, and one of these groups went on to develop curriculum units which incorporated the use of electronic messaging.

Evaluation.

A considerable number of current and intending teachers are introduced to electronic messaging and file transfer through the use of the SECAP BBS. The vast majority of students who used the system did so during a short introduction (one 2-hour session) which serves to do little more than to whet the appetite and provide a few references which can be followed up by the students individually. Very few of the students return in their own time to log on again, even though this was encouraged.

For this reason, little evaluation work has been able to be done on students' use and impressions of the system. However, the staff concerned noted that it was appreciably more appropriate to introduce students to computer communication with a hands-one activity than with a demonstration of a modem alone. It was possible to suggest to student teachers what was possible with a school-based communications system, but probably more importantly to give them experience with using a system which is available to them in schools by dial-up. Anecdotally, it was also noticed that users generally found the use of the menu-driven bulletin board and the full-screen message editor easier to use than a word-processor and that a small number of students found some conceptual difficulty with the notion of a computer conference and an asynchronous conversation.

Scurfield (1991) presented a useful discussion of the incorporation of the use of bulletin boards into a pre-service education program. A major result of a small survey which was conducted was that the vast majority of students she interviewed had not heard of bulletin boards before they were introduced in the courses at the College. Even considering her small and possibly unrepresentative sample, this is surprising. If nothing else, there is no shortage of folklore about bulletin boards (not all of it complementary) which creeps into our culture from time to time. Partly because of this, and also because of the possibilities she has discovered this medium has for her own teaching, it is her belief that

[teacher training courses] should be the place where students find out, experiment and learn the potential of bulletin boards. Considering the large potential such system have and the implications for future classroom learning, and introduction to their use and possibilities should, perhaps, be a compulsory aspect of teacher education.

WHSC Secondary College System

History and System Configuration.

The mail point at WHSC commenced operation during August 1991 as
part of the Communication Project for VCE (units 3 and 4) English for one student. (Details of the Communication Project, which is part of the senior secondary school curriculum, is given in Victorian Curriculum and Assessment Board, 1990, pp. 27-30). It was through this work that the standard configuration files for the school based systems were developed, and this was done so that they system looked like a "typical bulletin board system". The WHSC mail point was configured to operate on a Novell network and provided students with message areas which they would find entertaining and screens and menus which were simple to use. A modem or phone line could not be made available at the school, so the transfer and processing of mail had to be handled off-site, something which can easily be handled.

Use of the System.

With the co-operation of teachers at the school, students were able to use the mail point at lunchtime on one day a week. Over the time in which it operated, a total 22 students had logged onto the mail point, averaging around 14 per week, most of whom were in year 7. There was no staff use of the system. Once the student had completed his VCE year (and left school), there was no interest shown by the school to continue the mail point, and so it was discontinued.

Evaluation.

As part of the Communication Project a survey of users was held, and there were nine responses. In total, they had written 27 messages to students overseas, and a total number of 20 replies were received by the students. Unlike the SSC system, there is no gender analysis of the use of the mail point. The data collected by survey and by anecdotal comment is consistent with that from the SSC system, and a combined resume is presented below. On average, the students rated the success of the project an arbitrary nine out of ten.

SSC Secondary College System

History and System Configuration.

In late September 1991, a mail point at SSC Secondary College was established. It was initially set up to run on one IBM XT-clone computer with a 20 MB hard disk and a monochrome monitor. The purchase of several new computers by school meant it was possible to dedicate this machine to use as the mail point. No modem was permanently assigned to the mail point, but a 2400 bps modem from elsewhere in the school was reasonably freely available. The machine was variously located in the computer room and library (for student use) and the staff room (for inservice). Location in the library was particularly good, because it was available at times when supervision from the subject teacher would not be possible. The teacher responsible for the mail point was assisted by a number of student as co-systems operators.

In the early part of 1992 a network was installed, and a modem was found which could be permanently assigned to the mail point. The mail point was then configured so that it could be accessed from each of the IBM-compatible workstations on the network and
by dial-up, in an analogous fashion to the SECAP BBS. This process of gradually developing a network-available point system (which was forced upon the sysop by circumstances) proved to be a very helpful way to proceed. The teacher responsible and the student users could more gradually orientate themselves to the operation of the system. Demand to use the system was high and thus the establishment of the system on the network was justified to the teacher concerned and the relevant administrators within the school.

Use of the System.

The mail point was used initially to encourage year 10 Information Technology students to communicate other students locally and overseas, and there was good opportunities to learn about as well as with the technology. As a stand alone system, the 70 or so students concerned were rostered so that about 40 students were able to regularly log on during class time, each week, for up to minutes each. Because of the demand, use in other classes has only been possible from when the system was networked. The use has been for class projects, but there has also been considerable voluntary use of the system outside of class time (before school, recess, lunch time and after school). Use in classes other than Information Technology has included arranging a video exchange between SSC and a school in Boston USA, in French, and history.

Most excitingly, a strong link has developed with a neighboring primary school because of the mail point, with classes from the preparatory year through to 6 being rostered on to walk up the SSC and use the mail point. This venture started in September 1992, and the link between the schools has been steadily expanding from a mutual interest in the use of computer messaging in education between two teachers through to a greater sense of co-operation between the two schools than was present previously.

This system has become a prototype of the type which can be established in schools, and as such, as been the platform on which the menu development has taken place. Suggestions for use with very young children and strategies for encouraging appropriate network behaviour and etiquette have been developed through its use. These are described by Chandler, Clement, Gesthuizen, & Hall (forthcoming). It is this system which is being used to thoroughly investigate students' use of mail point, as described below.

Evaluation.

As well as anecdotal data, students were surveyed using an on-line questionnaire (see appendix). Table 1 provides some of the figures for usage over a two month period for approximately 20 min sessions, obtained from the user log from RemoteAccess from when the system was operating on a stand alone machine. (More thorough data gathering (discussed below) drawing on use of the network system is under way at the time of writing.) This is not complete data, since some students only performed a token log on to please the teacher and pass. It suggests some gender differences which are discussed below. Apart from this, the data collected by survey and by anecdotal comment is consistent with that from the WHSC system, and a combined resume is presented below.
### Table 1: Figures for Usage of the SSC Mail Point Over a Two Month Period for Approximately 20 min Sessions.

<table>
<thead>
<tr>
<th></th>
<th>Total Users</th>
<th>Total Messages Posted</th>
<th>Total Number of Calls</th>
<th>Average Calls per user</th>
<th>Average Messages Written per user</th>
<th>Average Messages Written per call</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>31</td>
<td>173</td>
<td>285</td>
<td>9.1</td>
<td>5.5</td>
<td>0.71</td>
</tr>
<tr>
<td>Girls</td>
<td>21</td>
<td>185</td>
<td>214</td>
<td>10.1</td>
<td>8.8</td>
<td>0.60</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>358</td>
<td>499</td>
<td>9.6</td>
<td>6.8</td>
<td>0.86</td>
</tr>
</tbody>
</table>

**EVALUATION OF THE SCHOOL-BASED SYSTEMS**

Students found the mail point easy to use, but they wanted the support from other people and the help screens provided. Human assistance is usually preferred to computer assistance when it is available. Sending messages to internet users was known to be a more complicated process, and those students who tried it certainly found it so. Students' impressions of the more recent revisions of the menu system which make the sending of mail to internet users ostensibly easier are not known, but student project work of late has focussed on the KIDLINK project which requires students to send mail to internet users. No great difficulties have been noted.

Students seemed to least like the limited access they had (restricted by the security level considerations discussed above), the length of time it takes to type a letter, the slow turn-around time to get a reply (often a week or more), and the possibility of not receiving a reply at all. (It should be noted that this is not so much of a problem with classroom projects when access to the system may not be every day, but does become a problem when some students log in several times a day and expecting "something to have happened" fairly regularly.)

These problems can often be traced to the nature of the Fidonet - an amateur and reasonably inexpensively operated network - but this is not necessarily only a technical problem: those at WHSC often did not have enough information about what to say in an opening letter. Some admitted that they struggled to find something to write about. There were a few concerns about people with a higher security level being able to read so-called private messages. That is virtually impossible to avoid, and is in fact one of the ways in which electronic messaging differs from written messages. It is an example of the socialization issue mentioned above - students need to come to grips with the two being different sort of mediums for which different sorts of messages and ways of writing are appropriate.

When they considered the future possibilities of the mail point, the SSC students wanted to be able to send messages to more schools electronically. They suggested the following activities which they think the mail point could be used for: comparing lifestyle, culture, etc; natural disasters; news reports of things that happen overseas; obtaining information on other countries; having assignments marked overseas by fellow students.
Gender Issues

The figures in table 1 indicate clear gender bias in favour of the girls, writing about 50% more messages per call than the boys. The girls' own estimates of how many messages were posted also exceed the boys' estimates, so they do not seem to be belittling their own activity. In addition, girls' estimates of how many messages they received exceed the boys' estimates of how many they received threefold. This may reflect the quality of messages which the girls posted. Boys also tended to write messages to people they knew (and therefore local users), whereas girls seemed more prepared to pick up a name from a conference and write to that person. The girls also seemed to have a much more broader appreciation of the computer conferencing activities than the boys: when asked what they liked about the mail point, a number of girls responded to the effect that they found it a good way of communicating with people overseas, making new contacts and friends, and that we can find out about people and the country they live in. Comments such as "it was fun to talk to your friends and teachers with computers" were more typical for the boys.

The teacher concerned was able to visit some of the girls during work experience. Their supervisors mentioned that unlike other girls they have had they were not intimidated by computer technology and had gained a sense of empowerment over it. It is just possible that their enthusiastic use of the mail point had contributed to that sense of empowerment. The girls themselves commented that the work they were doing on a company's mainframe was like the mail point, and were readily performing remote tasks and working in a virtual world. They were clearly proud of the work they had done at school, and eagerly told their supervisors about the students overseas who they had exchanged messages with. Several girls asked to do computer related work experience and proudly called themselves programmers!

It is not known whether boys felt similarly empowered and proud of their school activities, nor whether this was a general trend for girls. Both gender differences and the girls' response may in fact be due to a novelty effect, however it over the year since the original data was collected, and the teachers concerned have not observed any great change in the amount of use, so there is certainly something which is worth investigating. Regardless it can be unequivocally stated that the mail point experience was, for some of the students, one of the best experiences with computers they could have had.

Michel (forthcoming) and Wheeler (1993) have provided some interesting analyses of computer conferences used by students. In order to investigate the above issues further, it is intended to use this work as a base, but change the focus from a given _conference_ to a given _group of students_ - the users of one or more mail points. A reasonably automated way of collecting the relevant data has been developed. Ezycom maintains extensive files on user statistics and activity, and all manner of information on the messages available on the bulletin board. This information tends to be stored in package specific formats. Taking full advantage of these file formats being available from the authors, software has been developed (yet to be released) to archive periodically the system activity into a more common and more easily manipulated format: that of a set of DBASE files. This format allows for an initial investigation and later it may prove useful to generate data for analysis programs such as SPSSx
or NUDIST.

Using such information sampled several times over an extended period, gender differences in the use of this electronic messaging system will be investigated. Important differences between other groups of users could also be investigated, such as younger users compared with older users.

PROFESSIONAL AND TECHNICAL SUPPORT

Many educators have expressed interest in the mail point idea, but surprisingly few have even used an online service of any sort. The mail point makes access easy for the user, but the system operator needs to have a grasp of some reasonably sophisticated functions.

It is expected that budding system operators of mail points will be competent dial-up users of a bulletin board system, including use of messaging, file transfers and, ideally, the more sophisticated functions such as the use of offline message readers. They can be provided with a set of disks which automate the installation of a standard mail point configuration. They should then apply to an appropriate host system (such as the SECAP BBS) to be a point. The operation of the point has been completely up to them, with the exception of maintaining contact with other operators of mail points though a computer conference available on each of the mail points for this purpose (this can be accessed from the local mail point, or, if its function is a cause of concern, the conference can be accessed by dialing in to another system).

However, it has been observed that in order for users to grow in competence from a novice user to the relative sophistication of a mail point operator, a focus and structure needed to be provided. This has been conceptualized in the form of STEM (Students, Teachers and Electronic Mail): A loosely organized group of primary and secondary teachers, university lecturers and tertiary students who have a common commitment to promoting the use of electronic mail and computer conferencing for teachers and students in both primary and secondary schools. STEM is associated with the Bennettswood Technology for Learning Centre of Deakin University, which provides an organizational base for the provision of professional development programs, short courses, consultancy services, teaching resource development, and study and research opportunities.

CONCLUSION

This limited trial has established that:

* Socialization to the online environment takes time. Factors which may not motivate users to take the time to become accustomed to the environment need to be minimized and users of computer messaging systems need to be given some basic information about how to navigate the system and how write in that environment. Limiting access to parts of the system or functions of the system depending on competence are useful strategies in promoting orderly growth of users into well-socialized ones;
* The systems which were established effectively increased access to computer communications systems in conjunction with a much less problematic user interface compared with using a
terminal program, modem and on-line system. The trade-off is the amount of work which the mail point operators must put in;

* A Fidonet system can be effectively used as a school-based computer communication system, though the nature of Fidonet tends to mean slow turn-around time and the possibility of messages never arriving. Randall Reid (personal communication, January, 1992), has been exploring the setting up of similar systems at some Canadian schools. Those systems are UUCP based, a network which tends to offer more reliability and faster turn-around, and more directly interfaces with the rest of the internet, but the software is single-user only. There are clearly other systems and networks which deserve exploration;

* A network-wide Fidonet system can be used as an effective tool of introducing teachers to computer communications. Such an introduction should be considered as an important inclusion in pre-service teacher education;

* New users found a typical bulletin board system reasonably easy to use; the operation of it should be explained systematically, and there should be on-line help available and an expectation of co-operative learning;

* Secondary school students are motivated by electronic messaging activities, particularly those which are designed to be purposeful and/or linked to assessment. Girls might be more motivated towards and enthusiastic about this type of computer technology than other types of computer technologies;

* There may be gender differences in the ways in which girls write electronic messages and/or work with computer messaging compared with boys;

* A professional development and technical support structure is essential for any technological and educational innovation;

* Links between primary, secondary and tertiary education can be strengthened by participating in a common project which is seen to have practical significance and both immediate and long-term pay-offs to all concerned. Teachers can be empowered to see themselves as researchers in practical issues in such a situation;

Teachers in particular should be warned against any tendency to believe that overcoming any of the technical obstacles will automatically make computer communication activities more successful as Rogers, Andres and Jacks (1990) note. The human factors of learning to operate in the world of computer messaging are often more difficult to master than the technical obstacles.

However, now that the ground work has been done, it is viable to extend the trial and conduct evaluation in a systematic way. Regardless of any association with specific trials (such as this one), teachers and students alike should be encouraged to set up computer communications systems to be able to fully participate in the various electronic networks and projects. It is only by participating in this form of communication that its possibilities will be fully seen and the desire to more fully understand the implications computer communications will have on the lives of young people, their teachers and their schools as we move towards the 21st century will be realized.
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Footnote 1. On FidoNet systems, the messages are grouped into areas. Each area corresponds roughly to a conference topic or Usenet newsgroup (e.g., "Teacher Chat", "VCE English" or "Thematic Projects"). Broadly speaking, message areas are either local to the system they are entered on, or distributed to other systems in the network. This attribute of each message area is defined by the system operator.

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