THE DEVELOPMENT AND PRELIMINARY EVALUATION OF A COURSE AND OF THE KITIKMEOT BBS FOR WHICH THE COURSE WAS DESIGNED

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The Development and Preliminary Evaluation of a Course and of the Kitikmeot BBS for which The Course Was Designed

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I should like to thank Dr. Glenn Clark for his guidance and patience throughout this project.

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Introduction

This research project is a case study which took place in the Winter of 1996 in the geographically isolated Arctic community of Kugluktuk. A group of grade nine students from Kugluktuk High School were observed over six months as they worked through a computer course. The course was designed using current theory on learning and motivation. In turn, the computer course was used to analyze the effectiveness of the Kugluktuk School and Community Bulletin Board System (BBS),[1] as a communications and research tool. Study results were then used to make recommendations to the Kitikmeot Board of Education (KBE) as to further course and system development. In following through with the given recommendations, the KBE will be better prepared to promote effective learning models using available BBS and World Wide Web (WWW) technology in geographically remote areas across the whole Kitikmeot Board of Education.

The idea for this study was first devised when the Kitikmeot Board of Education received funding to initiate a BBS in the winter of 1995. Having used STEM~Net,[2] this Teacher/Researcher explored the idea of establishing a computer course which would develop student knowledge of the system and allow students full access to its capabilities. As a result of this interest, Clive Whitfield, the Secondary Schools coordinator for the Kitikmeot Board of Education, appointed this Teacher/Researcher as school/community

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[1] This Kugluktuk server is connected to the Kitikmeot server, and will hereafter be referred to as the Kitikmeot Bulletin Board System.

[2] STEM~Net is a computer network for active professional K-12 and public college educators in Newfoundlad and Labrador.

administrator of the local BBS server. The KBE director, Tom Stewart, also stated an interest in the study, and offered support where needed.

CHAPTER I: STATEMENT OF THE PROBLEM

Purpose of the Study

The Concept

Teaching within the Kitikmeot region, one soon learns that Inuit students speak English as a second language. This obviously represents an educational challenge from two standpoints. First, many of the students are weak in their first language. Secondly, many students have not solidly established English as a second language, either in speaking or writing. In consideration of these points, a curriculum which effectively emphasizes language and motivates use of language acquisition skills is desirable. A review of literature demonstrates that active participation by students in reading and writing with a sense of purpose greatly improves motivation, understanding, and hence ability to succeed in school. In contrast, traditional transmissional teaching methods do little to foster students' motivation to read and write with a purpose. A more interactive model of instruction is recommended for second language learners.

Students in isolated Arctic communities are also generally limited to travel within the Arctic. Knowledge and experience of the world "down south" comes from television, video rentals, and the non Inuit teachers who travel North to teach. As Nunavut becomes an Inuit governed territory in 1999, there is a strong need for more than traditional knowledge. Students need communication skills and knowledge of the greater world. School and community libraries provide limited resources for most students' research. Libraries simply do not have the financial resources to update and thus materials are restricted, and then often outdated. As educational budgets tighten, this situation will likely become worse.

With a telephone line and a few computers even remote schools may now tap into the Internet. Through the use of a modem and appropriate communications software, students can communicate with other students world wide, thereby obtaining large quantities of current information as well as participating in projects with classrooms around the world. Properly administered, participation in such activities will give students a sense of ownership, a purpose, and an audience for developing reading and writing skills. Future Inuit leaders may be isolated geographically, but given a well designed communication system, these students can have a quality education, thereby providing them with the skills they need to function within Nunavut.

The Cultural Base

Inuit Elders believe education must be community based, because all learning begins with the knowledge of the community. The Elders wish to see Inuit legends, stories, values and beliefs become a part of the daily teachings of Inuit schools. Most of all, the Elders want children to be proud of their identity and language. This is the underlying philosophy of Inuuqatigiit (curriculum from the Inuit perspective) as stated by the former Minister of Education, Culture and Employment, Richard Nerysoo (Nerysoo, 1995). Used effectively, a BBS can help reach these goals.

The BBS can help achieve these goals as constant language interaction and cultural sharing takes place between students within circumpolar communities. The result will be an advancement in education and communication in isolated Arctic communities, as they become members of a global classroom.

The Curriculum Base

In September of 1995 a group of grade nine students began a two part computer course from which they will be able to gain Career and Technology Studies (CTS) credits for entrance to grade ten. Both courses were designed to be product oriented. Students completed a number of assignments which were placed in a portfolio and graded periodically.

Information Processing I ran from September until December, covering keyboarding, word processing, desktop publishing, and spreadsheets. The course consisted of a variety of exercises from sign making to writing newspaper articles complete with mouse drawn graphics to scanned photographs. A number of assignments could also be completed for dual credit with other subject areas.

Information Processing II ran from January until June and introduced students to the BBS software used. Files from the previous semester were mailed electronically along with mail messages to one another and the teacher. By Unit Two, students were able to produce a piece of work, mail it to the teacher, and post it in a public writing folder for all students in the Kitikmeot region to read. By Unit 4, students were able to transfer previously completed assignments such as an elder interview onto a Web page complete with graphics. Web pages were then linked to the main school Web page to be read by all students, shared within the region, and possibly placed on a Web server for the world to see on the Internet. The running of this course provided an opportunity to determine the effectiveness of the Kitikmeot BBS, as well as to explore future possibilities for the system.

Significance of the Study

If remote northern school boards and communities determine that the BBS (or other similar forms of communication) is a highly effective communications and research gathering tool, then they will be encouraged to participate, and contribute to its growth and development. Contribution can initially come in the form of finance to cover hardware, software, access and curriculum development. Contribution can then translate and progress into participation as school and community members not only use the Internet as a source of current information, but also cooperate as authors.

CHAPTER II: SELECTED REVIEW OF THE LITERATURE

There were three main educational research areas for the purpose of this study.

(1) Consideration of the school BBS within applicable learning theory.

(2) Internet Studies in the Schools - use of a BBS.

(3) Data Collection Methods - Protocol analysis; Portfolio assessment; Student logs; Teacher anecdotal record system.

Learning Theory and the School BBS

Transmissional Teaching and the BBS

One can safely state that ten to fifteen years ago, most schools in North America had no computers in their classrooms. Other than purchasing overhead projectors, TVs and VCRs, no single expenditure for equipment in the past 10 years has matched that of computer hardware and software acquisitions. Prior to making a single purchase of thousands of dollars for library books, due consideration is made of their content, purpose and value. Ironically, schools have frequently adopted the computer with little consideration of its use (Greene & Maclean, 1978). Compounding this irony is that fact that many teachers are often unprepared and untrained in computer use, while being pressured into using computers before the computers have been adequately implemented in the schools (Seidman, 1986; Bosch & Cardinale, 1993; Topp, Mortensen, & Grandgenett, 1995).

Much of the early educational software written for computers in schools was of a drill and practice nature. This software could be purchased fairly cheaply, or better yet, programmed using simple BASIC commands by some teachers. Even if more sophisticated software could be purchased, the average desktop computer of the mid-80s was not powerful enough to run it. Thus, within transmissional pedagogy, technology served primarily as a means to make teaching more efficient without affecting the broad aims of education. This efficiency has come about largely due to drill and practice routines performed by a tireless computer (Fisher & Howell, 1994a).

This use of the computer for drill is not necessarily bad per se. In fact it can be argued that students may become engaged in practicing their "times" tables or learning "capitals" of countries in this manner. Of consideration however are other higher order skills such as language and literacy acquisition, which could not be supported by simple software designs. Computers can present a danger to literacy when used as drill and practice machines which accentuate only the trivial aspects of literacy (Dillon, 1985; Office of Technology Assessment, 1995). Cummins (1986) further points out that a transmission model of teaching contravenes central principles of language and literacy acquisition and that a model allowing for "reciprocal interaction" among students and teachers represents a more appropriate alternative. Accessing and evaluating information are equally and perhaps more important in view of the information explosion and the critical social issues that our children's generation will be required to resolve (e.g., issues related to climate change, pollution, alcoholism, etc.) (Cummins, 1988).

In the ten years since these statements were made, progressive research, quality programming, and advanced technology have helped create a whole new purpose for the computer - that of a communication tool. The BBS is the tool which can improve communication between remote Arctic communities. Studies related to implementation and use of the school BBS are however required, especially since setting up a network in remote Arctic communities is a relatively novel concept.

Interactional Teaching and the BBS

Within the interactional pedagogical framework, students actually engage in the phenomena of learning themselves. This is different from traditional pedagogies in which students were expected to learn about phenomena. In the process of interacting, otherwise known as the transformational scenario (Fisher, Wilmore, & Howell, 1994a), knowledge tends to be viewed as internal, subjective, and dynamic. Teaching is viewed as coaching as opposed to telling. Learning tends to be viewed as active social construction as opposed to passive individual reproduction. Interactional teaching makes use of the computer as a tool, "not for providing new paths to old ends, but for supporting profoundly new interaction patterns and activities that simultaneously alter both the means and the ends of classroom thought and action" (p. 123) (Fisher, Wilmore, & Howell, 1994a).

Some educators may feel that computers will tend to isolate students from one another, actually reducing their need for verbal communication. Smith (1984) notes that, in fact, computer use can, and does, encourage joint authorship. Scott & Bell (1985) encourage allowing children to work in

groups of two or three. This, they say, allows the children to talk, write, listen and read, all the activities necessary for language development, while they compose on the computer. In doing so, children naturally discuss, hypothesize, argue and debate, thus producing richer, more thoughtful pieces of writing. The Bullock Reports of 1975 states that the central tenet of an interactive/experimental approach to pedagogy is "talking and writing are means to learning" (p. 2) (Cummins 1988). Fisher, Wilmore and Howell (1994a), discuss this new pedagogy using themes. McComb (1994) sees learning as a dialogue, not a lecture, thus requiring more attention, engagement, and energy from the Teacher/Researcher. Graves (1983) tells us that a student's growth in literacy will improve significantly given two important catalysts: purpose and audience. Cummins (1986) would conclude by saying that when microcomputers are applied within the appropriate pedagogical framework, they have the potential to radically improve the quality of education children receive.

If all these statements are true, then use of electronic mail (i) for informal writing between users, (ii) authoring and electronically posting of student writing and research, (iii) researching information using the World Wide Web and (iv) creating personal Web pages should have positive effects on the learning process. It is intended that students in *Information Processing II* will use these advanced features to author their own culturally relevant stories and legends, which will then be posted on the BBS and turned into Web pages.

While being interactional teachers, we must keep in mind that there are two approaches which can be taken. The first is to include Native culture as content, while the second, more favorable approach is to include Native culture, but through the adaptation of traditional educational practices (Leavitt, 1995). Native children learn by experience, not necessarily by being told how to perform a task (Leavitt, 1995). For example, according to Stairs (1995), teachers may conclude that Native students are not involved in their learning when they reject early attempts at a new skill, or are lost and unable to learn a skill when they fail at preliminary and isolated attempts. Native students may be watching the process (such as importing graphics into a school newspaper) until they feel proficient to do it themselves.

An interesting example of how traditional practices can be included in a computer project of cultural relevance is the Carrier Culture Stack, which was a project carried out in Burns Lake, British Columbia. Native and non-native students were involved in the development of a multimedia presentation of Native history, language and culture (Wilson, 1992). Acting as a facilitator, the teacher helped assign particular tasks to individual students according to their capabilities. Students in the project worked in a real-world environment in which they produced something of value to the school and community. Wilson (1995) also reported that while Native students benefited from being content experts for the project, the non-Native students benefited from gaining a knowledge and an appreciation in Carrier culture. Both groups of students were also taught to deal with the acquiring, organization, and presentation of knowledge, a skill which is becoming increasingly valuable in a global economy.

The success of Carrier Culture Stack and similar projects in native schools comes as a result of the movement from cultural inclusion to cultural base in the conceptualization and implementation of Native education. According to Stairs (1995) this movement rests on the progressive incorporation of schools into the Native cultural context from the language and content to the process aspects. An education with a broad cultural base includes cognitive process, social process as well as ecological context.

In summary, the challenge within the new pedagogy is to provide children from all social and ethnic groups with sufficient and equal access to current and relevant information resources within northern schools, while motivating them to communicate and learn. Accomplishing this task is unique within the North in that methodologies within the new pedagogy must be consistent with the philosophy of Inuuqatigiit. The two complement one another however as Inuit traditionally depend on creative thinking and decision making skills required for existence on the land. Inuit also learn by watching and then doing. Combining traditional skills with information technology could play an important part towards inclusion of Inuit in the global economy as they prepare to govern their own territory in 1999.

Internet Studies in Schools - use of a BBS

Background

No formal studies on the use of the BBS have been conducted within Nunavut. This fact is of no great surprise because although some school boards have been using the technology for a few years, basic experimentation

with the technology is still in progress. This study is therefore the first to formally consider the use of widespread electronic communication of this nature in the Nunavut region. Fortunately, however, many schools in North America have been on line for a few years now. Initial growing pains are being overcome allowing the use of a communications system for its intended purpose. Experience can be drawn from these examples enabling the immediate integration of a communications system into the school and community without completely re-inventing the wheel. Conditions within the Arctic are unique however, so the emphasis is still on the design of a system, and a compatible curriculum which suits northern goals.

In consideration of the location of the Kitikmeot BBS, specific educational issues should be considered. Cummins (1986), noted that Inuit students generally have low academic achievement and struggle with cultural identity issues. The Kitikmeot Board of Education has further recognized the fact that the Inuit aboriginal language is very weak within the region and thus requires reinforcement. In dealing with these issues, Cummins suggests contact with similar language groups across Canada by writing in their aboriginal language. Writing between other groups can also be done in English, to reinforce present skills.

Developing a Model

The search for an electronic communications model which incorporates the goals of education in this region will involve an extensive examination of success stories as well as failures from around the world. Many schools have experimented with similar forms of electronic communication. Unfortunately

the given evaluations are lacking in both depth and focus. In analyzing 45 recent reports on the use of electronic communications systems operating similar to the BBS, Collins (1992) concluded that the majority of reports based their description of benefits on no more than the perception of teachers. Teachers' perceptions in turn were often thought to be relative to increase in enthusiasm on the part of the students, rather than on measurable progress toward specific learning goals. In almost every report, the major recommendation was that more time should be spent developing relevant projects which support the curriculum.

Educators, responding to a survey in Pennsylvania, felt more strongly about the use of computers in general. They indicated that curriculum should drive technology and not the reverse, thereby creating the goal to improve instruction and to simply "put technology in our system." (Benjamin, 1995). As previously noted, students often show an enthusiasm for computer use and this could perhaps translate into enthusiasm for learning given appropriate and engaging software. The point being however, that if this medium captures the attention of students, then software and courseware deserve more design attention.

Fortunately, examples of technology supporting the curriculum within modern pedagogical frameworks are growing, and include project titles such as: Holocaust History; Canadian World Fest; A Project on Canadian Heritage Between Schools Across Canada; Our Global Neighborhood - Telecommunications in the Classroom; The Canadian Geography Game; Kids as Global Scientists; Foreign Language Learning; and MathMagic Internet.

(Owen, Owston & Dickie, 1995). Even more numerous are the problems faced, but usually overcome in a cooperative effort by teachers and students together.

Fisher, Wilmore and Howell (1994b), describe the Knowledge Express Project in which fourth grade students spent approximately one fifth of their school day developing a school newspaper using computers with scanners. Researching, writing and producing the newspaper for the whole school, including parents, required that the students delegate tasks according to desire and skill level. Perhaps the most important lesson learned was that quality counts over quantity.

With the use of computer networks, collaborative projects need not be restricted within the walls of one building. For example, students in Hawaii and Japan were organized into teams and competed with one another in a business simulation (Bailey and Cotlar, 1994). The Global Schoolhouse is a another project that involved school children from all over the United States. Students conducted ground-water pollution studies in their communities and shared the information with one another (Parker, 1994).

Another very promising model for collaborative learning is described by Scardamalia, Bereiter, McLean, Swallow and Woodruff (1989). Computer-Supported Intentional Learning Environments (CSILE) involves cooperative learning (as opposed to cooperative task performance). Students using CSILE or similar networked projects can respond to other students' ideas, requests for information, confusions, self-ratings and so on. Collaboration can take the

form of file sharing (enabling multiple users to work on the same file simultaneously); conferencing (connecting multiple users via text, voice, and/or video in real time); messaging/e-mail (sending and receiving text or multimedia messages to/from other networked users via some type of electronic mailbox system); and scheduling/project management (enabling users to access and share schedules and project timelines)(Dyrli & Kinnaman, 1995). Under such a design, students can even be involved in preparation of class contributions, as opposed to only the teacher giving prior thought to goals for a classroom session. In creating their own Web pages, students include personal and culturally relevant information. Students are thus able to acquire higher-level executive control of learning processes, usually associated with being able to teach what one has learned. Perhaps to do otherwise would result in individuals who become overwhelmed to the point of inaction by the inability to access vast amounts of information required in modern professions (White & Hubbard, 1988).

In summary, the course designed for this study must fulfill a number of requirements in order to satisfy a wide range of goals. First of all, if the BBS is to be used effectively for communication and information gathering, then the learning needs of the students must be considered. Second, in order to become an effective tool in assisting educators, the BBS must have well designed projects, based on proven models. There are many examples of models in the literature, some far better designed than others. The best models all have one theme in common. A cooperative environment exists in which students become stake holders in a project of personal relevance, and thus their own learning.

In the Kitikmeot Region many students have low academic achievement, struggle with cultural identity issues, and are weak in their spoken and written language. The course designed for this study includes projects which will challenge the students to communicate to a purposeful audience and participate in projects within the philosophy of Inuuqatigiit.

Data Collection Method

Data collection was conducted in as unobtrusive a manner as possible. A qualitative analysis followed, combining the four sets of data so as to cover a variety of situations in a natural classroom setting. The forms of measurement involved were:

(1) Protocol analysis;

(2) Portfolio assessment;

(3) Student logs, and;

(4) Teacher anecdotal records.

(1) Protocol Analysis

Verbal reports provide a record of statements made during concurrent "think alouds", and have been used in many types of research over the years (Safrit, Ennis & Nagle, 1988). The perceived deficiency of verbal reports can be addressed by using protocol analysis. Protocol analysis allows an information processing model of the cognitive processes to be used to provide a basis for encoding verbal protocols in an explicit and objective manner (Ericcson & Simon, 1984). When used to interpret verbal data, the model assumes that information is stored in several memories having different capacities and accessing characteristics (Safrit et al. 1988).

According to Ericcson & Simon (1980), when subjects verbalize concurrently they generally do two things: perform the task that is being studied and produce verbalizations. This model of concurrent verbalizing assumes that verbalizations involve up to three different levels. Level one verbalization assumes that the verbalizations involve direct articulation of information stored in language (verbal) code. Level two verbalization assumes articulation or verbal recoding of non-propositional information without additional processing. Level three verbalization assumes articulation after scanning, filtering, interfering or generative processes have modified the information available. When subjects articulate information directly that is already available to them, the model predicts that thinking aloud will not change the course and structure of the cognitive process. However, instructions that require subjects to recode information in order to report it may affect this process.

Ericcson & Simon (1984, p. 83), note that verbal probes reminding subjects to "keep talking" are shown to have little, or no effect on the experimental outcome, other than ensuring constant flow of data. However, a reminder of the type, "what are you thinking about?" is more likely to elicit a self-observation process or produce an other-oriented description as a response.

(2) Portfolio Assessment

Current widespread enthusiasm for assessment via portfolio is a product of particular historical and social circumstances. Alternative forms of assessment exist, such as authentic assessment as reported by Wiggins (1989),

performance assessment by Stiggins & Bridgeford (1985) and dynamic assessment by Cioffi & Carney (1983).

Portfolios serve to capture and capitalize on the best each student has to offer. They represent an ongoing form of instruction, inform instruction, and are multidimensional, including cognitive, affective, and social processes. Portfolios also provide an active, collaborative reflection by both teacher and student. Finally, students are assessed while they are actually involved in literacy learning (Valencia, Au, Scheu, & Kawakami, 1990).

A composite portfolio should consist of several categories of evidence. Koskinen, Valencia, & Place (1994) developed a portfolio assessment which consisted of three categories. First, work is selected by the students which includes periodic self-reflection and evaluation of their progress. Second, common tools are included in all portfolios which represent district learning outcomes. Third, students are encouraged to add other work and notes, important to understanding and documenting the learning processes of the individual student. Gordon (1994) notes that portfolios require students to demonstrate learning that demands thought, reflection, commitment, and risk. In so doing however, students are able to demonstrate learning outcomes not assessed using traditional evaluation techniques.

(3) Student Logs or Journals

Student logs can be analyzed to determine progress (Lamme & Hysmith, 1991). Writing in logs also give students practice in manipulating concepts,

clarifying thinking, exploring ideas and searching for connection (Grumbacher, 1987). Specific problems and noteworthy details may appear in logs which were not otherwise picked up on the particular day.

In order to use student logs effectively however, Staton (1987) suggests some basic considerations. In effectively using this process, the teacher must be willing to take the time to respond to logs before the next class. This process cannot be taken lightly as the mutual responsiveness of a written conversation is quite different than that of replying. Unlike a homework assignment in which questions are replied to, in a student log, persons are responded to. A response involves an implicit commitment of self so as to engage the student. In so doing the student receives feedback and reinforcement while the Teacher/Researcher receives feedback for the study.

(4) Teacher Anecdotal Records

Teacher anecdotal records are an established form of reporting observations and involve descriptions of behavior that the teacher considers typical of the individual described (Borg & Gall, 1989, p. 515). Apparently trivial observations at the time of reporting may shed light later in piecing together a complete picture of the individual or setting. Anecdotal records should be entered in a private teacher's notebook as often as necessary and as immediately after an observed event as possible in order to maintain accuracy.

CHAPTER III: RESEARCH QUESTIONS

Through a selected review of the literature, it is apparent that computers can be used as tools in assisting the process of higher learning. In concluding this study, the Teacher/Researcher used current theory combined with successful models encountered in the research, to design *Information Processing II.* Besides the obvious consequence of educating a group of students, the purpose of this course has been to help answer the given research questions.

(1) Were the students enrolled in *Information Processing II* able to effectively use the Kitikmeot BBS (in its present form), as a communications and research tool?

(2) Based on the findings in (1), what recommendations can be made, so as to maximize the use of the BBS, given its present limitations, but also considering future modifications and opportunities?

CHAPTER IV: METHODOLOGY

The Setting

Data was collected over a five month period in the winter of 1996, with a grade nine computer class at Kugluktuk High School in Kugluktuk. A slight interruption in data collection took place in the beginning of April. Extensive renovations saw the computer room moved to an alternate classroom. This new location was wired to provide telephone access for the server, and had a physical layout very similar to the previous computer room.

The Teacher/Researcher was involved in administering the network, developing a course and analyzing the data. The network was also open to the community who were able to access the server via modem. This provided additional resources and online experts such as the regional biologist who shared a folder with a school science teacher entitled "Ask the Scientist". Feedback to such folders has been quite favorable from the students.

The physical layout of both computer room settings is shown in Figure 1 below.

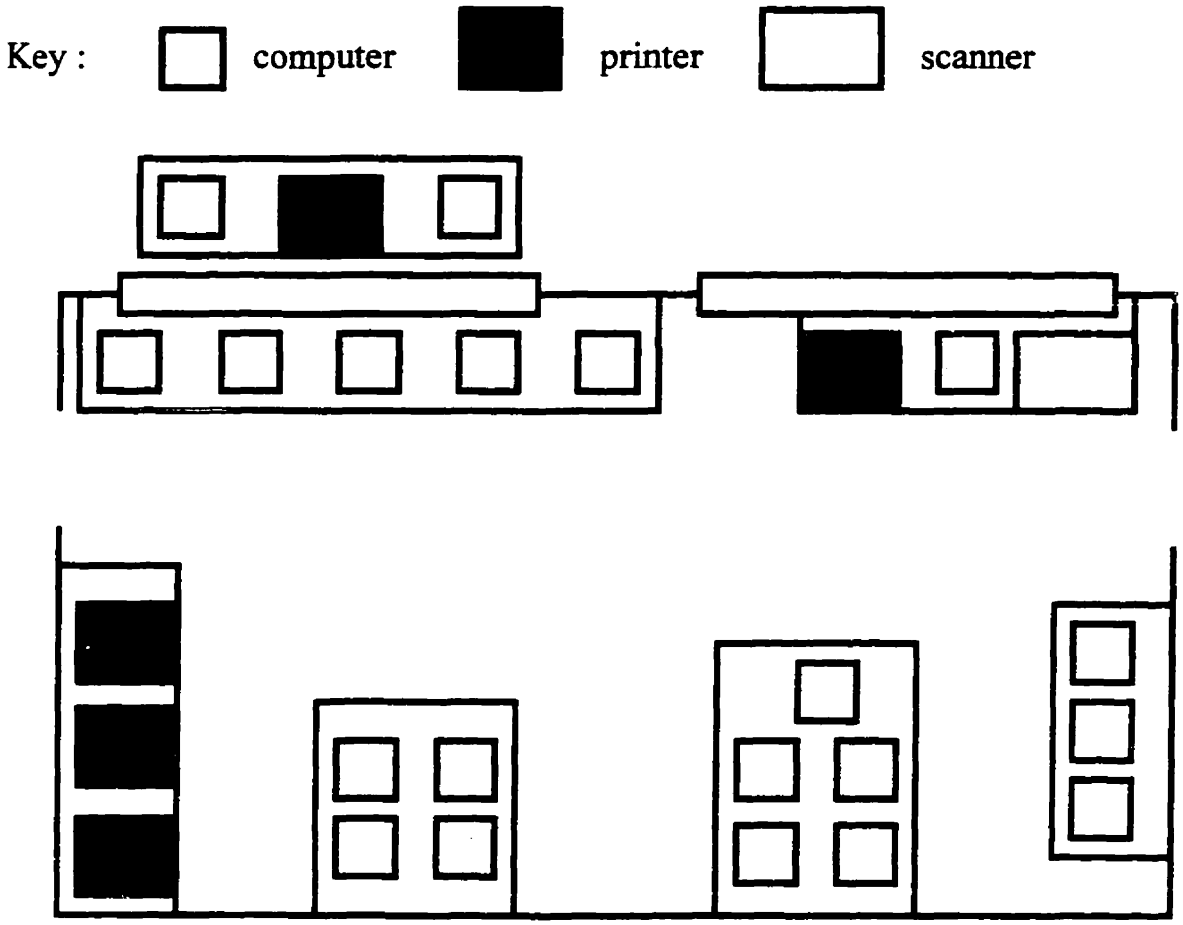

Figure 1. Computer lab schematic.

The Hamlet of Kugluktuk (Figure 2.) is located roughly 550km North of Yellowknife, Northwest Territories. The population is 1100, and predominantly Inuit. There is one Inuit language specialist/instructor in the High School.

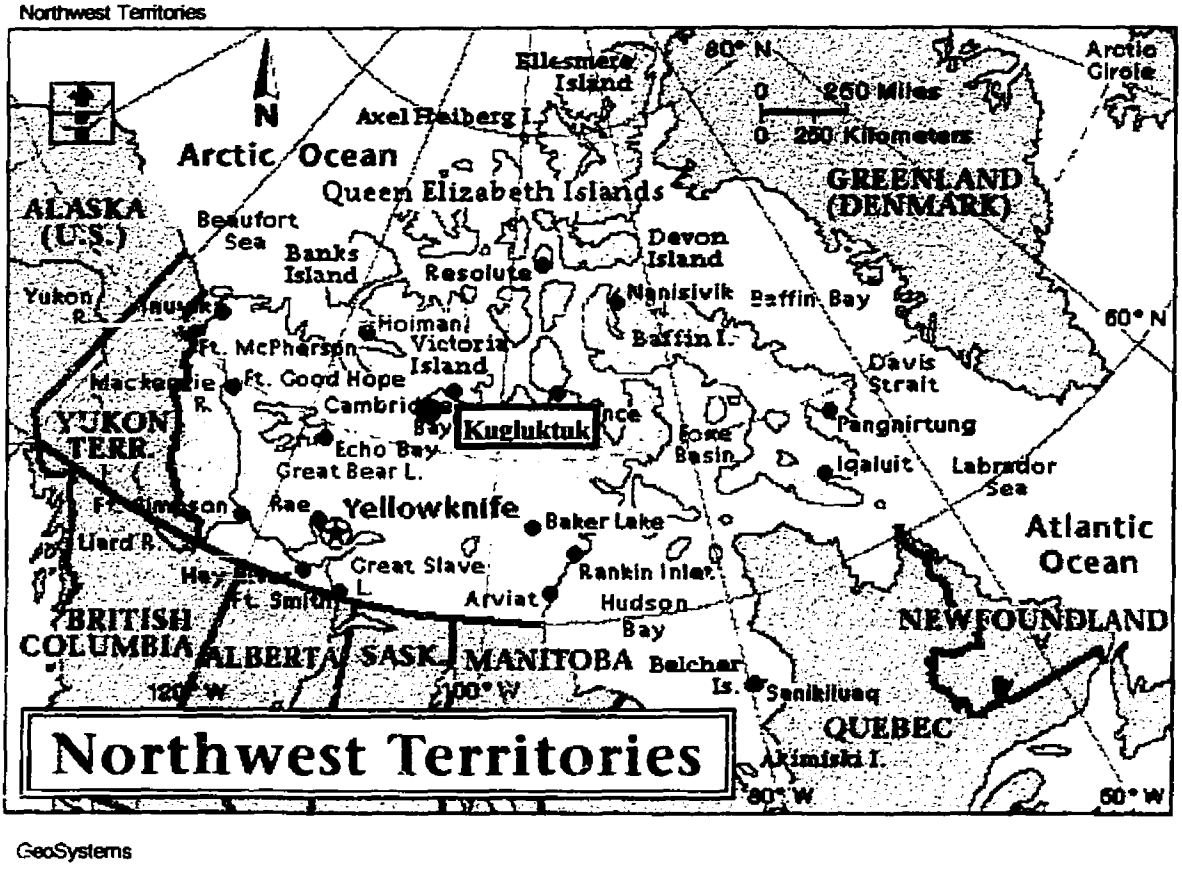

Figure 2. Location of Kugluktuk within the Northwest Territories.

Access to the community is by plane on a dirt runway. The only road leading out of the community ends at the sewage lagoon, about five kilometers away. The nearest community is several hundred kilometers away and is accessible only by plane, snowmobile over the sea ice in the winter, or by boat in the short summer.

The Participants

Information processing I and *II* were mandatory courses taken by sixteen students in a grade nine computer class. In this study six participants were selected. All were between the ages of 14 and 16. Two were male, four female. Two non-Inuit students (male and female) were also selected, one having grown up in Kugluktuk, the other having lived there for three years.

With regards to protocol analysis, Ericsson & Simon (1984) have noted that a large sample is not necessary to obtain valuable information, especially if a reasonable strategy is utilized for the selection of subjects. In selected studies, Safrit et. al (1988) used six undergraduate participants; Nakleh & Krajcik (1993) used 15 grade 11 participants (in treatment groups of five each); and Mann (1995) used 12 inservice teachers as participants (in three treatment groups of four each).

Participants were partly selected based on grades received in *Information Processing I* and cumulative record information, but primarily on attendance and the ability to cooperate. In a study performed by Nakleh & Krajcik (1993) participant selection for protocol analysis was made based on GPA, thus excluding all high and low achieving students. In the Kugluktuk study, GPA range was not as significant a factor as cooperation, considering the age and maturity of the group studied.

The Technology

Within the computer room there were 19 Apple computers; consisting of ten Classics, eight Classic IIs, and one Performa 580CD. Outside the computer room, and visible by a pane of glass installed on the wall facing the library were two computers consisting of an LC575 and a Performa 580CD. All computers were networked using AppleTalk with Farallon PhoneNet connectors. Included in the network were two ImageWriter and three LaserWriter printers. The Performa within the lab had a colour flat bed scanner. Two networked computers were also located in the science lab which was free during the grade nine computer class.

The server, with an 80Mb hard drive running FirstClass software, was located in another room a few feet away. Four phone lines were attached to four separate 14.4 Kbps modems. As the computer room was temporarily located until completion of renovations, only one modem was operating on one phone line. In the future, one phone line will be kept for administrative purposes only. The other three lines will be available for Telecom users in town.

Computer software available on all computers consists of the following:

- At Ease
- ClarisWorks, Version 3.0
- FirstClass, Release 2.6
- HyperCard

Additional software was loaded only as needed. Limited hard drive capacity on the Classic computers was the deciding factor for which software was used at any one time.

Until recently, none of the Macintosh BBS programs were able to communicate with an Internet host. With SoftArc's FirstClass BBS software, and special add-on gateway to the Internet, a Macintosh BBS can have both a clean graphical interface and an e-mail and Usenet news connection (Engst, 1994). Most of these sorts of Internet connections are handled through UUCP gateways, which means the FirstClass BBS calls the Internet host every few hours to transfer e-mail and news. During this study the Kitikmeot server initiated its nightly gateway to Yellowknife, from which data from the Internet was downloaded. The Kitikmeot server then gatewayed between other servers within the Kitikmeot region after midnight, so as to take advantage of cheaper phone rates. The Kugluktuk server was gatewayed to the Kitikmeot server once a day, at about 4:00 p.m.

Figure 3 outlines the Kitikmeot BBS configuration. Some communities have two servers, one in the high school, the other in the elementary school.

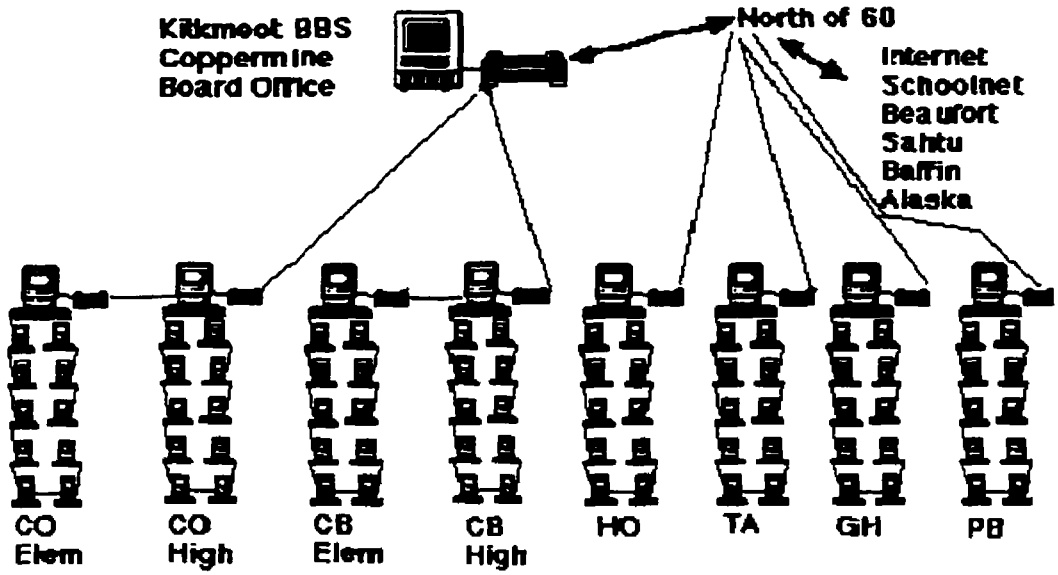

Figure 3. The Kitikmeot BBS configuration.

Figure 3 Legend: CO - Kugluktuk, elementary and high school
CB - Cambridge Bay, elementary and high school
HO - Holman TA - Taloyoak GH - Gjoa Haven
PB - Pelly Bay

Over the period of this study, the phone system in the Kitikmeot region was very poor. Data transfer between communities often took place at 4800 baud (kilobits per second) or lower. In contrast most communication outside the region is restricted more by the speed of the modem used, which can start at 14,400 kps. Unfortunately the main draw back of this situation was that the number of newsgroups had to be curtailed as astronomical phone bills were

being received by the KBE for nightly data transfers. In addition, a narrow bandwidth makes use of Web pages frustrating under the best of circumstances. Developing a local Web server is an alternative. Disks containing HTML files can then be transferred from community to community using surface mail, or occasionally transferred as attachments on e-mail.

In the future, the Performa 580CD in the science lab will be designated as a part time Web server. At that time students (and community members possessing appropriate software) will have access to this Web server, which will then exist in addition to the BBS server.

Course of Study - *Information Processing II*

Information Processing II was divided into seven modules. Module units are as following in Figure 4 below.

Figure 4.

Module 1	**Communications - January to June.**
Unit 1	Internal Communication
Unit 2	Regional Communication
Unit 3	The Internet
Unit 4	Web page reading and authoring - to be shared by disk exchange with other interested schools.
Module 2	**Research - April to June**
Unit 5	Information Search using Discussion Groups
Unit 6	Internet Scavenger Hunt

Unit 7 Project: Research on a relevant topic such as Gophers, WAIS, WWW, Ftp, Telnet, etc., to be completed using a word processor, and then either e-mailed to the Teacher/Researcher or posted to a relevant news group.

Design Rationale

Information Processing II was designed in an attempt to link a problem with a solution. The problem, as noted earlier, is that Inuit students generally have low academic achievement, struggle with cultural identity issues, and are weak in both English and their aboriginal language. In reviewing current literature, we know that reading and writing with a sense of purpose acts to greatly improve one's motivation, understanding and hence ability to succeed in school. We must also be aware of the fact that a northern educational system must take language and culture into consideration. Obviously a computer network does not automatically create the link between the problem and the solution. Joint authorship is certainly facilitated by a computer however. Observation of computer popularity with students also signifies that this medium draws student attention by providing instant feedback to actions. Within this medium students thus have purpose and audience for their creative work. The audience can consist of classmates, or students in another community.

In consideration of the above, a need arose for a course which achieved recognized goals with the assistance of current computer technology. Course design had to allow for informal writing between users, authoring and

electronic posting of student writing and research, the ability to research using the World Wide Web, and the creation of personal Web pages.

Information Processing II was therefore designed to make use of current technology in an attempt to fulfill clearly identified goals of education. Performance by the six students participating in the study could then be analyzed in addressing the research questions.

Design Methodology

Units were developed as the course progressed. The reason for this method of course development was three fold. Developing a course of this nature is extremely time consuming, and the Teacher/Researcher tested every exercise on the network to ensure ease of use. Secondly, one or two students often worked well ahead of the others, and their performance and reactions often assisted in slight changes for clarity. Finally, parts of this system were under constant improvement. Grant money allowed for the purchase of newly developed Web authoring software which eliminated the need to learn HTML. This major breakthrough in Web page construction meant that Unit 4 only required a few pages of instruction. The software also turned out to be quite easy to use, meaning that students only had to work through the introduction of the software manual before they were able to competently develop their own Web pages.

Information Processing II was divided into two modules. The emphasis in Module 1, is communication. Unit 1 introduces students to the BBS and covers basic e-mail use with file sharing. Unit 2 deals with regional

communications. Students soon learn the benefit of the BBS as they are able to communicate with friends and family in other communities. Exercises progress from finding the other servers in the region to writing and sharing a research project with others on the network.

Cyberex 2.4a/b in Unit 2 is quite involved and covers a number of goals. First students must interview an elder on some aspect of traditional life. Interviews are then written up with the inclusion of a picture or graphic. Next, part of the interview is to be translated into Inuinnaqtun. Finally, their research project can be placed in a writing folder accessible to all students within the region. This project is later recycled in Unit 4, with the text and graphics being placed on a Web page. In keeping with theory, Unit 2 exercises allow students to write for a purpose and an audience, while reinforcing their cultural ties and use of language.

Unit 3 introduces students to the Internet with its various protocols. Of most interest in this unit is the use of news or discussion groups in which discussions can take place in anonymity.

Unit 4 is the most exciting unit up to this point. Exercises from previous units can be turned into visually appealing and easily accessible Web pages. Students also have a chance to be creative, especially with Cyberex 4.3e where they may show off their skills with text formatting and graphic creation according to their own design.

Units 5 through 7, yet to be written, take the student further into the use of the Internet as a research tool. For example, with a dedicated line to a Web server, students will be able to research information on any topic using powerful search engines provided with the Web browser.

Assignments and projects were all e-mailed to a fictitious character known as Binary D. Cyberkid. Over time this character was given a humorous persona in order to relate with the students. Binary encouraged individual students, e-mailed assignments, and provided reminders of due dates. On several occasions, Binary was involved in general conversations across the network.

Course Constraints

Unfortunately, delivery of this course was significantly hampered by time constraints. At least 30% of regular class time was lost. This time loss was due to such factors as rotating morning meetings (15%), various activities (7%), weather (4%), and workshops (4%). In addition to this overall loss of time, individual students missed fairly significant portions of class time for a number of reasons ranging from family and community tragedies, to hunting trips on the land. As a result of these time constraints, only the first four Units were developed and participated in by the students. The obvious consequence of this situation was that the research questions could not be investigated as thoroughly as planned.

Data Collection

Permission to begin research was verbally granted from the Kitikmeot Board of Education as well as the school principal. As student voices were to be recorded, a consent form was distributed. A research license was also applied for, and received from the Nunavut Research Institute.

Data was gathered qualitatively using verbal reports, portfolio assessment, student logs, and teacher anecdotes.

(1) Protocol Analysis

In implementing the think aloud process, the student participant was asked to verbalize thoughts generated while using the BBS. Ericsson & Simon's (1980) second and third level of verbalization was stressed. These two levels involve an explanation of thought processes, which include the recordings of information in short-term memory and linking this information throughout the task to future goals. In other words, these levels reflect the interpretive, reasoning, and planning processes. Information gained was used to verify use of problem solving skills, connectivity between events and knowledge in long term memory, as well as in planning future events. This link was critical in determining if projects had been adequately designed to fulfill their intended goals.

Six students were chosen to participate in this section. Two subjects per class participated in verbal reports. The subjects were trained in accordance with suggested strategies as proposed by Ericcson & Simon (1984). Verbal protocols were modeled using a math problem, followed by a logic problem,

and then followed by conducting some basic tasks on the BBS. Students then practiced by performing simple tasks on the BBS while having their think alouds recorded. This training session allowed the teacher to encourage students as well as demonstrate how to use the tape recorders. Students were also told that they would be rewarded for their participation in the project by being able to choose the CD of their choice from a local store, upon completion of the their rotation.

An initial attempt to gather verbal reports within the computer room, and then outside the room met with poor results. The two students involved suggested that they would not be shy to talk aloud if they were in a separate room. Analysis of the tapes also demonstrated that background noise from the other computers and students made hearing the tapes almost impossible. As a result, a line was run from the server, to the science lab which was always vacant during that period. Two computers were placed in the lab, which is where the six students were oriented. The students were quite pleased at being able to talk aloud with only one class mate around.

Another teacher, familiar with the course supervised the two students and was able to answer any questions the students had. In addition, the students were able to use Chat Mode to contact their Teacher/Researcher in the computer lab if any problems arose.

A simple four question protocol guide was posted next to each computer. The four questions were: What are you thinking? What are you doing? What problem are you dealing with? What are you planning? These questions were

also made available during the orientation session and thus students were familiar with their purpose.

Two students at a time entered the science lab to perform their verbal reports. Each student was given an alphanumeric identity code for their observation schedule, as shown in Table 1. Due to uncertainty as to the future of the computer lab during the term, no further reports were planned beyond the end of March, as construction was set to begin on the initial location of the computer lab. In all 18 tapes were recorded, one for each session.

Table 1. **Subject Rotation During Verbal Protocols**

Activity or Project	**Date of Class**	**Subject Rotation**
	March	
	6	S1, S2
	8	S3, S4
Units	11	S1, S2
	12	S3, S4
One	19	S1, S5
and	20	S2, S6
Two	22	S3, S4
	26	S5, S6
	27	S2, S6

Verbal protocols produced were to be sorted into five statement segments as shown below in Table 2.

[3]Table 2. **Protocol Segment Classification**

Segment Classification	**Segment Content**	**Sample**
Procedural	Actions taken to accomplish a task.	"I'll click on this box now."
Observational	What subjects observe as they perform the activity.	"It changes colour."
Interrogation	Category 1 - confusion, consideration of how to proceed. Category 2 - Asking a peer or the teacher for help.	"I don't understand this part, what should I do next?" "Tom, how do you do this?"
Conceptual/ Analytical	Relate phenomenon observed to those stored in long term memory. Category 1 - from Info. Proc. I Category 2 - from Info. Proc. II	"You cut and paste here just like with Claris Works"
Emotional	Outbursts in either a +ve or -ve sense.	"Wow!" or "This is really boring."

[3] Adapted from Nakleh & Krajcik (1993) and Mann (1995).

The first two categories, procedural and observational, were useful in determining what steps were taken, and what concurrent observations were made in completing a task.

There are two categories of Interrogation segments as subjects may have differing approaches. Some students may only use Category 1 segments as they think through a problem, where as others may constantly seek help. Category 2 segments would help identify the number of times a student seeks help.

Conceptual/analytical segments give a sense as to how previous computer knowledge or recall of previous relevant information or experiences in the course, would benefit the subject in their present task analysis. Data in this area would assist in the course design so that units and activities could be further improved.

Finally, emotional statements could demonstrate the extent to which the student was engaged in learning, as well as to identify specific problems with the Unit design.

(2) Student Portfolios

The second form of analysis, and possibly the most valuable in terms of assessing the educational value of the BBS, was the collection of student work as a portfolio. Students were required to develop portfolios in *Information Processing I*, and were therefore familiar and comfortable with the process. Portfolios contained compulsory assignments and projects, but

could also contained additional information of interest. Personalization of portfolios was encouraged and accounted for in grading.

(3) Daily Logs or Journals

Students were required to complete daily activity logs which were contained in a teacher provided note book. Each day the students answered the following four questions which had been typed and placed in their note books: What did you do today, and for how long? What went well? What did not go well? What do you need to do next class? At the end of each class students completed their logs and then placed the logs in their personal folder, where the Teacher/Researcher could respond to them before the next class.

(4) Anecdotal Records

On a continual basis, observations were entered onto a standard teacher anecdotal record sheet. These observations were subsequently dated and stored for cross reference at a later date. Anomalies appearing in data analysis of the verbal protocols may become quite clear when referring to anecdotes. For example, students may be distracted on a particular day due to a family dispute.

Data Analysis

(1) Protocol Analysis

All 18 tapes were transcribed into text. Tape duration, student time spent on each category, and additional events were timed in minutes.

It soon became apparent that the content of the tapes was of little use as verbal reports. Tape lengths decreased rapidly from the first recording. Even given the ideal recording conditions described earlier, students often did not adequately verbalize. As time progressed, the students tended (for various reasons) to also shut off the tape over periods of time. This occurred despite instructions to the contrary. In addition, students found that constant verbalization was very tiring, and some (the weaker students) chose to stop completely at times, even while recording. In earlier discussions with the Secondary Schools Consultant at the Kitikmeot Board of Education, verbal protocols were discussed, and it was noted that Inuit children are not traditionally strong verbal communicators. None-the-less, the exercise still provided some interesting and valuable insights into how the students progressed through the course.

Each graph in Figures 5 through 10, describes the percentage of the tape spent on each activity described. Following the six graphs is a summary graph for all six students. Table 3 describes the activity represented by each bar of the graph.

Table 3. **Description of Activities Represented by each Graph**

Activity	Description of Activities
chat	FirstClass software enables synchronous chat which allows all users logged on, the ability to communicate with one or more users using a dialogue box. Chat mode is restricted to users of the Kugluktuk BBS which includes all school computers wired into the BBS as well as one possible outside caller from the community.
mailbox	Each user has a mailbox in which they receive correspondence from other users with accounts on the Kugluktuk BBS, as well as all other systems world wide connected to the Internet. Mail can therefore be read and responded to. Files such as graphics and stories written using a word processor can be attached to a message.
news	There are several news groups on the BBS covering a variety of interests from Homework to Music and Sports. Users can read submissions from other users or respond to the news group or in person to the original author.
Cyberex online	Cyberexs are the exercises students completed as part of the course. Online Cyberexs required the student to be logged onto their account to perform functions such as specific searches.
Cyberex offline	Offline Cyberexs required the student to complete an exercise using one of the applications bundled with ClarisWorks, which generally included the wordprocessor, draw, paint, or spreadsheets.
other soft(ware)	During taping, students may have explored other software on the computer's hard drive, such as math programs, or CDs available for the CD ROM.
lessons	This category represents the amount of time spent reading the lessons required to complete the Cyberexs during taping.
verbal	This category represents the amount of time spent talking to the other students in the lab, the supervising teacher, or visitors.

Table 4. **Academic Profile for Student S1**

Student: S1	**Date of Birth:** 30/08/82		**Ethnic Origin:** Non-Inuit **Schooling:** Last 3 years in Kitikmeot Region.	
Subject	**Grade level completed 1994 - '95 school year**	**Subject mark 1994 - '95**	**Grade level as of February 1996 reporting period**	**Subject mark Feb. 1996**
Computers	7	91	9	
English	7	93	8	80
Food Science	7			
Health	7	94		
Home Ec.	7			
Industrial Arts	7	91		
Info. Proc.	7		9	89
Info. Proc. II	9		9	97 (June '96)
Math	7	95	9	90
P. Ed.	7	72	9	65
Science	7	98	9	88
Social Studies	7	97	8	82

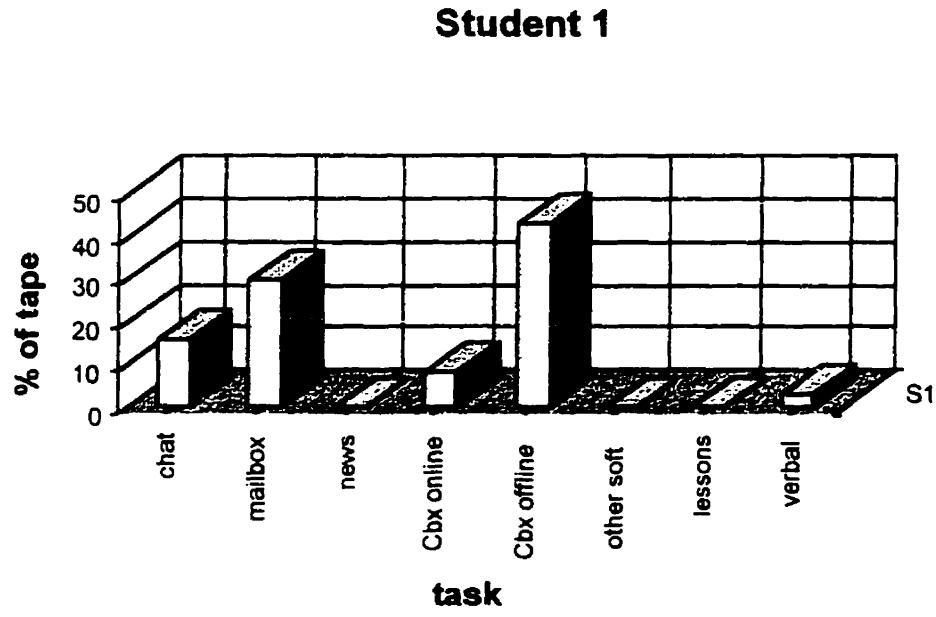

Figure 5. Percentage of tape spent on each activity.

Table 5. **Final Course Evaluation for J4 Information Processing**

NAME: S1

1)	Mark for Sept. >> Dec. Portfolio and Work.			19 /20
2)	Cyberex mark based on percentage of completed exercises.			10 /10
3)	Demonstrate Web pages to Neil.	Cyberex 4.3b	2 /2	
		Cyberex 4.3c	1 /1	
		Cyberex 4.3d	1 /1	
		Cyberex 4.3e	2 /2	
		Cyberex 4.3f	2 /2	8 /8
4)	Journal			4.5 /5

5)	**Portfolio 1: Sept. >> Dec.**			
	Desktop Publishing	cover page	2 /2	
		3 column article	2 /2	
		graphic + text	2 /2	
		sign	2 /2	
		science lab	2 /2	
		pH diagram	2 /2	
		lesson 17	2 /2	
		volcano + story	2 /2	
	Spreadsheets	# of customers	2 /2	
		Arctic Communities	2 /2	
		Brenda's subjects	2 /2	22 /22

6)	**Portfolio 2: Jan. >> June**		
	cover page	3 /3	
	resume	1 /1	
	Cyberex 1.9 (BBS wiring)	3 /3	
	Cyberex 2.3 (autobiography)	8 /8	
	Cyberex 2.4a/b (elder interview)	8 /10	
	Cyberex 3.3a/b (forward message)	2 /2	
	Cyberex 4.3c (autobiography on Web page)	2 /2	
	Cyberex 4.3d (elder interview on Web page)	2 /2	
	Cyberex 4.3e (personal Web page)	2 /2	
	Cyberex 4.3f (main Web page)	2 /2	33 /35
	TOTAL	**97 /100**	

As shown by the graph, S1 spent the greatest percentage of S1's time offline working on Cyberexs. Tape transcripts confirmed that much of this time was spent efficiently working and otherwise reading mail and attaching Cyberexs for the Teacher/Researcher.

(2) Student Portfolios

S1 created the most impressive portfolio of the group. Although S1's first portfolio (*Information Processing I*) received a perfect mark for contents, its general aesthetics paled in comparison with Portfolio 2. S1's Portfolio 2 demonstrated a wide use of software and hardware. All submissions were creatively laid out making good use of space and colour. S1 was advised to use this portfolio in summer job interviews. Portfolio 2 received a mark of 94%.

(3) Daily Logs or Journals

Journal correspondence was insightful for the Teacher/Researcher since S1 made suggestions as to how some aspects of the course could be improved upon. Even though highly motivated, S1 commented that the course seemed to have its "ups and downs", especially during Unit 3 as the Cyberexs were tiring for the students.

(4) Anecdotal Records

S1 has worked consistently hard throughout the course, often assisting the Teacher/Researcher as well as other students in overcoming technological obstacles. S1 had little trouble with Unit 4 and put in extra hours after school in order to complete it on time. A number of bugs were discovered in the

software used (PageMill) to produce the Web pages, and S1 devised some unique methods for overcoming the program's short falls. On several occasions, S1 was observed helping other students with their Cyberexs and portfolio organization.

S1 participated in an Information Processing CTS class prior to Christmas, in which S1 created a HyperCard book. Otherwise S1's computer experience has been fairly limited. S1's family had a 386, 33 MHz, PC at home, but S1 did not use this computer much.

Table 6. **Academic Profile for Student S2**

Student: S2	**Date of Birth:** 11/01/81		**Ethnic Origin:** Inuit **Schooling:** All in Kitikmeot Region	
Subject	**Grade level completed 1994 - '95 school year**	**Subject mark 1994 - '95**	**Grade level as of February 1996 reporting period**	**Subject mark Feb. 1996**
Computers				
English	8	A	9	55
Food Science			9	86
Health	8	A+		
Home Ec.	8	A		
Industrial Arts	8	A		
Info. Proc. II			9	68 (June '96)
Math	7	A	9	39
P. Ed.	8	A	9	90
Science	8	A	9	76
Social Studies	8	A+	9	70

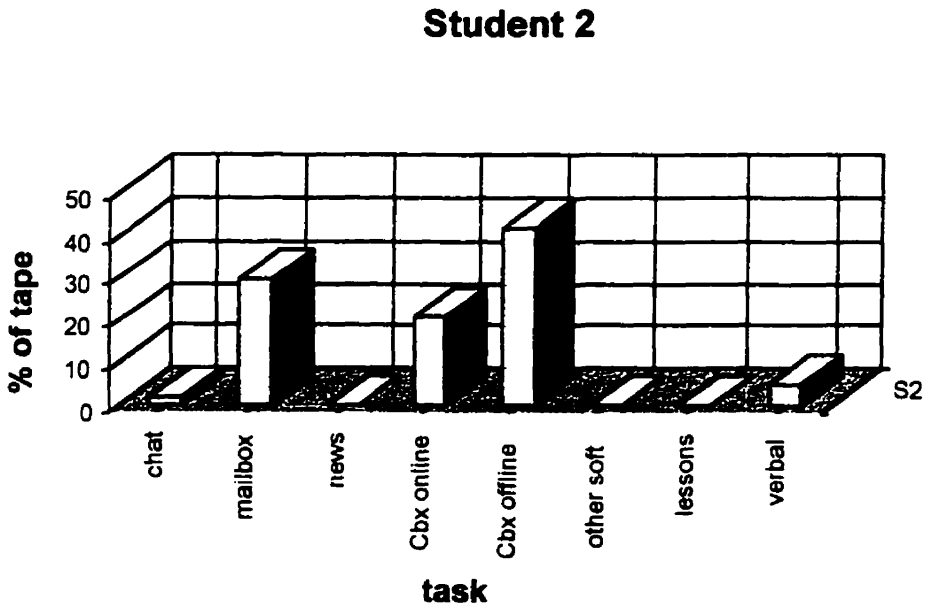

Figure 6. Percentage of tape spent on each activity.

Table 7. **Final Course Evaluation for J4 Information Processing**

NAME: S2

1)	Mark for Sept. >> Dec. Portfolio and Work.			16.8 /20
2)	Cyberex mark based on percentage of completed exercises.			7.5 /10
3)	Demonstrate Web pages to Neil.	Cyberex 4.3b	2 /2	
		Cyberex 4.3c	1 /1	
		Cyberex 4.3d	1 /1	
		Cyberex 4.3e	1 /2	
		Cyberex 4.3f	0 /2	5 /8
4)	Journal			4.25 /5

5)	**Portfolio 1: Sept. >> Dec.**			
	Desktop Publishing	cover page	2 /2	
		lesson 17	1.5 /2	
		sign	2 /2	
		science lab	2 /2	
		house	2 /2	
		3 column + graphic	2 /2	
		logo	2 /2	
		volcano + story	2 /2	
	Spreadsheets	# of communities	2 /2	
		subjects	2 /2	
		wish list	2 /2	21.5 /22

6)	**Portfolio 2: Jan. >> June**		
	cover page	2.5 /3	
	resume	0 /1	
	Cyberex 1.9 (BBS wiring)	0 /3	
	Cyberex 2.3 (autobiography)	8 /8	
	Cyberex 2.4a/b (elder Interview)	0 /10	
	Cyberex 3.3a/b (forward message)	0 /2	
	Cyberex 4.3c (autobiography on Web page)	2 /2	
	Cyberex 4.3d (elder interview on Web page)	0 /2	
	Cyberex 4.3e (personal Web page)	0 /2	
	Cyberex 4.3f (main Web page)	2 /2	12.5 /35

TOTAL **68 /100**

(2) Student Portfolios

Exercises submitted in Portfolio 2 were well done, but several exercises were either not completed or not submitted. Portfolio 2 received a mark of 36%.

(3) Daily Logs or Journals

S2 completed entries on a fairly consistent basis, but often left the journal until the last possible moment in the period. As a result, entries were somewhat rushed and lacked significant detail.

(4) Anecdotal Records

S2 has been a fairly consistent worker throughout the course. Quite often S2 would spend time on aesthetics as opposed to Cyberex content. For example, several classes were used in scanning and modifying graphics for a cover page.

S2 particularly enjoyed creating a Web page, but again was more concerned with creating a perfect layout than completing the appropriate exercises.

S2 was often reminded by the Teacher/Researcher of due dates, matters of lesson procedure and computer room rules. Discussions were often forgotten by the next class. This could of course have been attributed to a very unsettling home life as family problems erupted just prior to the Christmas period, and were still continuing. Only a few days of school were missed, but S2 was certainly not consistently focused. Despite all this, S2 still managed to

complete much of the required course work and will certainly have no trouble continuing with similar work in the future.

Table 8. **Academic Profile for Student S3**

Student: S3	**Date of Birth:** 30/6/82		**Ethnic Origin:** Inuit **Schooling:** All in Kitikmeot Region	
Subject	**Grade level completed 1994 - '95 school year**	**Subject mark 1994 - '95**	**Grade level as of February 1996 reporting period**	**Subject mark Feb. 1996**
Art	7	81		
Computers	7	81		
English	7	71	8	43
Food Science				
Health	7	72		
Industrial Arts	7	75		
Info.Proc.				
Info. Proc. II			9	41 (June '96)
Math	7	89	9	95
P. Ed.	7	78	9	90
Science	7	89	9	51
Social Studies	7	75	8	72

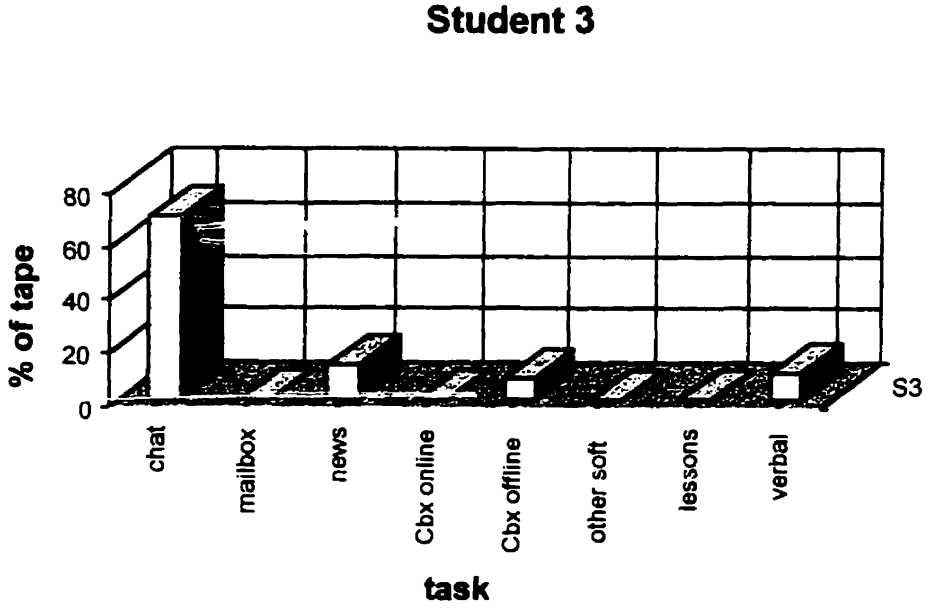

Figure 7. Percentage of tape spent on each activity.

Table 9. **Final Course Evaluation for J4 Information Processing**

NAME: S3

1)	Mark for Sept. >> Dec. Portfolio and Work.			10.6 /20
2)	Cyberex mark based on percentage of completed exercises.			4 /10
3)	Demonstrate Web pages to Neil.	Cyberex 4.3b	0 /2	
		Cyberex 4.3c	0 /1	
		Cyberex 4.3d	0 /1	
		Cyberex 4.3e	0 /2	
		Cyberex 4.3f	0 /2	0 /8
4)	Journal			3 /5

5) **Portfolio 1: Sept. >> Dec.**

Desktop Publishing	cover page	1.5 /2	
	poem	2 /2	
	3 column article	2 /2	
	formatting	1.5 /2	
	sign	2 /2	
	science lab	2 /2	
	special functions	2 /2	
	house	2 /2	
Spreadsheets	Arctic communities	2 /2	
	_____	0 /2	
	_____	0 /2	17 /22

6) **Portfolio 2: Jan. >> June**

cover page	2 /3
resume	1 /1
Cyberex 1.9 (BBS wiring)	3 /3
Cyberex 2.3 (autobiography)	0 /8
Cyberex 2.4a/b (elder Interview)	0 /10
Cyberex 3.3a/b (forward message)	2 /2
Cyberex 4.3c (autobiography on Web page)	2 /2
Cyberex 4.3d (elder interview on Web page)	0 /2
Cyberex 4.3e (personal Web page)	0 /2
Cyberex 4.3f (main Web page)	0 /2 10 /35

TOTAL **45 /100**

(2) Student Portfolios

The 5 exercises submitted were well done, but represented the easiest exercises. Portfolio 2 received a mark of 29%.

(3) Daily Logs or Journals

S3 did not enjoy making daily submissions. Writing was sloppy and sentences often faded into a scrawl. In part, this may have been due to S3's frustration at not progressing through the exercises. Despite constant verbal and written encouragement, S3 continued to vary little in the content of each submission. Typical entries were as follow.

Describe briefly what you did today. Used chat, read news, checked work.
What went well? Nothing much, too tired to think.
What did not go so well? Just about everything.
What needs to be done next class? Work! My Cyberexs.

S3 spent a large proportion of time on the chat mode, corresponding with other students in the class, especially S3's significant other. Messages were otherwise short, requiring little typing, and were often of a similar nature, such as, "What's up?", and "What ever."

S3 missed some class time as S3 is involved in Youth meetings out of town. Time was also missed either side by preparing and then resting from the trips. One hunting trip on the land also took three class periods, all of which has resulted in a significant amount of missed school time.

S3 is very weak in English, and advanced in all other subjects by two grade levels, while advancing by one grade level in English. Journal entries were sketchy and S3 certainly did not enjoy, nor put very much time and thought into this task. Exercises which involve many instructions seem to stall S3.

Table 10. **Academic Profile for Student S4**

Student: S4	**Date of Birth:** 12/5/80		**Ethnic Origin:** Non-Inuit **Schooling:** All in Kitikmeot Region	
Subject	**Grade level completed 1994 - '95 school year**	**Subject mark 1994 - '95**	**Grade level as of February 1996 reporting period**	**Subject mark Feb. 1996**
Computers				
English	8	B	9	61
Food Science				
Health	8	B		
Industrial Arts	8	B		
Info.Proc.			9	81
Info. Proc. II			9	65 (June '96)
Math	8	A	9	74
P. Ed.	8	B	9	90
Science	8	A	9	69
Social Studies	8	B	9	70

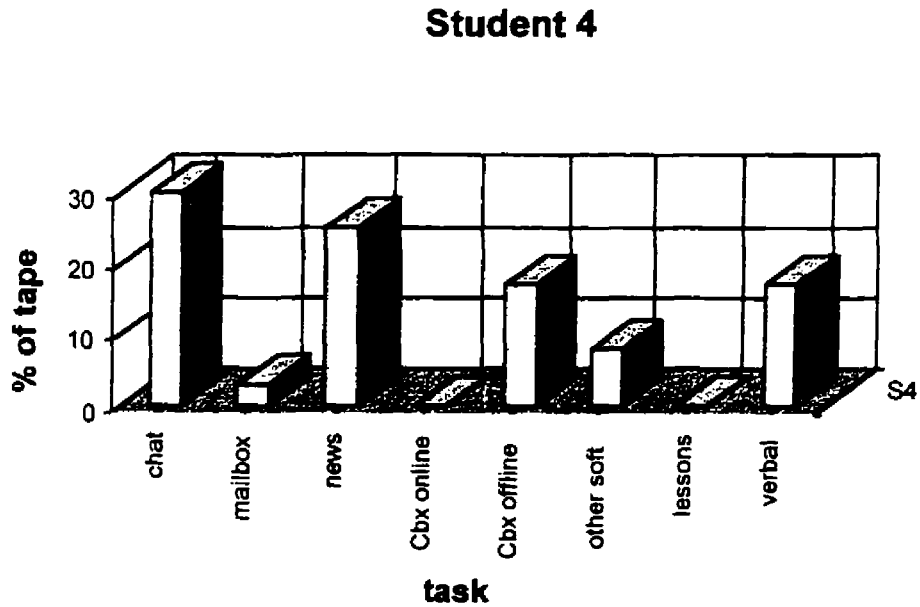

Figure 8. Percentage of tape spent on each activity.

Table 11. **Final Course Evaluation for J4 Information Processing**

NAME: S4

1)	Mark for Sept. >> Dec. Portfolio and Work.			11.6 /20
2)	Cyberex mark based on percentage of completed exercises.			9 /10
3)	Demonstrate Web pages to Neil.	Cyberex 4.3b	2 /2	
		Cyberex 4.3c	1 /1	
		Cyberex 4.3d	0 /1	
		Cyberex 4.3e	2 /2	
		Cyberex 4.3f	2 /2	7 /8
4)	Journal			4 /5

5)	**Portfolio 1: Sept. >> Dec.**			
	Desktop Publishing	cover page	1.5 /2	
		story	2 /2	
		poem	2 /2	
		3 column article	2 /2	
		formatting	2 /2	
		sign	2 /2	
		science lab	2 /2	
		special functions	2 /2	
	Spreadsheets	wish list	2 /2	
		_____	0 /2	
		_____	0 /2	17.5 /22

6)	**Portfolio 2: Jan. >> June**		
	cover page	0 /3	
	resume	0 /1	
	Cyberex 1.9 (BBS wiring)	3 /3	
	Cyberex 2.3 (autobiography)	7 /8	
	Cyberex 2.4a/b (elder Interview)	0 /10	
	Cyberex 3.3a/b (forward message)	0 /2	
	Cyberex 4.3c (autobiography on Web page)	2 /2	
	Cyberex 4.3d (elder interview on Web page)	0 /2	
	Cyberex 4.3e (personal Web page)	2 /2	
	Cyberex 4.3f (main Web page)	2 /2	16 /35
		TOTAL	**65 /100**

(2) Student Portfolios

S4 could have had a high mark on the portfolio, but was not overly motivated by marks. Unfortunately some exercises which could have counted in the portfolio were either not completed, misplaced, or deleted. Portfolio 2 received a mark of 46%.

(3) Daily Logs or Journals

S4 had fairly consistent but short journal entries. The occasional specific question by the Teacher/Researcher after an entry was often ignored.

(4) Anecdotal Records

All year, S4 has been motivated first by interest, then by marks. A low grade on the February '96 report card did not reflect S4's ability properly. S4 would do well on exercises which were of interest to S4, and otherwise would ignore submitting exercises. At times S4 could be completely absent minded and appeared to show a lack of interest in school so as to fit in with S4's peer group.

S4 has an innate ability with computers and software, and had the most experience of the study group upon entering the course. S4's parents both use computers at home as well as at work. S4 also subscribes to computer game magazines and regularly purchases up-to-date software.

S4 participated in an Information Processing class in which S4 created HyperCard stacks of music selections in the form of a book. Much of this

project was completed at home with S4's music collection and home computer.

Table 12. **Academic Profile for Student S5**

Student: S5	**Date of Birth:** 6/3/96		**Ethnic Origin:** Inuit **Schooling:** North, except for Gr. 8 in Saskatchewan	
Subject	**Grade level completed 1994 - '95 school year**	**Subject mark 1994 - '95**	**Grade level as of February 1996 reporting period**	**Subject mark Feb. 1996**
Computers	Anecdotal report card showing			
English	regular program in all areas		9	52
Food Science	except for a modified program		9	82
Health	in mathematics and science.			
Home Ec.	Recommended advance to			
Industrial Arts	grade 9 from past school in			
Info.Proc.	Saskatoon.			
Info. Proc. II			9	36 (June '96)
Math			9	29
P. Ed.			9	60
Science			9	34
Social Studies			9	54

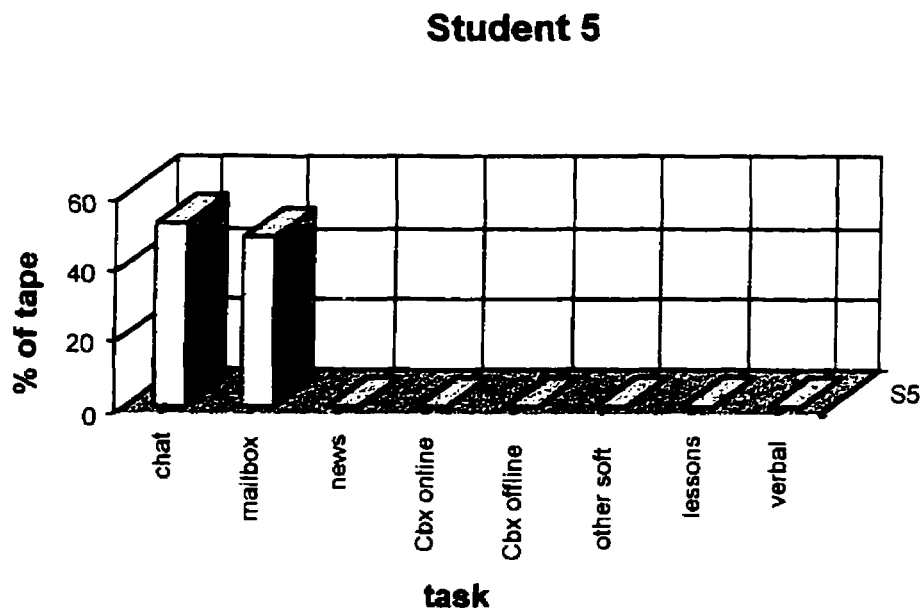

Figure 9. Percentage of tape spent on each activity.

Table 13. **Final Course Evaluation for J4 Information Processing**

NAME: S5

1)	Mark for Sept. >> Dec. Portfolio and Work.			7.6 /20
2)	Cyberex mark based on percentage of completed exercises.			3 /10
3)	Demonstrate Web pages to Neil.	Cyberex 4.3b	0 /2	
		Cyberex 4.3c	0 /1	
		Cyberex 4.3d	0 /1	
		Cyberex 4.3e	0 /2	
		Cyberex 4.3f	0 /2	0 /8
4)	Journal			2 /5

5)	**Portfolio 1: Sept. >> Dec.**			
	Desktop Publishing	cover page	1.5 /2	
		story	2 /2	
		poem	2 /2	
		3 column article	1 /2	
		formatting	2 /2	
		sign	2 /2	
		science lab	1.5 /2	
		special functions	2 /2	
	Spreadsheets	Arctic communities	2 /2	
		_____	0 /2	
		_____	0 /2	16 /22

6)	**Portfolio 2: Jan. >> June**		
	cover page	0 /3	
	resume	0 /1	
	Cyberex 1.9 (BBS wiring)	0 /3	
	Cyberex 2.3 (autobiography)	7 /8	
	Cyberex 2.4a/b (elder Interview)	0 /10	
	Cyberex 3.3a/b (forward message)	0 /2	
	Cyberex 4.3c (autobiography on Web page)	0 /2	
	Cyberex 4.3d (elder interview on Web page)	0 /2	
	Cyberex 4.3e (personal Web page)	0 /2	
	Cyberex 4.3f (main Web page)	0 /2	7 /35

TOTAL **36 /100**

(2) Student Portfolios

S5 only submitted one exercise to the portfolio. Fortunately this exercise was worth 20%, which is what S5 received on the portfolio.

(3) Daily Logs or Journals

S5 rarely completed any journal entries. Those entered were sketchy and uninformative. Even if S5 was having trouble, responses suggested otherwise.

(4) Anecdotal Records

S5 had a tumultuous year with constant family problems which only became more severe as the year progressed. S5 missed a significant amount of school time for a variety of reasons, and would arrive back having missed significant quantities of work in all subject areas. As a result, S5 spent most of the computer course chatting with others using chat mode, as well as reading and responding to mail messages from other communities.

The Teacher/Researcher would often attempt to help S5, but S5 was simply coping from day to day and found the process of reading lessons and then completing Cyberexs to be far too demanding. S5 would sometimes become short tempered, only to apologize later via a BBS message to the Teacher/Researcher.

In discussions with S5's Mother, it was apparent that S5 had resigned to the fact that the year was a failure by February's reporting period, which of course resulted in reduced interest in completing any work.

Table 14. **Academic Profile for Student S6**

Student: S6	**Date of Birth: 18/5/85**		**Ethnic Origin:** Inuit **Schooling:** all in Kitikmeot Region	
Subject	**Grade level completed 1994 - '95 school year**	**Subject mark 1994 - '95**	**Grade level as of February 1996 reporting period**	**Subject mark Feb. 1996**
Computers	9	55		
English	8	57	9	55
Food Science				
Health	9	58		
Home Ec.	9	62		
Industrial Arts				
Info.Proc.				
Info. Proc. II			9	67 (June '96)
Math	8	54	9	71
P. Ed.	9	78	9	60
Science	9	41	9	42
Social Studies	9	48	9	72

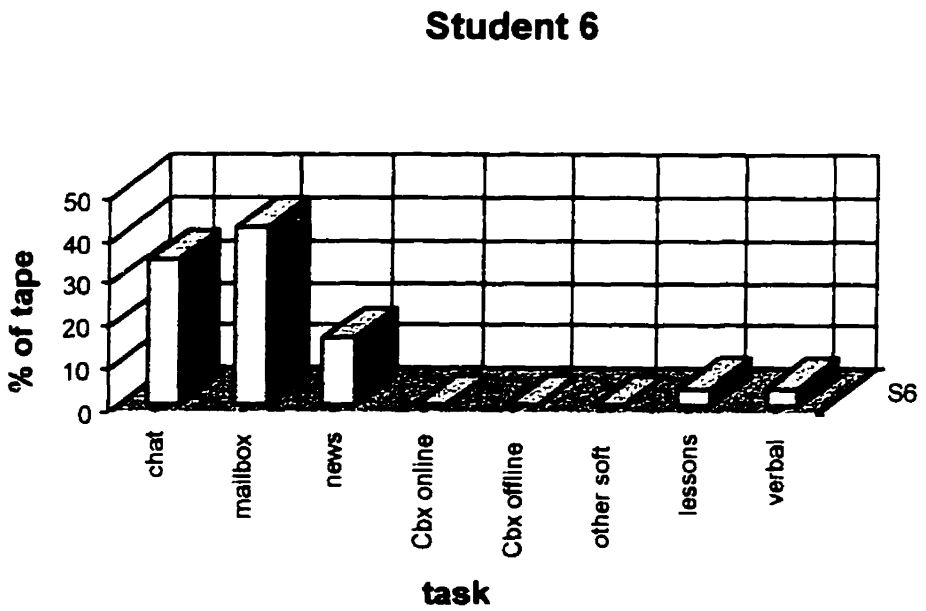

Figure 10. Percentage of tape spent on each activity

Table 15. **Final Course Evaluation for J4 Information Processing**

NAME: S6

1)	Mark for Sept. >> Dec. Portfolio and Work.			16 /20
2)	Cyberex mark based on percentage of completed exercises.			4.5 /10
3)	Demonstrate Web pages to Neil.	Cyberex 4.3b	2 /2	
		Cyberex 4.3c	0 /1	
		Cyberex 4.3d	0 /1	
		Cyberex 4.3e	0 /2	
		Cyberex 4.3f	0 /2	2 /8
4)	Journal			3 /5

5)	**Portfolio 1: Sept. >> Dec.**			
	Desktop Publishing	cover page	2 /2	
		volcano + story	2 /2	
		3 column story	2 /2	
		family profile	2 /2	
		sign	2 /2	
		science lab	2 /2	
		pH diagram	2 /2	
		_____	0 /2	
	Spreadsheets	# of customers	2 /2	
		Arctic communities	2 /2	
		graph	2 /2	20 /22

6)	**Portfolio 2: Jan. >> June**		
	cover page	1 /3	
	resume	1 /1	
	Cyberex 1.9 (BBS wiring)	3 /3	
	Cyberex 2.3 (autobiography)	8 /8	
	Cyberex 2.4a/b (elder Interview)	8 /10	
	Cyberex 3.3a/b (forward message)	0 /2	
	Cyberex 4.3c (autobiography on Web page)	0 /2	
	Cyberex 4.3d (elder interview on Web page)	0 /2	
	Cyberex 4.3e (personal Web page)	0 /2	
	Cyberex 4.3f (main Web page)	0 /2	21 /35

TOTAL **67 /100**

S6 began the recording period completing more tape that any other student. The taping session included reading lessons prior to completing sequential Cyberexs. Within one session, tape time dropped significantly, though, as S6 became quite tired of verbally reporting and even legitimately forgot to "think aloud" for a twenty minute period by the third session.

An encouraging note this year is that S6 stopped at least three times to organize S6's portfolio and determine which Cyberexs required completion prior to continuing. This activity in itself was a considerable improvement from last academic year.

(2) Student Portfolios

S6 began working quite hard at the very end of the course. With some help from S1, S6 was able to organize a portfolio at the last moment. Although only 5 of the ten exercises were completed, two were worth over 50% of the overall mark. Portfolio 2 received a mark of 60%

(3) Daily Logs or Journals

As S6 was away for part of the term, missed journal entries were not considered in the mark. Entries were sometimes missed, but those completed were insightful and showed S6 was planning ahead. As S6 had good and poor days, advance planning was not always followed up on right away, but would eventually be considered. S6 occasionaly participated in a written conversation through the journal. These conversations with the Teacher/Researcher were usually not related to course material, but to others students S6 was trying to counsel as a friend.

(4) Anecdotal Records

S6 repeated grade nine, having failed a number of subjects in the last year. This year S6's life has been more stable as S6's parents are running a hostel for students from Holman, in which S6 is a resident. Last year, S6 had experienced a number of problems in S6's home boarding situation and lacked parental guidance and support.

The second part of the grade nine computer course (Information Processing II) is different from last school year, so S6 did not have an advantage over other students. This year, S6 worked significantly harder though, despite missing several weeks due to sporting obligations.

Summary Data

Table 16. **Activity Range as a Percentage of Tape Length**

Activity	Minimum Time (min)	Maximum Time (min)	Average Time (min)
chat	2	69	35.5
mailbox	1	48	24.5
news	0	25	12.5
Cbx online	0	21	10.5
Cbx offline	0	43	21.5
other soft	0	17	8.5
lessons	0	4	2
verbal	0	17	8.5

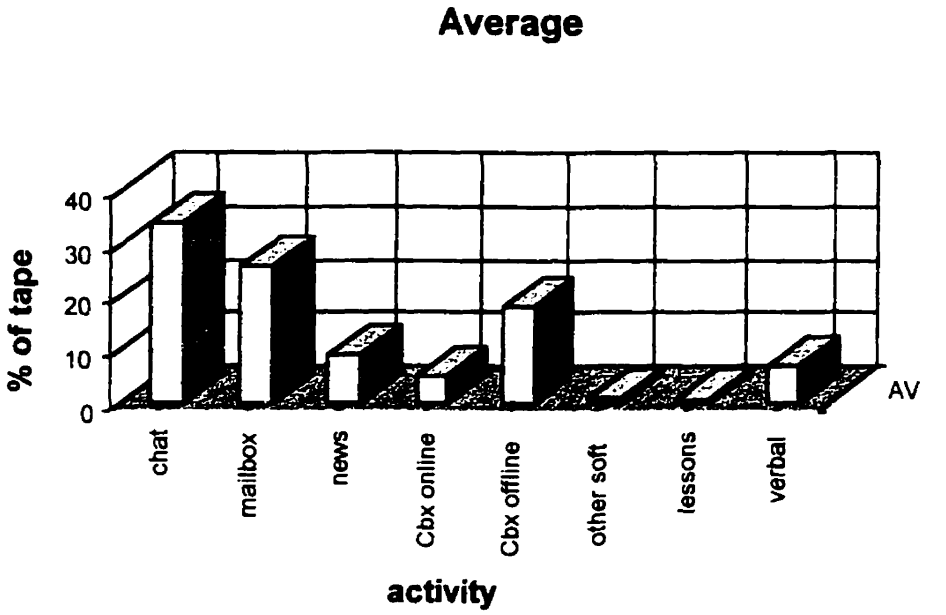

Figure 11. Average percentage of tape spent on each activity.

Summary data in Table 16 shows a wide range in the use of both chat mode and e-mail posted to individual mailboxes. Overall, students were obviously thrilled at the novelty of being able to communicate with their peers both synchronously (using chat mode) as well asynchronously (posted e-mail) within the school and with other communities. Quite often little work would be completed on Cyberexs as students were catching up on the volumes of mail in their mail boxes. Synchronous chats were often of a frivolous nature, but provided the students with a public forum in which they had to type coherent messages.

The academically weaker students in the group were observed to ignore or simply delete messages which they did not immediately understand, or which were of any great length, unless they were from a friend who was supplying some new gossip. S1, S2, and S4 (the most academically strong students) read most, if not all, messages from the Teacher/Researcher regarding procedure, completion dates, etc. Each of these students also spent a significantly higher portion of their time completing Cyberexs, or participating in activities which gave them a better understanding of the BBS, as well as available software and hardware.

Communication via the BBS was shared by most students in the school who populated the computer room before school, during recess, lunch, and after school, with the common goal of logging onto the BBS to check their mailboxes and use the chat mode. Teachers often used the BBS as a reward system for students who would be allowed special permission to enter the computer room and log on.

(1) Were students enrolled in Information Processing II able to effectively use the Kitikmeot BBS (in its present form), as a communications and research tool?

The Kitikmeot BBS has become a very popular communication tool not only with the subjects of this study, but with all students within the school. In considering the first part of this question, S5 demonstrates a clear case for the effectiveness of the BBS in drawing students into communicating with one another through written words.

Subject S5, the weakest overall student participating in the study, was observed to correspond with friends and relatives within Kugluktuk and other communities daily, and could be found logged onto the BBS during recess and after school. In fact, as teacher anecdotal records and posted messages in newsgroups demonstrated, corresponding became the only activity S5 spent any significant amount of time on. Even though S5 failed both parts of the course, the one positive note is that the BBS seemed to provide S5 with a window to connect with other students, both within the community and in other communities. This written communication was some comfort to S5 and certainly spurred S5 to write clear and concise messages to an audience for a purpose.

In considering the second part of the question, students one, two, and four completed the greatest number of research assignments requiring the use of the BBS in some form. The effectiveness of the BBS as a research tool was not properly assessed however for two main reasons. First, units 5 through 7

of *Information Processing II* were not covered due to time constraints. Second, when the BBS was first set up, a variety of discussion and news groups were transmitted and updated daily. Due to the cost of data transmission, most of these groups and news items were terminated. Thus, even if the students had completed Units 5 through 7, their resources would have been fairly limited. As a result, this part of the question remains inconclusive without further study.

(2) Based on the findings to (1), what recommendations can be made, so as to maximize the use of the BBS, given its present limitations, but also considering future modifications and opportunities?

This Teacher/Researcher feels that more time could have been spent assisting and encouraging students if technical and logistical problems with the computers and the BBS had not required as much teacher/student time. Most solutions were derived from the time consuming method of trial and error. The development of a concise Instructor's Manual would definitely assist teachers in overcoming many of these technical and logistical shortcomings in advance. Using the presently developed *Information Processing II*, teachers would also have more time to consider alternate methods of scheduling computers, in order to accommodate students completing projects which required extra help, technical, or otherwise.

Given these considerations, other teachers should be able to spend a more significant portion of their time facilitating the course. Students such as S3 for example, have strong analytical skills but may have trouble reading and

comprehending lessons and instructions. Such students would undoubtedly be able to complete more Cyberexs given the extra attention they require. In doing so they would be able to effectively use the BBS for communication as well as research.

With its present limitations, the Kitikmeot BBS still has tremendous potential as a communications tool. Students are able to share e-mail of a personal as well as academic nature. Files consisting of stories, projects, and any piece of writing can be attached to an e-mail message and received within a day or two any where in the world. Thus, in its present form, the BBS does indeed fulfill the basic goals of creating purpose and audience for student's writing.

The second part of Research Question 2 deserves proper addressing. With exception of S5, all the students had some exposure to preparing Web pages. S1 completed all the Cyberexs in Unit 4 by making up extra time outside of class. Even with the given time constraints, the students reacted very positively to the use of Web pages. A school Web page was developed by the Teacher/Researcher with links provided where each student could add their own Web page.

An investment of about $140 in software will provide one school computer with the capability to author Web pages. Netscape can be loaded on all relatively powerful computers which can then have the school web page loaded on their hard drives. This is of course rather tedious. The next stage would be to dedicate one school computer as a local server, which can technically run on the BBS network. Web data could be sent to other schools

via the present BBS, but long distance costs would be prohibitive. A better solution would be to have school Web pages placed on disks to be either shared between schools, or added to a CD ROM which could also be mailed with Web pages from all schools as well as other resources. Ultimately, an improvement in the phone system will allow for full access to the WWW. Full access to the Web would allow any student with an account to log on and browse through cyberspace for any topic.

Encouraging students to use the Internet is not a difficult task. Focusing their time and attention on school related projects does take significant time and planning however. Examples of successful projects which involved research for a purpose, and especially those involving collaboration between schools require set up a year in advance. This is obviously a time consuming process which also requires the desire by teachers to participate once they are aware of what projects involve and how they are conducted. Given due consideration however, the Internet with access to the WWW certainly has limitless possibilities in helping to deliver education in Arctic communities.

CHAPTER V: STUDY LIMITATIONS

There are several study limitations which need to be addressed:

1) From a technical point of view, communication in this part of the Arctic is terribly archaic. Low baud rates, narrow band width, and line noise often cause data transfer problems. Only two or three Usenet groups remained on the system by the end of the study due to large costs associated with data transfer. According to U.S. Robotics Inc., a two Mb graphic file will take 2.5 hours at 2400 bps and 23 minutes at 14,400 bps. If the same two Mb graphic were to be transferred during full rate hours at 2400 bps, it would cost roughly $150 to download. On a good day, the highest baud rate was usually 4800 bps, and communication lines were occasionally lost during a large data transfer. There was also only eight lines out of the community, so even if a live line was used during the day, circuits could be busy.

2) In this study, the Teacher/Researcher spent a significant amount of time conducting the study as well as trouble shooting software and hardware limitations and problems. As a result, not nearly as much time was spent assisting the students, especially those who were not naturally confident and independent. It is felt by the Teacher/Researcher, that if more time had been devoted to assisting the students one on one; that their performance would have improved. For instance, a number of Cyberexs beginning in Unit 4 required extra memory be allocated for a particular software application over other applications. The correct memory allocation was often derived by trial and error so as to provide a balance required to run one or more memory hungry applications. Although this clearly provided a study limitation in that

students were not given an ideal classroom situation in which to learn, it provides some information for insightful thought towards future recommendations.

3) An additional consequence of time taken to overcome technical problems was that even the top students only finished Unit 4. Units 5 through 7 could easily be developed with little extra time by other teachers though as the basics have already been covered in the previous Units.

4) Cyberexs were forwarded to each student's mailbox for downloading onto disk. This approach was not successful as students often deleted the Cyberexs or neglected to read them upon downloading. As a result, some students failed to begin their work on time and then became confused about what they were supposed to be working on. The Teacher/Researcher began posting Cyberexs on a class bulletin board, but confusion was still apparent among the weaker students.

This Teacher/Researcher feels that more mature students with greater organizational skills could have handled this method of obtaining the next set of assigned work. Younger age groups however need to have the work given in a concrete fashion and subsequently followed up on.

5) The success of any study in accurately addressing the research questions depends on the instrument used. In this study, the instrument was *Information Processing II.* Although this course was designed to assist in carrying out the study, there are aspects which need to be re-considered. For example,

perhaps each unit should have included two or more levels of Cyberexs such as beginning, intermediate, and advanced levels. Students completing exercises at the beginning or intermediate level could receive just as many marks as the student moving directly to the advanced level, but with more steps. This addition also may have encouraged the weaker students while providing more challenge for other students.

CHAPTER VI: SUMMARY and RECOMMENDATIONS

This case study addressed two research questions with the assistance of a group of grade nine students who took part in the study by completing *Information Processing II.* This Teacher/Researcher developed course was employed as a tool or instrument in the assessment of the Kugluktuk School and Community BBS (as an extension of the Kitikmeot BBS) with regards to the research questions posed. The qualitative analysis which followed used four methods which were: protocol analysis, portfolio assessment, student logs, and teacher anecdotes.

It soon became apparent that verbal reports taken using protocol analysis were not able to be properly analyzed. They still however augmented other forms of data collection, further illuminating analysis of the research questions.

The first research question asked: Were students enrolled in *Information Processing II* able to effectively use the Kitikmeot BBS (in its present form) as a communications and research tool?

As a communications tool, the BBS has proven itself to be both popular and effective. Although effectiveness was not measured by comparing reading and writing ability using pre and post testing, it was obvious that students had been given an audience and a purpose for their writing. Current literature rates these two aspects of communication as being the measures of whether students will significantly gain from their experience.

The question regarding the BBS as an information gathering tool remains inconclusive. Due to time constraints, students were not able to complete the section of *Information Processing II* intended to measure this aspect of the BBS. It should be noted however that as the amount of information available on the Kitikmeot BBS server was drastically reduced due to transmission costs, the effectiveness of the system as an information gathering tool was certainly reduced.

The second research question asked: Based on the findings in (1), what recommendations can be made, so as to maximize the use of the BBS, given its present limitations, but also considering future modifications and opportunities?

1) Teachers using the BBS need to make use of the course which was developed for this study. In addition, a teacher's manual needs to be written. The result would be that teachers could spend the majority of their time directly assisting students instead of developing material and administering the system.

2) The BBS can be used quite effectively to submit student writing to public folders for others to read. Projects involving collaborative writing can easily be produced in this way for both intra and inter-school work. These projects require some advance planning and communication between the various classes which may be involved.

3) The future of Web servers should definitely be explored. Using recently developed software, students can produce interactive and colourful Web pages which employ a variety of skills for the authors and are visually appealing to the reader. Even if schools do not have a live line to the World Wide Web, they may still share CD ROM disks containing Web pages produced by various schools. A school server can be set up to service an in-school network, more popularly known as an Intranet. Web pages on the Intranet can also contain information of interest such as legends and music from similar cultural groups, or a review of projects at a science fair.

4) Teachers and Administrators could compile brief reports of projects attempted. These reports could be shared between the schools, thus providing a databank for other teachers. Projects for the upcoming year, especially those within the philosophy of Inuuqatigiit, could be added to the databank with time.

5) Teachers should be encouraged to participate in the delivery of similar computer projects which motivate students by providing them with both a purpose and an audience. Such projects should not just include Native culture, but also adopt traditional educational practices. Students who are motivated and empowered will strive to succeed in school and in life.

As the gathered data is soft, this study should be considered as a preliminary analysis of the research questions. Keeping this in mind, two major

contributions still resulted. First, a valuable instrument was designed which can be changed and augmented by other teachers. *Information Processing II* was authored based on Teacher/Researcher experience in developing several computer courses. The instrument was also developed based on current literature dealing with learning theory, and other similar working models. Second, recommendations were drawn up based on the study results. These recommendations are of assistance to others wishing to improve on the effectiveness of the Kitikmeot BBS.

This Teacher/Researcher enjoyed the opportunity to conduct this research project. One other class has already been known to make use of the course developed for this study. It is hoped that others may be able to make use of this report along with *Information Processing II* in affecting learning in northern communities.

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White, C. S., and Hubbard. G. (1988). Teaching in the information age. Computers and Education. New York: Macmillan Publishing Company.

Wiggins, G. (1989). Teaching to the (authentic) test. Educational Leadership, 46(7), 41-47.

Wilson, J. (1992). The computers and culture project: A multimedia approach to the preservation of native history, language, and culture. Canadian Journal of Native Education, (19)1, 7-19.

Appendix 1

Definition of Key Terms

For the purpose of this study, definition of key terms are as follow:

BBS	An electronic bulletin board system consisting of a computer network in which all participants have access to commonly posted information.
HTML	HyperText Markup Language - the programming language used to produce hypertext documents.
HyperText	A term used to describe non-linear writing in which you follow associative paths through a world of textual documents.
WAIS	Wide Area Information Service - allows full text searches in a number of databases.
WWW	World Wide Web - presents information in a friendly hypertext format.

Appendix 2

Observation Consent Form

Prompt Sheet

Daily Log Question Sheet

Research Licence

J4 Computer Class
Observation Consent Form
Teacher/Researcher: Neil Burgess

Students enrolled in the J4 computer course will be using an electronic bulletin board system to complete their course between January and June of 1996. Research is being conducted using this class in order to determine the effectiveness of the Kitikmeot Electronic Bulletin Board System (BBS) as a research and communications tool. This research will be conduced by Neil Burgess in partial completion of a Masters degree in Education. In addition, data gained will be used to further improve the BBS, and its applications.

On a rotational basis, students will be requested to speak into a tape recorder so as to record their thoughts as they work through lessons, between February and April. Each student will complete their rotation over three separate classes.Taped information will be used only by Neil Burgess. At no time will the identity of students be revealed in the study and all tapes will be erased after the data has been gathered from them. At the end of June, any student or parent may have access to written material taken from the tapes, in order to be assured that the data is anonymous.

Participation in the recording of voices from individuals is completely voluntary. If the student wishes to stop at any time, there will be no prejudice held against them.

This study is within the ethical guidelines of Memorial University of Newfoundland as well as the Kitikmeot Board of Education, and Kugluktuk High School.

I _____ give consent for _____
Parent/Guardian Student

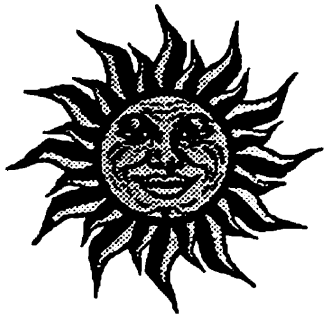
to participate in the above described study. Date:_____

_____ _____
Parent/Guardian Student

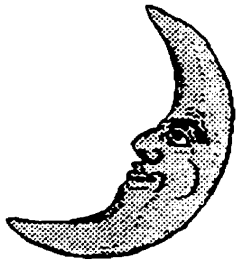
_____
Principal

On your BBS assignment.... right now....

What are you thinking?



What are you doing?



What problem are you dealing with?

What are you planning?

J4 Information Processing II
Daily Log

Complete the Record Sheet each day and place it back into your folder.

1. **Describe briefly what you did today. Include roughly how much time was spent on each task (in minutes).**

2. **What went well?**

3. **What did not go so well?**

4. **What needs to be done next class?**

Nunavut Research Institute / Nunavummi Qaujisaqtulirijikku
Box 160, Iqaluit, NT X0A 0H0 phone:(819) 979-4108 fax:(819) 979-4911 e-mail: stroke@inukshuk.gov.nt.

14 February 1996

Neil Burgess
Bag #3
Kugluktuk School
Kugluktuk, NT
X0E 0E0
(403) 982-3404 f

RE: 1996 Science Research Licence

Please find enclosed your 1996 Science Research Licence No. **0400396N** which was prepared under the Northwest Territories *SCIENTISTS ACT*, and forwarded to you today via mail. Should you require further support from the Science Institute's Research Centre, please contact the Research Managers to discuss your research needs.

According to the Scientists Act, researchers issued licences must submit *an Annual Summary Report* of their research. Upon completion of your 1996 field work in the Northwest Territories, please ensure that you submit a 200 word (maximum) non-technical summary of your research findings to our office by January 31, 1997, or with your new year's application, which ever is earlier. In addition, we require a copy of your *Final Report* and would appreciate copies of papers that you publish.

Thank-you in advance for assisting in the promotion and development of a scientific research community and database within the Northwest Territories. The reports and information you provide are utilized to prepare our annual research compendium, which is distributed to communities and organizations in the NT as well as to researchers across Canada.

Please accept our best wishes for success in your research project.

Sincerely,

Sharon Troke
Science Liaison Coordinator/Licensing Admin.

Nunavut Research Institute / Nunavummi Qaujisaqtulirijikkut
Box 160, Iqaluit, NT X0A 0H0 phone:(819) 979-4108 fax:(819) 979-4911 e-mail: stroke@inukshuk.gov.nt .ca

SCIENTIFIC RESEARCH LICENCE

LICENCE # 0400396N

ISSUED TO: Neil Burgess
Bag #3
Kugluktuk School
Kugluktuk, NT
X0E 0E0
(403) 982-3404 f

TEAM MEMBERS: none

AFFILIATION: Kitikmeot Board of Education

TITLE: Student Interactions Online in an Arctic Secondary School

OBJECTIVES OF RESEARCH:

To study how students use the Kitikmeot electronic bulletin board system (BBS) as a communications and research tool. To determine, based on student response to the modules, what kinds of course work can be recommended for the future, using the Kitikmeot BBS.

DATA COLLECTION IN THE NWT:
DATES: February 01, 1996 - March 29, 1996
LOCATION: Kugluktuk, NT

Scientific Research Licence 0400396N expires on December 31, 1996
Issued at Iqaluit, NT on 14 February, 1996

Bruce Rigby
Science Advisor

Nunavut Research Institute / Nunavummi Qaujisaqtulirijikkut
Box 160, Iqaluit, NT X0A 0H0 phone:(819) 979-4108 fax:(819) 979-4911 e-mail: stroke@inukshuk.gov.nt.ca

14 February 1996

NOTIFICATION OF RESEARCH

PLEASE BE ADVISED THAT SCIENCE RESEARCH LICENCE No. 0400396N **HAS BEEN ISSUED TO:**

Neil Burgess
Bag #3
Kugluktuk School
Kugluktuk, NT
X0E 0E0
(403) 982-3404 f

TO CONDUCT THE FOLLOWING STUDY:

Student Interactions Online in an Arctic Secondary School

SUMMARY OF RESEARCH:

To study how students use the Kitikmeot electronic bulletin board system (BBS) as a communications and research tool. To determine, based on student response to the modules, what kinds of course work can be recommended for the future, using the Kitikmeot BBS.

THE STUDY WILL BE CONDUCTED IN Kugluktuk, NT
BETWEEN February 01, 1996 - March 29, 1996.

SHARON TROKE
SCIENCE LIAISON COORDINATOR

DISTRIBUTION:

Director, Kitikmeot Board of Education
President, Kitikmeot Inuit Association
Director, Social, Culture & Education, NTI

Appendix 3

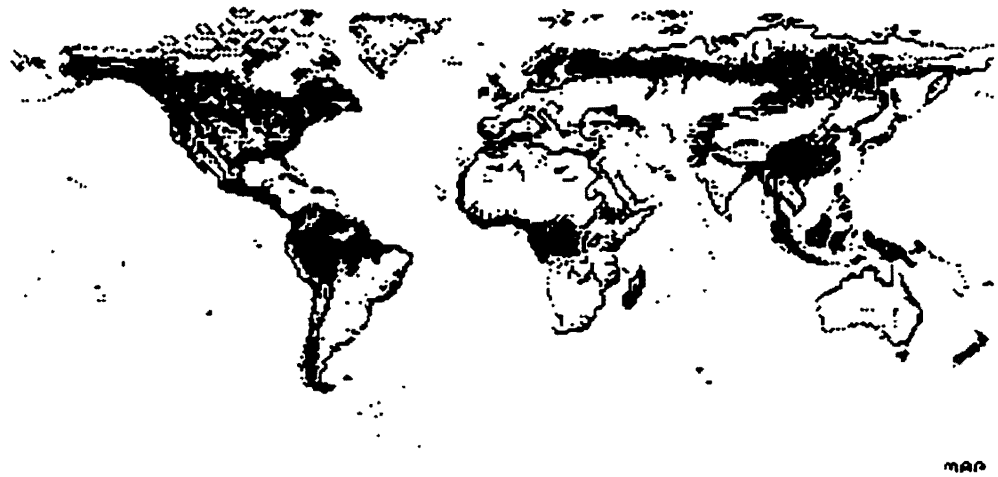
Information Processing II

Cyberexs

Information

Processing

II



using the

Kitikmeot BBS

Author: Neil Burgess

Kugluktuk High School

Unit One

Internal Communication

Unit One: Internal Communication

1.1 Overview of FirstClass

FirstClass® is an electronic messaging and conferencing system, designed for ease of use and high speed over network or modem. It can be used for electronic mail, groupware discussions, as a public access bulletin board system... or as all three at the same time. With FirstClass you can:

- Send and receive mail & files to/from other users
- Browse, contribute and subscribe to special mail groups ("conferences")
- Chat in real-time with users of other computer platforms
- Access other information services through gateways
- Connect to external databases

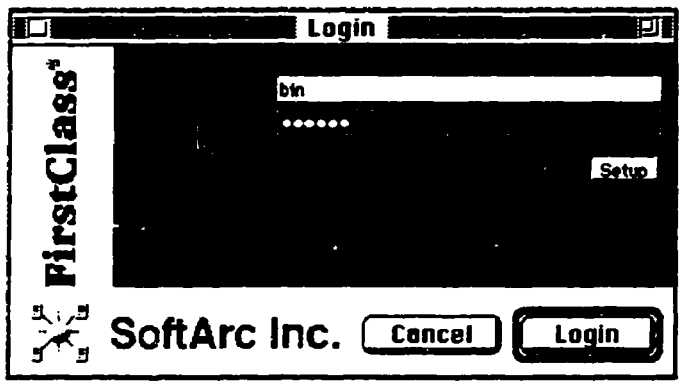
All of this is accomplished through a familiar, multitasking graphical user interface that's easy and fun to use.

Symbols: When you see a  , expect to complete some task.

When you see a  , take note, this is a serious message.

1.2 Starting the FirstClass Application

To start the FirstClass application, open the BBS icon *Kugluktuk BBS* by double-clicking on it. As soon as FirstClass starts up, the *Login Form* is displayed:

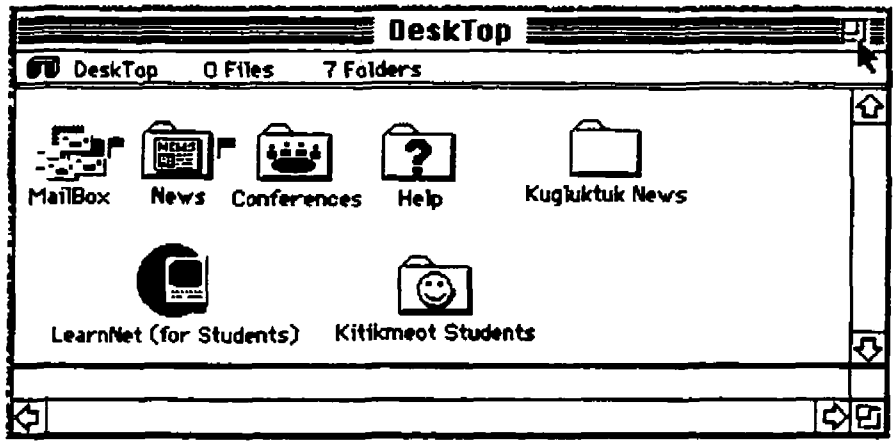


From here, you *login,* or connect to the FirstClass Server, which is simply a computer sitting in the office attached by a modem and a telephone line, to other computers outside the school.

Do not go into the Setup menu and enter you User ID and Password. If you do, it will be saved and available to the next person who may not use your account in a wise manner.

The FirstClass DeskTop

When you log in to FirstClass a window is opened with the title "DeskTop". This is your starting point in the system. All mail, conferences and files are accessed by starting at the desktop.



When you first log in you will see a number of items on the desktop, including your "MailBox" (where private messages are sent and received) and a Help folder (where the online documents you're reading right now are stored.) There may be other icons on your desktop like "Conferences" or "News" which the administrator of your system has placed there.

You can double click on any of these icons to open them up and browse the information within.

FirstClass allows you to open multiple windows at once so you can quickly switch between tasks. You can be reading your mail, switch to a conference then chat with an associate connected via modem—each in a different window and each at the same time.

The FirstClass Menus

File Edit Message Conference Service View

The top bar of the screen contains the pull-down menus for FirstClass. These are grouped according to the functions they provide:

◊ File provides commands to operate on files such as Delete or Close.

◊ Edit provides editing commands such as Cut and Paste, as well as commands to change personal information such as your résumé.

◊ Message provides the electronic mail commands such as "Send" to send a message.

◊ Conference provides commands for conferences.

◊ Service provides setup commands, services such as chatting and a way to change your password.

◊ View provides commands to change the way you view the information on the screen.

Changing Your Password

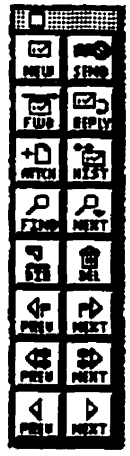
Your new account password will be given to you by your teacher. The first thing you must do is change it. To do so, go to *Service* and *Change Password.* Don't forget your password, and don't let any one else know what it is!

1.3 E-mail: Electronic Mail

Checking out your MailBox

Go to your DeskTop and open your MailBox. There are a few messages there. I want to introduce you to someone special. Double click on the message "Who am I"?

How about sending a message back now? There is a very useful tool you may wish to use. Check under *View*, then *Palette*. Click on the REPLY. Automatically a new screen will appear with your name in the from. Under Subject, enter "hello" and enter Binary's name. Then move under the line and write a message back. Don't forget to SEND your message when you're finished.



You can always check to see whether your message has been delivered by going to *Message* and *History*.

Now check out the other DeskTop folders to see what's in them. This information is always changing. In fact, your assignments for this course are in one of the folders. Can you find it?

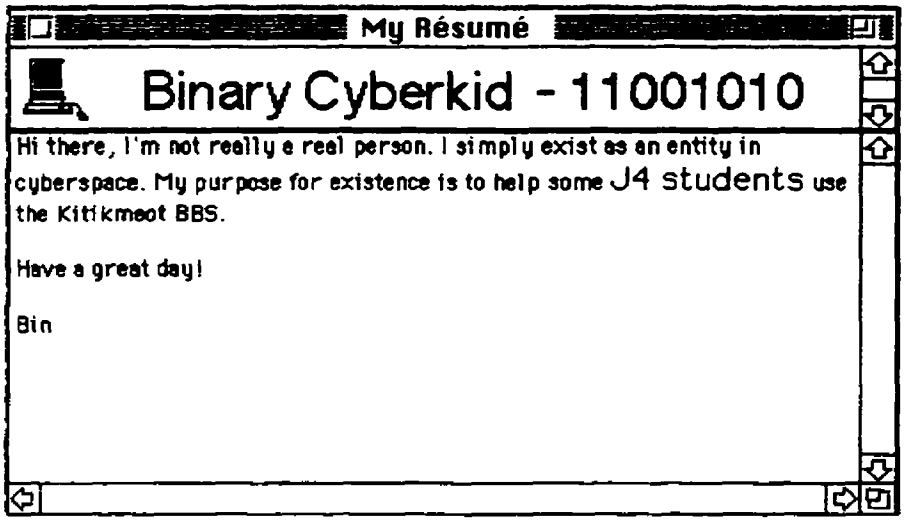
1.4 Résumé

As a user of FirstClass, you have a résumé on this system that other users can view by double clicking on your name whenever they see it in a message or directory listing. Résumés are used to provide other users information about yourself. You can type as much information as you wish into your résumé file.

To edit your résumé file, go to the desktop window, pull down the Edit menu and choose Résumé. If this is the first time you have used the résumé feature, your file will be empty. Type in any information that you wish other users to know about yourself. In the upper

panel there are two empty fields, one for a picture of yourself, and the other for your title.

The left box is for your picture, and you may use copy/paste to insert a picture there. We will do this later. On the right is a large text box into which you may type your title. Click on the close box to save changes.

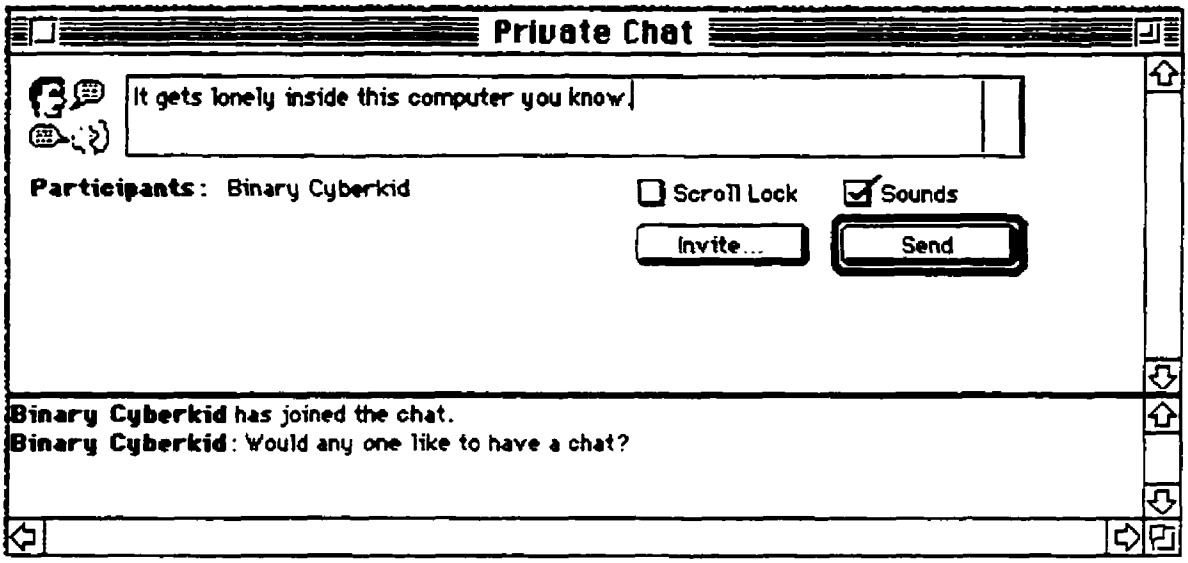


To view the résumé of someone who has sent you a message, open the message, and double click on the "Form" name. The person's résumé will be displayed. You can also display the résumé of anyone in the To: or Copies: list by double-clicking on the name you want. You can also view résumé from a directory list window by double-clicking on any name.

Many people choose to tell others a bit about themselves and their interests in their résumés. View what others have written if you're unsure of what to say in you file.

1.5 Private Chat

Quite often it's nice to have a chat within the class, or with other users logged on at the same time. To either initiate or participate in a chat, go to *Service* and *Private Chat*. If there are several participants, select those you want to chat with by holding down the shift key and clicking on the participant's names.



1.6 Attaching Files

You may share files with other people using the File Transfer features of FirstClass. You can "attach" any number of files on your disk to a message and send them along with the message to one or more users. The recipients can save the attached file on their disk.

You may put descriptive information about the file or files in your message.

Files can also be placed on the server directly, without being attached to a message. You can transfer these files to your computer using the Download feature. If you have a file which you wish to make available to others, you can Upload this file. These features can be useful, but most users prefer attaching files to messages. This allows for full descriptions and the routing of files to various destinations. All of these features can be found under *File*.

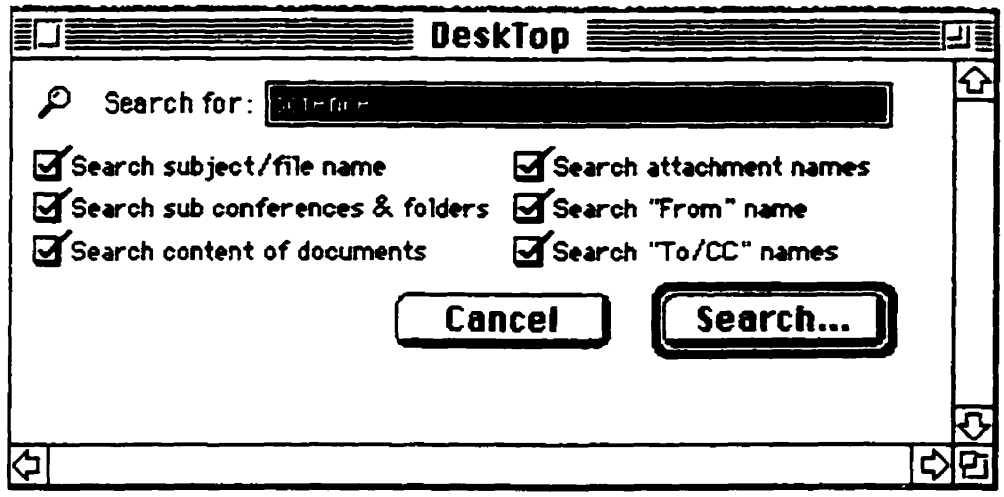
Any file you can create on any computer can be transferred without any loss of information. This includes graphics, sound and special application dependent files (spreadsheets, word processor documents etc.).

Check out the attached file from Binary Cyberkid. Hey, ever wonder if Binary was a boy or a girl? Try asking her/him/it.

1.7 Searching For Files and Mail

FirstClass contains a powerful built-in search feature. You can search within messages and documents for a word, or you can search for items based on the subject, filename, attachment name, to/from names and even the content of the item. Searches in FirsClass are performed in the background, allowing you to carry out other tasks (like reading your mail or chatting with another user).

Under the *File* menu, open *Search*. Perform a search similar to the one below. Try clicking different boxes and using different key words.



It's amazing what's out there. If the system is slow, it's because the FirstClass has to look through every word in every document you chose. That may take some time, especially as you're on a network with other users who may be doing the same thing.

1.8 The Kitikmeot BBS

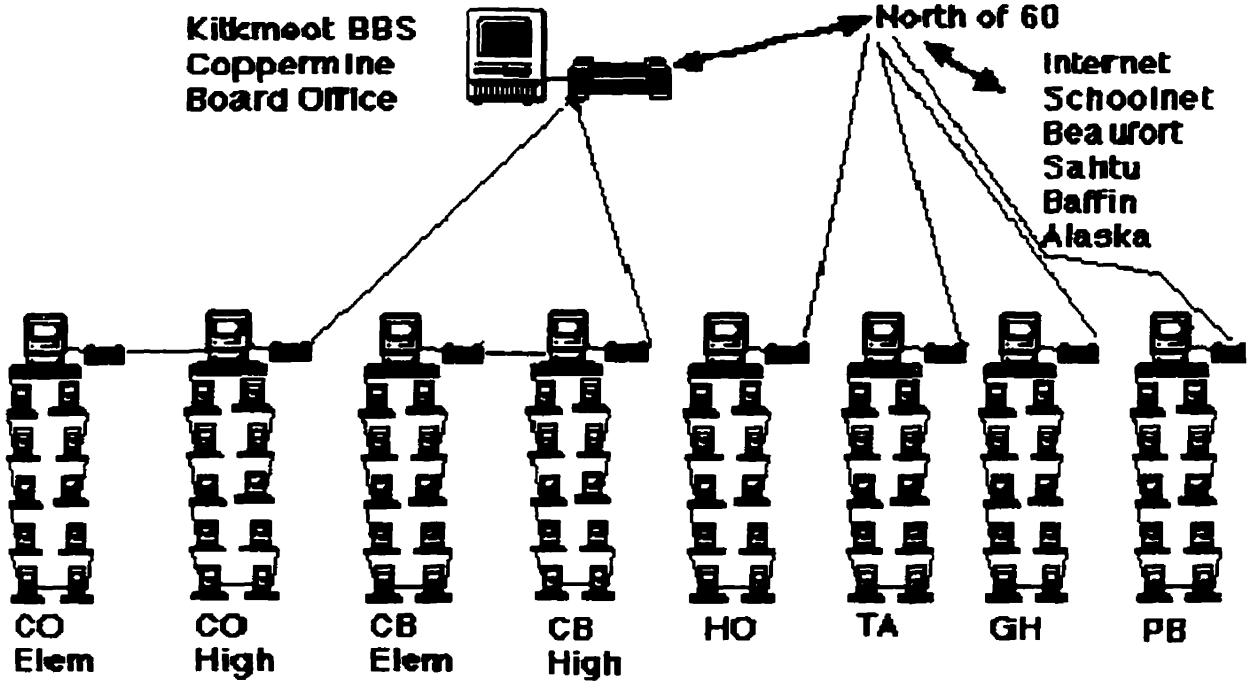
BBS of course stands for Bulletin Board System. We have our own for the Kitikmeot region which is connected by telephone lines to other BBS systems. Next in line comes another system called North of 60. This system is connected to what is called the Internet. The Internet is really just a huge network of computers and BBS systems. No one runs the Internet itself, and no one knows exactly how many computers are actually connected. Some estimates point to between 30 and 50 million computers. This is why we have to be especially careful of what we send out on our computer. That many people could potentially read it!

One of our problems right now is that the phone system is not very sophisticated in this region. As a result, we are not able to transmit very much information and very high speeds. Sometimes we are only able to transmit at between 1200 and 4800 bits per second (bps).

That may seem like a high number, but eight bits of data were needed just to make the period at the end of this sentence. We'd like to be able to have phone lines capable of transmitting at 56000 bps. There is some talk of this, so keep your fingers crossed!

Another problem we have is that our phone lines are very dirty meaning that their is a lot of electronic interference. This often causes email messages to get corrupted and lost.

Below is a diagram which shows our present Kitikmeot BBS network.
Can you find our server?

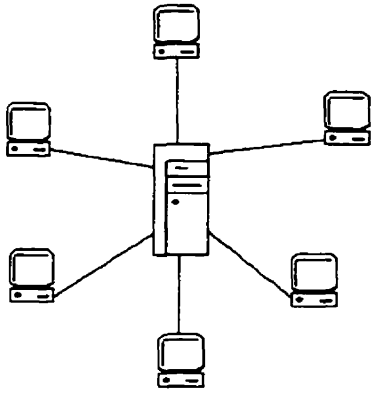


1.9 A Brief History of the Internet

We think of the Internet today as a world-wide network of computers. Using the Internet, you can contact thousands of people and access large volumes of information including software.

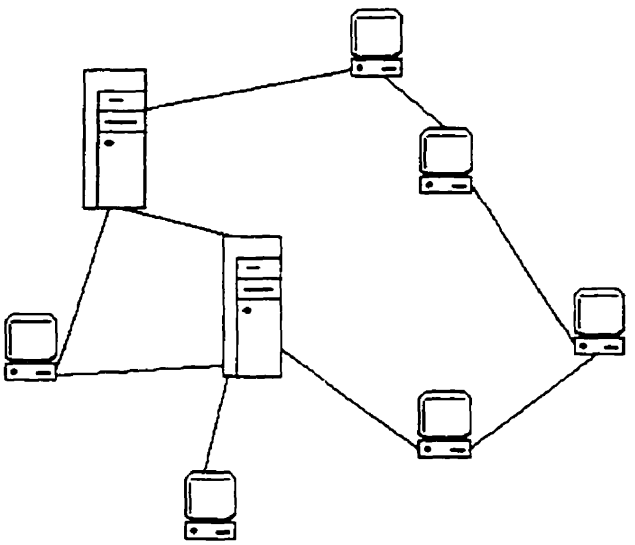
The Internet wasn't initially planned to do the things we use it for now. It grew naturally from the Unites States, with a military research network called ARPNET (Advanced Research Projects Agency NETwork).

Traditional computer networks are designed to rely on one huge central computer, with all the other computers on the network connected directly to the central one like spokes on a wheel. Any communication between computers on the network has to pass through the central computer at the hub. But if anything happens to the central computer, the entire network is useless until it's repaired.



A **centralized network** has only one route between any two points.

The goal of ARPNET was to develop a reliable wide-area communications network that couldn't easily be disabled. So, a new kind of decentralized network design was introduced. Instead of a wheel, the network looked more like a web, with each computer having connections to other computers nearby rather than to one central machine. Instead of relying on one computer to manage all the communication over the network, many computers would share the job. To get from one machine to another, a message might have to pass through several other machines along the way. At first glance it seems inefficient, but it's really much safer and more reliable. If any one computer in the network is unavailable, the others can probably still exchange messaged by finding a new route around the disabled computer.



A **decentralized network** has several possible routes between any two points.

In addition to a decentralized design, ARPNET also introduced the idea that you could have many different kinds of computers on one network. Today, there are Macintosh, DOS, UNIX, VMS, and many other kinds of computers on the Internet. They all communicate following a standard set of rules, called protocols. The most basic set of communication protocols for the Internet today is TCP/IP (Transmission Control Protocol/Internet Protocol). More on this subject later.

Today, millions of people have some degree of access to the Internet. Areas of the world which don't have access to the Internet probably don't have access to high-speed data lines that go along with a modern telephone system. Sound familiar?

How do you think all the computers in the school are connected? Ask your teacher.

1.10 Netiquette

Look up the work "etiquette" in the dictionary. What does it mean?

Remember that when you are on the Internet, there are potentially thousands or even millions of people reading what you write. Netiquette is etiquette on the Net. When you joined this network, you became part of a global community. What's unusual about this community is that there are no written laws. Certainly, many individual member networks have written rules about their own network - but there are none about the Internet as a whole. This does not mean that the Internet is lawless! Members of the Internet community share very definite principles of proper behavior and you will undoubtedly suffer the wrath if you violate these principles. The basic rules for members of the Kugluktuk BBS are as follow:

1) No foul language.

2) Never put someone down.

3) Do not participate in discussions which could misinterpreted by someone else.

These basic rules are very simple. At any time your mail may be read by the administrators of the system. **If the administrators feel that you have misused the system you will loose your account for a one week period upon the first warning. If you abuse the system for a**

second time, your account will be permanently canceled and you will automatically fail this course. In addition, your offense will be reported to the principal who may take further action.

The consequences are very serious. Remember that what you say and do is representative of the students in Kugluktuk school.

Unit One

Cyberexs

Cyberex 1.4

1) Create your own résumé. Include a graphic which you design yourself, or from the clipart folder.

2) Once you have created your graphic, use the **Copy** and **Paste** functions to enter it into your résumé.

Cyberex 1.6a

1) Open a wordprocessing document in CarisWorks.

2) In Lesson 13, you designed a volcano. Paste this volcano into your document.

3) In Lesson 19, you created a bar chart for communities in the Arctic. Paste this bar chart under the volcano. Save your work.

4) Log onto your account.

5) Create a message for Binary Cyberkid. At the top of the message page, include this exercise number followed by your name and the date. For example:

Cyberex 1.6
my name goes here
today's date

*** from now on, include the above with every exercise you complete***

6) Now attach the document created in ClarisWorks to this BBS document and mail it to Binary.

Cyberex 1.6b

7) Repeat the steps taken in 5 and 6, but with Lesson 17 attached.

8) Instead of mailing a copy to Binary Cyberkid, mail it to Mike Johnston, so he has a copy.

Cyberex 1.7

1) Log onto your account. Include the same heading as in the last exercise (Cyberex #, name, date).

2) Search for the acronym "BBS". How many times does it appear?

3) Search for the word "Science". The BBS is quite large however. If you perform a search on the whole system, you could be waiting for some time. Instead, open the Kugluktuk folder, and then begin the Search.

4) Open the "Science Projects" folder and see what's in it.

5) Mail you results to Binary Cyberkid, as an attachment.

Cyberex 1.9

1) In ClarisWorks, create a diagram which shows how the Kugluktuk BBS is wired. Save your work.

2) Log onto your account and address a message to Binary Cyberkid.

3) Include the usual heading with the exercise number, your name, and the date, and then attach the diagram you created.

4) Mail your work to Binary Cyberkid.

Cyberex 1.10

Complete the crossword at the end of your exercises and pass it in to Neil. The crossword was not included online because it would create much too large a file, and would require extra printing.

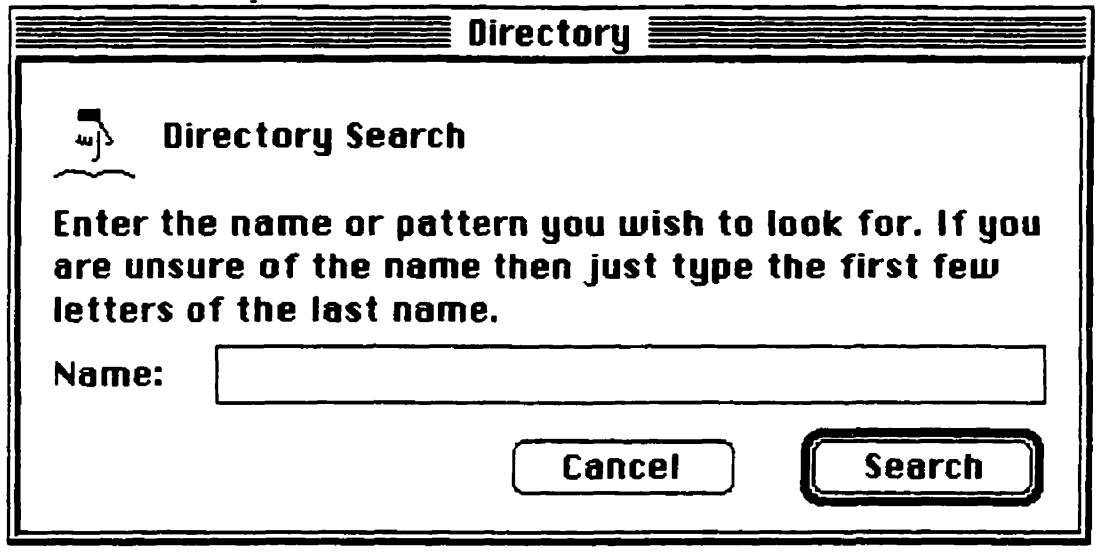
Unit Two

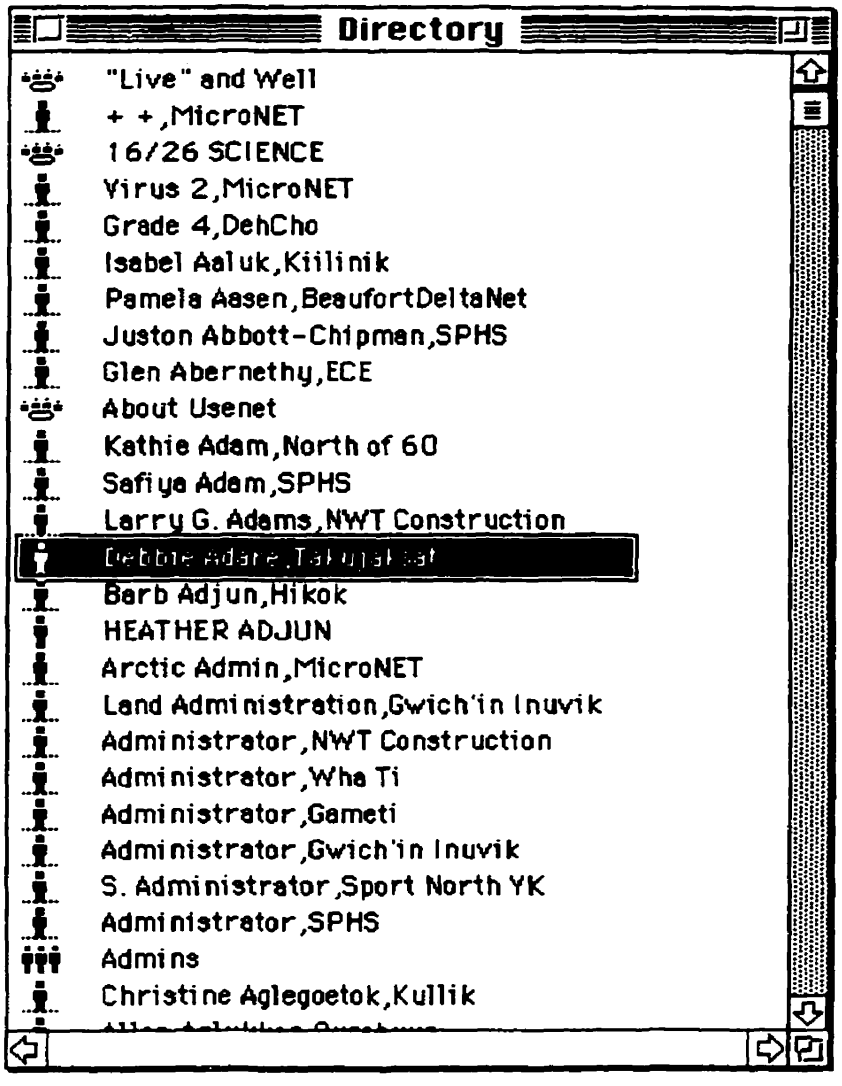
Regional Communication

Unit Two: Regional Communication

2.1 Using the Directory

By using the directory, you can get a fantastic list of people and resources who you have direct access to. If you just press enter after "Name:", you will get a total listing.

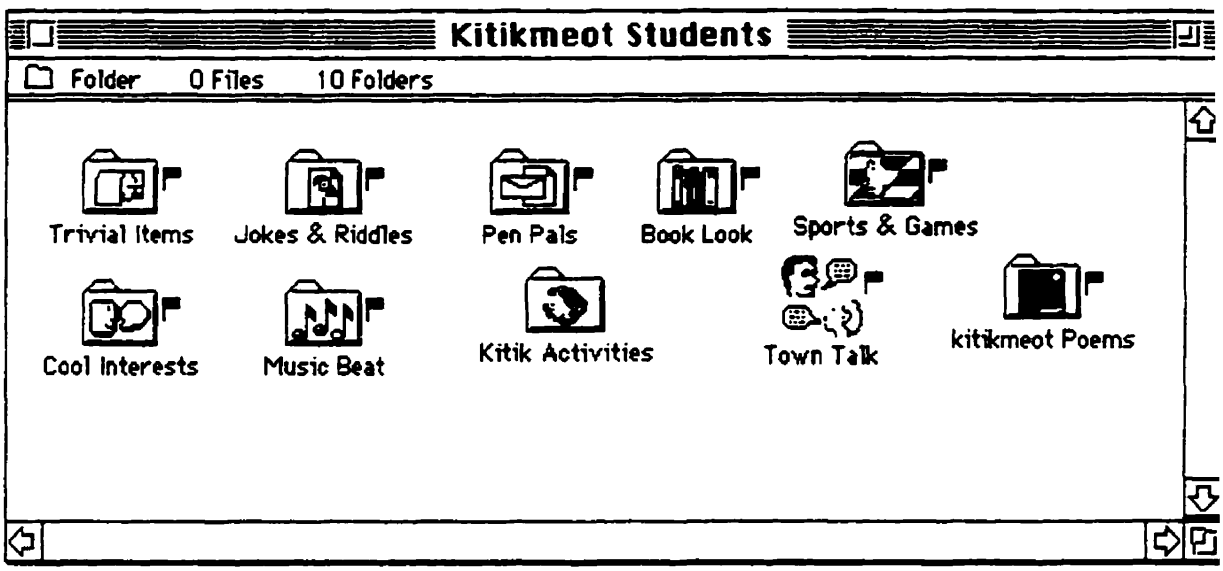




Each symbol to the left of a name in the directory has a meaning. Can you figure out the difference between the symbols? Are all the names people's names?

2.2 Pen Pals

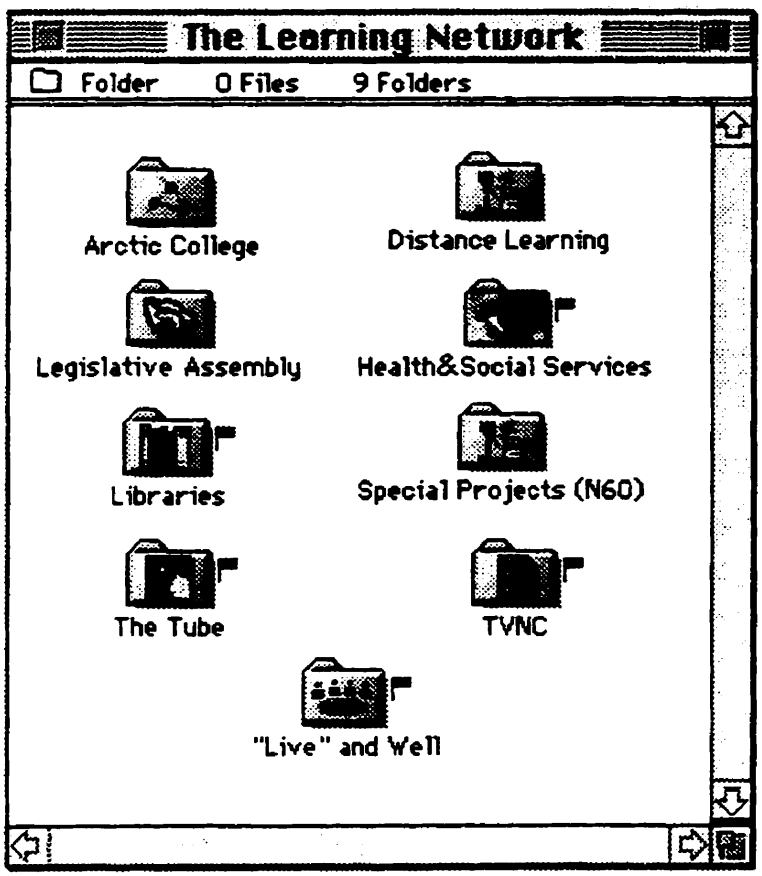
As you learned in section 1.8, our region has a number of schools to which we are connected using the Kitikmeot BBS. If you receive mail from any other school within the region, the person's name will have the school's name appended. For example, someone in Cambridge Bay will see Bin listed as "Binary D. Cyberkid,Kugluktuk".



Check out the Pen Pals folder as shown above. You might even find someone in "Kitikmeot Poems" who shares the same interests. Have a look in the other folders as well. They may appear to be different than the screen clip above. The reason for this is that that BBS is always evolving as new folders are added, and others deleted or moved.

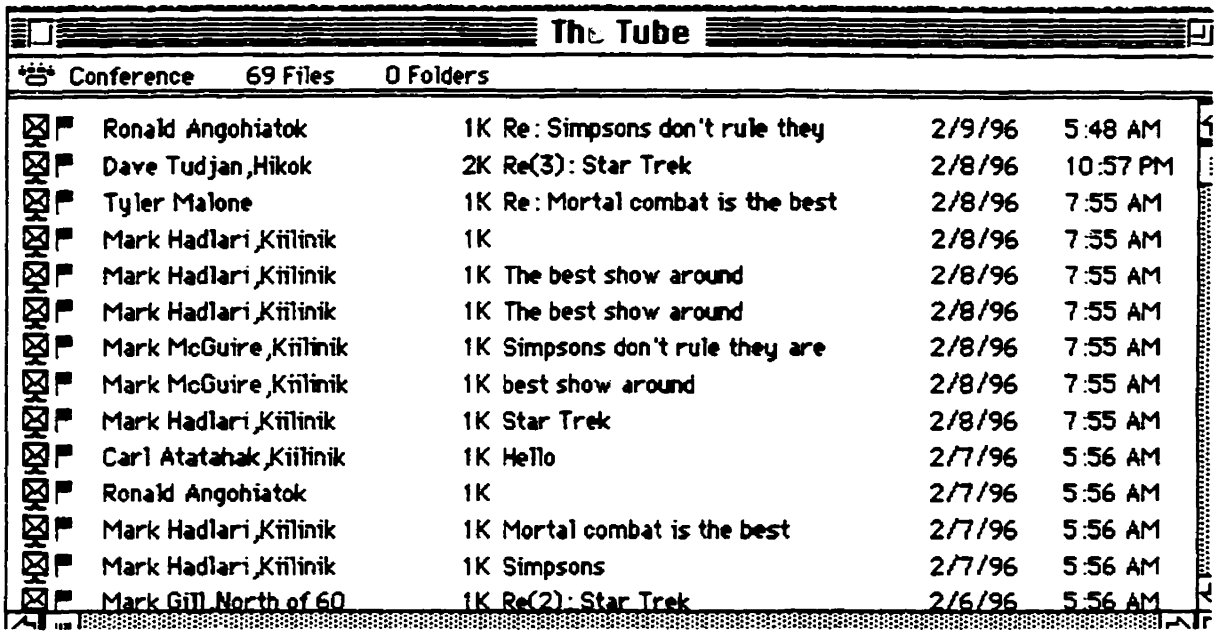
2.3 The Learning Network

The Learning Network is an excellent folder in which to find some discussion groups as well as general information.



One folder which may be particularly interesting is The Tube.

Check it out. You can post your own questions and comments, as well and respond to what others have written.



If you see a response to an item you would like to trace back to the original author, simply follow the "Re:" pattern. for example, if there are three responses to an item such as "North of 60", the original message will read "North of 60", the first response will read "Re: North of 60", the second response will read "Re2: North of 60:", etc.

The file size, date and time of posting are also included. Messages or items in these folders are only kept for a certain period of time. They are then deleted as new items are downloaded by our server.

There are some general, but very important rules to posting and responding in these folders, otherwise known as "Discussion Groups". Don't respond to any messages in a manner which may be taken offensively by any one else. Such responses are called "Flamers". Unless you have something useful to contribute, don't. Otherwise discussion folders simply become filled will junk, and then no one wants to read them any more. If you have a beef with someone, perhaps it would be better to Compose a new message to their personal mail box.

Unit Two

Cyberexs

Cyberex 2.1

There are six schools on the Kitikmeot BBS. Kugluktuk and Cambridge Bay each have two servers, one for the high school, and one for the elementary school. Find the names of all eight schools on the Kitikmeot BBS and email the results to Bin. Remember to include the usual.

Cyberex #
your name
today's date

*** from now on, include the above with every exercise you complete***

Cyberex 2.2

If you have not already done so, find yourself a Pen Pal. Choose someone from a community other than your own in the Kitikmeot. Send Binary Cyberkid a note telling her/him (we still don't know for sure) the following information: (1) Who is your Pen Pal? (2) What community are they from?

Cyberex 2.3

Write a short autobiography (scan in a picture if you have a recent one) and email it to Binary Cyberkid. Once it has been approved (Bin will send it back to you), attach it to a file which you will send to your Pen Pal.

Cyberex 2.4a

This is a major project, worth a lot of marks - and it will be a lot of fun. We recently created a folder called Kugluktuk Writing. If contributions to this folder are good, we will later call it Kitikmeot Writing, and make in available to anyone within the region.

Here's your project. You are to interview an elder in the community on some aspect of traditional Inuit culture. Each project must be at least two pages long (14 point and using an easily readable font) and must include either a picture or some sort of graphic.

All projects will be posted in the Kugluktuk Writing folder for the rest of your peers to see.

This project will be recycled. Later on we will come back to it, and use it again to develop a Web page to post on the World Wide Web. If you do a good job the first time, you will be able to post this project a second time (and get even more marks for it) for the entire world to see.

There is a sign up sheet on which your elder and topic will be placed. Once all the projects have been completed, we may have an elders tea where we will invite them to see your wonderful work!

Here are some suggested topics. You may of course choose your own as long as your teacher approves of it.

Suggested Topics

building igloos	medicine and healing
hunting	laws and leadership
lamps	sleds and sled dogs
polar bear	camping on the land
Fall - Ukiaq	Winter - Ukiuq
Spring - Upirngaaq	Summer - Aujaq
marriage customs	spiritual beliefs, ex. Shamanism
photo history	elders
responsibilities of women	responsibilities of men

Send this piece of writing to (1) the Kugluktuk Writing folder, and (2) Binary Cyberkid as Attachments.

After all the projects have been passed in and posted in the Kugluktuk Writing folder, we may do something special like invite the elders in for tea and bannock. This would be a good time for them to see the page you developed based on your interview with your elder.

Cyberex 2.4b

Margo, our language specialist, has agreed to help us out with the next phase of this project.

You are to translate **at least** one decent length paragraph into Inuinnaqtun. This paragraph can then be added into our article which will be re-posted in Kugluktuk Writing.

Cyberex 2.5

With this Cyberex, you have a choice of working on **ONE** of two long term projects. As soon as you choose, sign up with Neil.

Project School Newspaper: Sheila, Brian, and many great volunteers, started a wonderful school newspaper. They presently are printing a limited number of copies. Students are asked to read the paper and then place it in a box for reading by others. We are going to go one step further in helping them save paper. We will publish this paper electronically!

If you choose this project, you will be a part of a class team which takes the newspaper already produced on paper, and turns it into one which can be read on the BBS.

The System Administrators will create a folder in which each issue of the paper can be placed.

++

Project Recycling: Wilma's class is collecting some great data on paper and can use in this school. But guess what????? They need someone to post it on the BBS for all to read on a continual basis.

If you choose this project, you will be part of a class team which takes the data and reports it in short newspaper articles with charts and pictures.

The data will appear in the Recycling folder on the BBS.

Name: _____
Title: Cyberex 1.10

Across

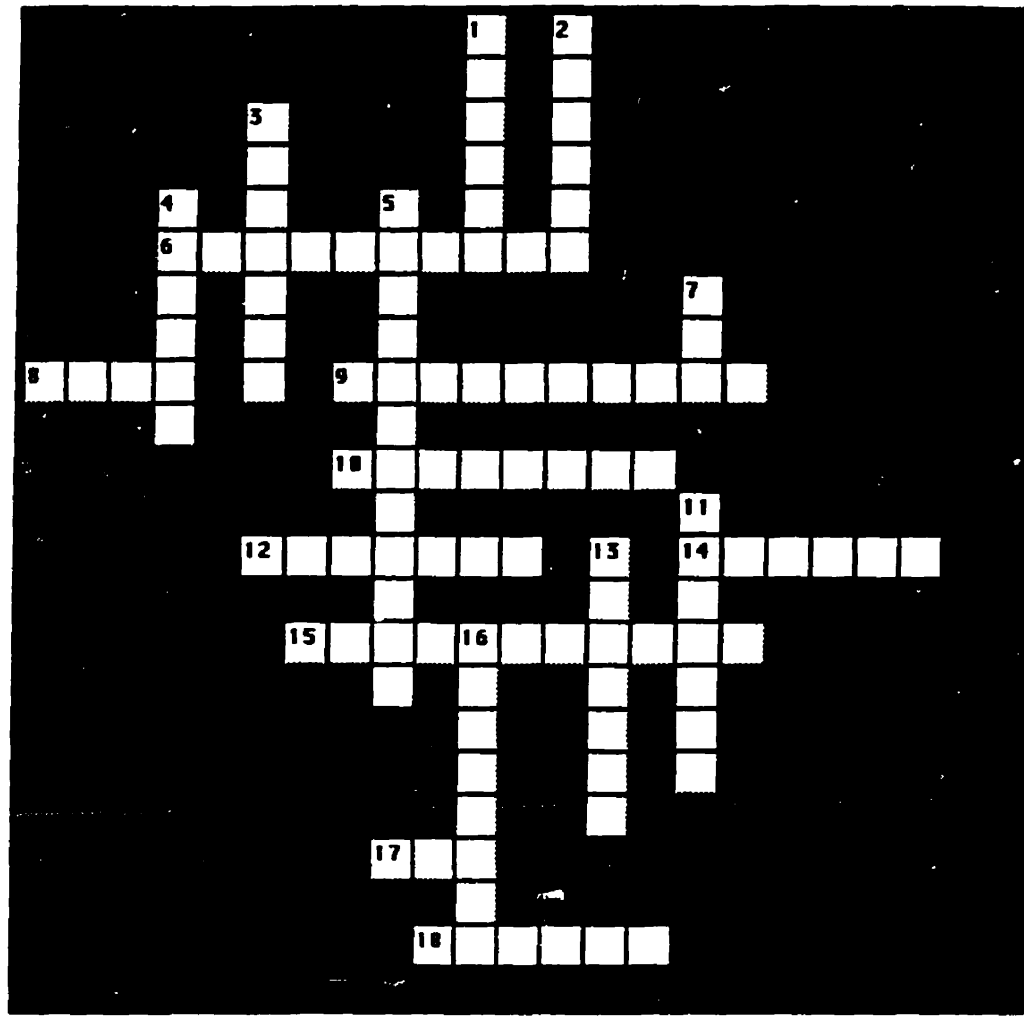
6. Appropriate behavior on the network.
8. A button which can be pressed on the computer screen, in order to perform a certain function.
9. This is the name of the communications software we use.
10. A file in which information is kept.
12. This is what you see after logging onto the network, and contains all the folders you can access.
14. You perform this function when you add a file already on disk to a message being sent on the network.
15. This is how a computer network is organized if all the computers are attached to one main server.
17. Graphical User Interface – the ability of a computer program to use graphics.
18. You must perform this function if you need to look for an item or topic and don't know where it is.

Down

1. This is the acronym given to the United States military Advanced Research Projects Agency NETwork.
2. A French word which refers to information about you.
3. This is the company which makes the software we use for our network.
4. This is what you are, if you are presently logged onto the server.
5. A computer is capable of this if it can perform several function at the same time.
7. This is the acronym for a computer network.
11. A door to another network.
13. Where is your mail?
16. Chatting with someone on the network at the same time – not using mail which is picked up later.

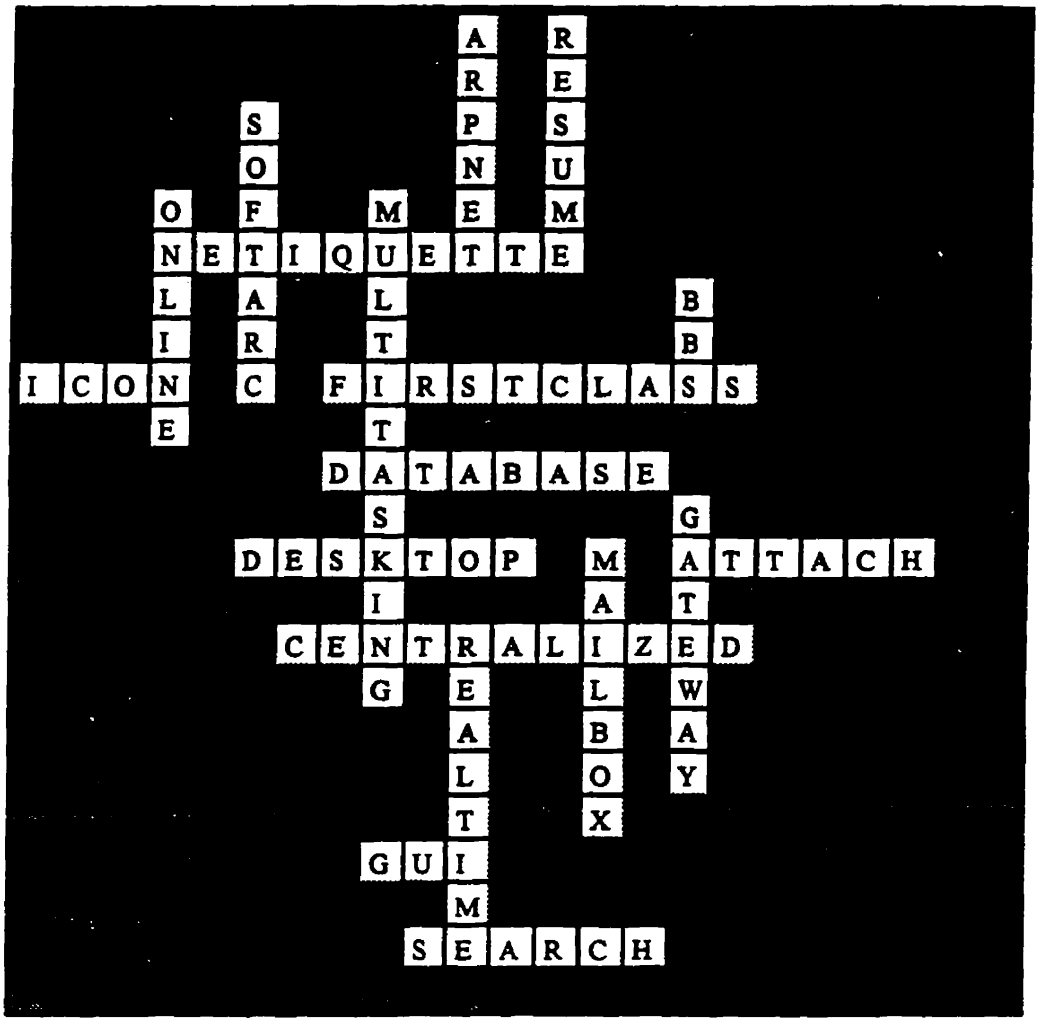
Name:_____

Cyberex 1.10



Key

Cyberex 1.10



Unit Three

The Internet

Unit Three: The Internet

3.1 What is the Internet?

Look back at the schematic for the Kitikmeot BBS in Unit 1.8.

You will notice that through the North of 60 server, we have access to a number of different servers, including the Internet. The Internet is not just one server however. Rather, the Internet is made up of many different servers world wide. No one knows exactly how big the Internet is. Estimates range around 23 million people having Internet access world wide. That's close to the population of Canada!

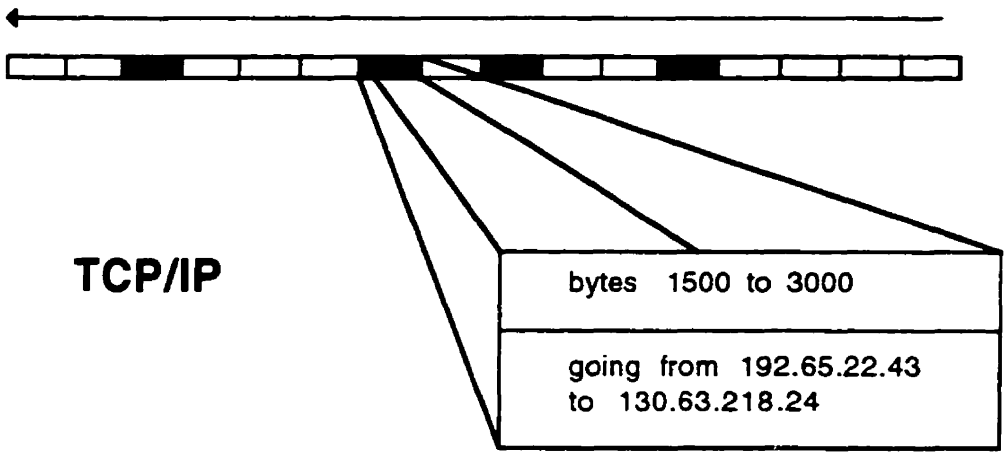
3.2 Communication Protocols

As there are many different types of computers on the Internet, they must have some common language so as to communicate. Just as you may not be able to speak Chinese, your Apple speaks a different language than a DOS computer or a UNIX machine.

In order for different computers to be able to speak to one another, they must speak TCP/IP. Recall that TCP stands for Transmission Control Protocol and IP stands for Internet Protocol.

Imagine someone sends you a file from Edmonton. When the file is sent to you, it doesn't come across the network in one big chunk. Instead, it is broken into small packets of information, each of which is sent across the network individually. These become mixed

in with packets from other people using the network at the same time you are. In this way, you share the network with potentially thousands of other people who may be connecting to computers all over the world. But things don't become garbled, because when the packets arrive at their destination, they're checked for errors and the messages (including your file) are reassembled. This is called packet switching, and on the Internet it's handled by the TCP. Through packet switching, a lot of people can share limited network resources.



Roughly how many bytes of information are required for one page of text? How many bytes of information can a floppy disk hold? How fast can our modem transfer information to the kitikmeot server, and then to the Internet? What are the limitations to our system in terms of how much data can be transferred? Ask your teacher, ask your Pen Pal, or look up the information in a computer magazine or book.

How do the packets know how to get to you from Edmonton in the first place? That's where IP comes in. Every computer on the Internet is assigned a unique number known as the *IP address*. This number identifies which network a computer is on, and which computer it is. Here's an example of an IP address.

130.34.216.27

Each packet that makes up your message is labeled with the IP address of the computer it's to go to. Often, to find another computer by it's IP address, your computer will need the help of a special computer called a router. Each major network has at least one router that knows how to get a message to the other computers on its network, and also to routers on other networks. Your message is forwarded from your computer to its network router, which forwards the message to another router, and so on, until it reaches its proper destination. By working together in this way, the network routers can carry a message between any two points on the Internet.

The IP method of network routing has two main strengths: 1. It's invisible - you don't have to know how to route the message, because the Internet handles it for you. 2. It's flexible - if part of the network is unavailable or too busy to handle your message, it can find a different route to Edmonton. Often individual packets take different routes to the same destination before they're reassembled into a complete message.

3.3 Internet Addresses

Binary_D_Cyberkid@Kugluktuk.Learnnet.NT.CA 

Computers know one another by number. We're not very good at remembering numbers though, so the Internet uses the *domain name system* to make sense of the millions of machines that make up the Internet.

Despite the fact that all Internet addresses are sets of four numbers, the corresponding name can have between two and five sets of words. After five, it gets out of hand, so although it's possible, it's not generally done. For instance, Bin's Internet address is Binary_D_Cyberkid@Kugluktuk.Learnnet.NT.CA. The symbol @ means "at". So, Bin can be found at the Kugluktuk server on the Learnnet system in the Northwest Territories which is of course in Canada.

Each word after the @, separated by a period, is called a domain. The Top Level domain comes at the end of the address. The mid-level domains come in between and the *userid* or *username* comes before the @.

Originally there were only six top level domains which indicated what type of organization the server belonged to. They are:

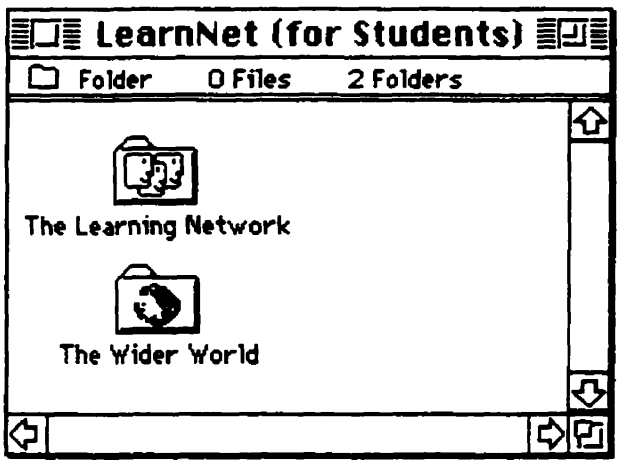
- com = commercial
- edu = educational
- org = organization, usually nonprofit
- mil = military
- net = network
- gov = government

This setup was all fine and nice for starters, but as the number of machines on the Internet began to grow at an amazing rate, a more all-encompassing solution became necessary. The new top-level domains are based on countries, so each country has its own two-letter domain. Canada's top level domain is of course CA, Japan's is JP, and so on.

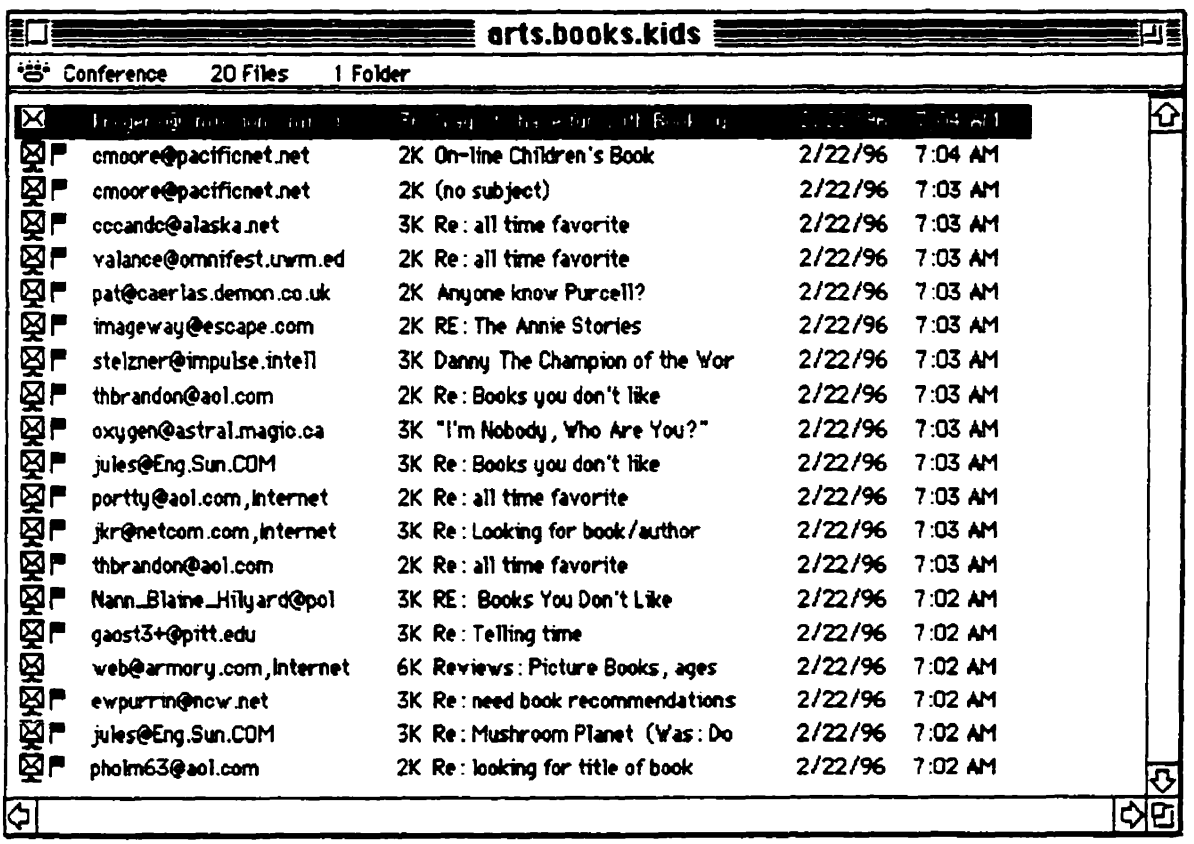
Because so many sites existed with the traditional six top domains, they remain in use today.

You may see a couple of other top-level domains on occasion such as bitnet and uucp. In both cases, the top-level domain indicates that the machine is on one of the alternative networks and may not exist directly on the Internet.

The door or gateway to the Internet is through The Wider World. Check it out. By double clicking on it you will enter the next screen. Next go to The Internet and check out the arts.books.kids folder.

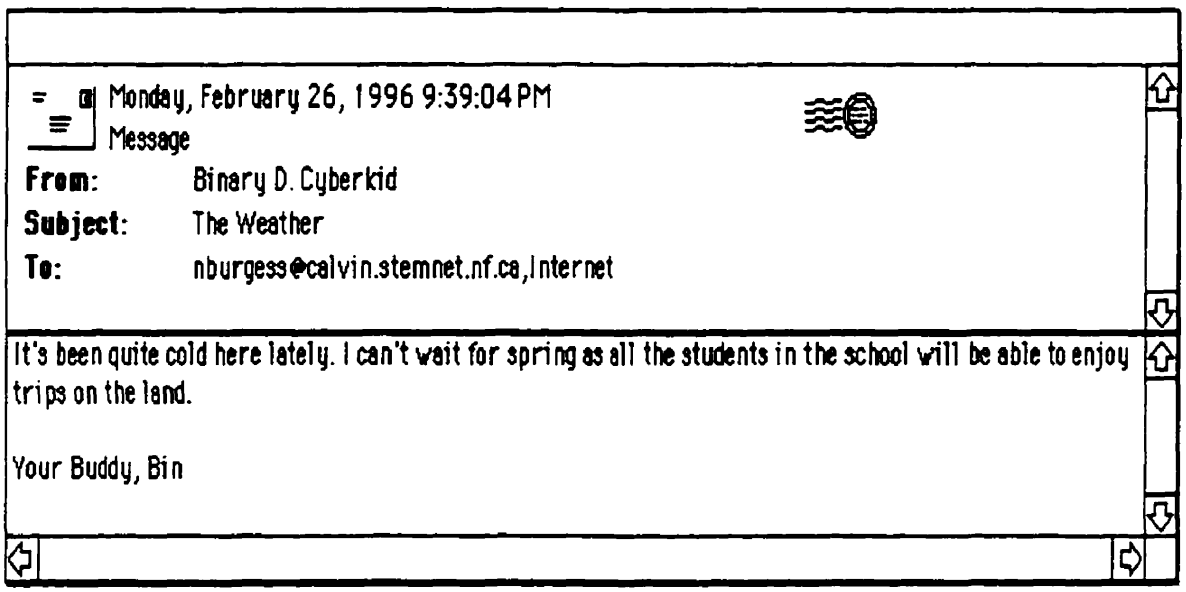


This is a good place to see a variety of Internet addresses



3.4 Mailing on the Internet

Sending mail to someone outside our system, on the Internet, requires a special addition to the address. You must include a comma followed by Internet, so our server knows not to search its own data bank for a matching address.



Where in the world was the above message sent?

3.5 Bounces and NDNs

In a perfect world, all email would get through to its destination quickly and reliably. But just as with snail mail (regular letter

mail), which can take one to nine days to appear, and which sometimes never appears at all, email isn't perfect, and sometimes bounces back to you. Some of the time the server which bounces the mail back to you will give you a hint as to what went wrong, but more often than not, you're on your own.

The most common reason for bounced mail is a typo somewhere in the address. Another common error message in bounced email is "User unknown." This means that the email arrived at the proper server, which searched through its list of users and decided that it didn't have a user with the name used. "Host unknown" is another serious error message and can be harder to work around. For some reason, your server, or one somewhere along the line was not able to contact the host server. There's not much you can do in this case but to try again later, in the hope that the server is up and running again.

On the FirstClass server, the most common error message is the Non-Deliverable Notification (NDN). Other than trying to type the email address in again, there is not a lot you can do if the address is on the Internet, because our system is unable to check it's own directory for the individual who owns the address. If you originally got mail from the owner of the Internet address, check their signature file before retyping their address.

3.6 Usenet

There are thousands of Usenet discussion groups on every imaginable topic. We have our own on the system such as Town Talk. There are in fact huge thick books published every year listing the current discussion groups found on the Internet. As soon as the book is published however, it's actually out of date because new groups are being formed and others dropped, every day.

One Usenet group was already listed in section 3.3. Can you find another one?

So why doesn't our system carry a number of these discussion groups? Very simple. It comes down to money. In order to remain current, we would have to download all the new messages on each discussion group. This takes a lot of time. Even if done during cheap time, our phone bills would be far too large. When we do get a better phone service however, we will be able to download more information at a fraction of the cost because it will be so much faster and therefore cheaper.

Unit Three

Cyberexs

Cyberex 3.1a

In the arts.books.kids folder, find 10 different top level domains. Mail your results to Bin.

Cyberex 3.1b

Again, from the arts.books.kids folder, find an interesting article. Once you have one you'd like to share with Bin, forward it to Bin by going to **Message** and **Forward.**

The subject will appear to be the same as the original author wrote. No problem, change the Subject to Cyberex 3.1b.

Finally, before sending the message, move down a few lines by pushing the main text down and type the usual: Your name, Cyberex #, and today's date. Below is an example.

Unsent Message

From: Neil Burgess
evan@pcix.com,Internet

Subject: Cyberex 3.1b

To: Binary D. Cyberkid

Cc:

Cyberex 3.1b
Neil Burgess
March 20, 1996
++++++++++++++++++++++++++++++++

Hiya,

I am wondering if anyone can tell me if anyone designs something for FC to allow my users access to the web, telnet, ftp, talk, finger, newsgroups, internet email, irc, and any other internet functions that my users may like. email replies to evan@pcix.com

Thanks,
Ev

Name: _____
Title: Unit 2/3 Crossword Review

Across

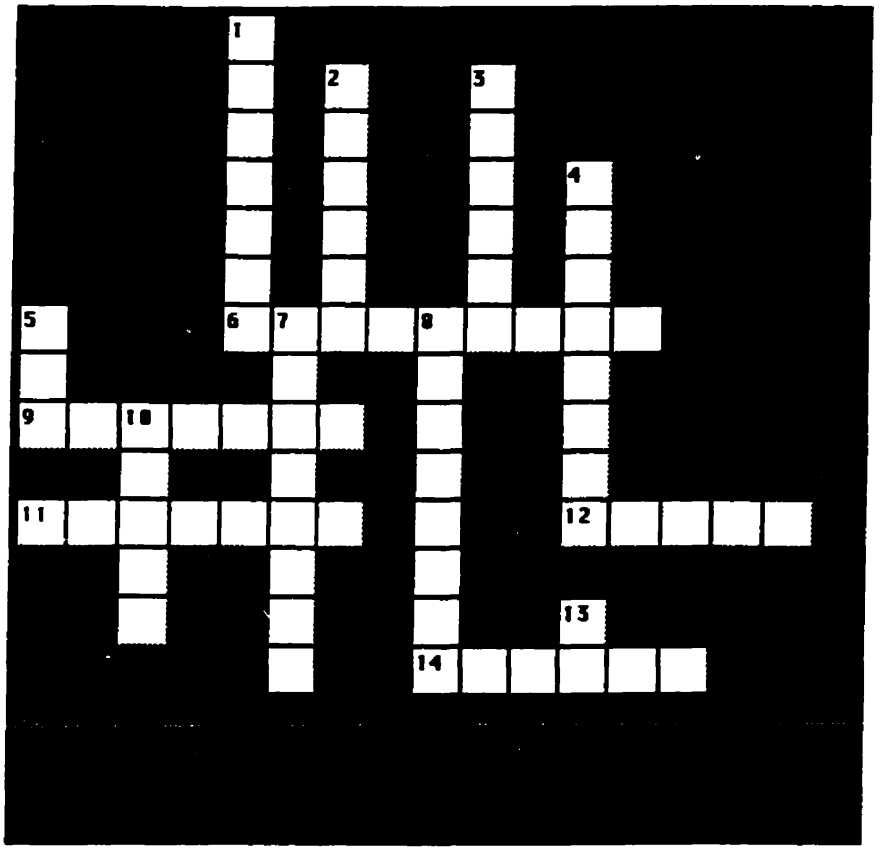
6. Using this option, you can get a list of all accounts listed on our system.
9. Information rarely moves all together. What is the name of the little bits in which information is moved?
11. Does an IP address consist of numbers or letters?
12. This is the common language spoken by all computers using the Internet.
14. What is the NAME SYSTEM used by all computers on the Internet?

Down

1. What has happened to your message if it comes back without ever being read?
2. Messages sent on the BBS which may be taken offensively. Hint: People may get really FIRED UP by them.
3. Internet discussion groups.
4. What is the system on which Binary D. Cyberkid can be found?
5. What level domain comes at the end of an internet address?
7. What do roughly twenty three million people have access to?
8. This is what you become if you are a kid who uses the Internet a lot.
10. An address to someone outside our system must include this between the end of the address and "Internet".
13. What are the two letters used to represent "Canada"?

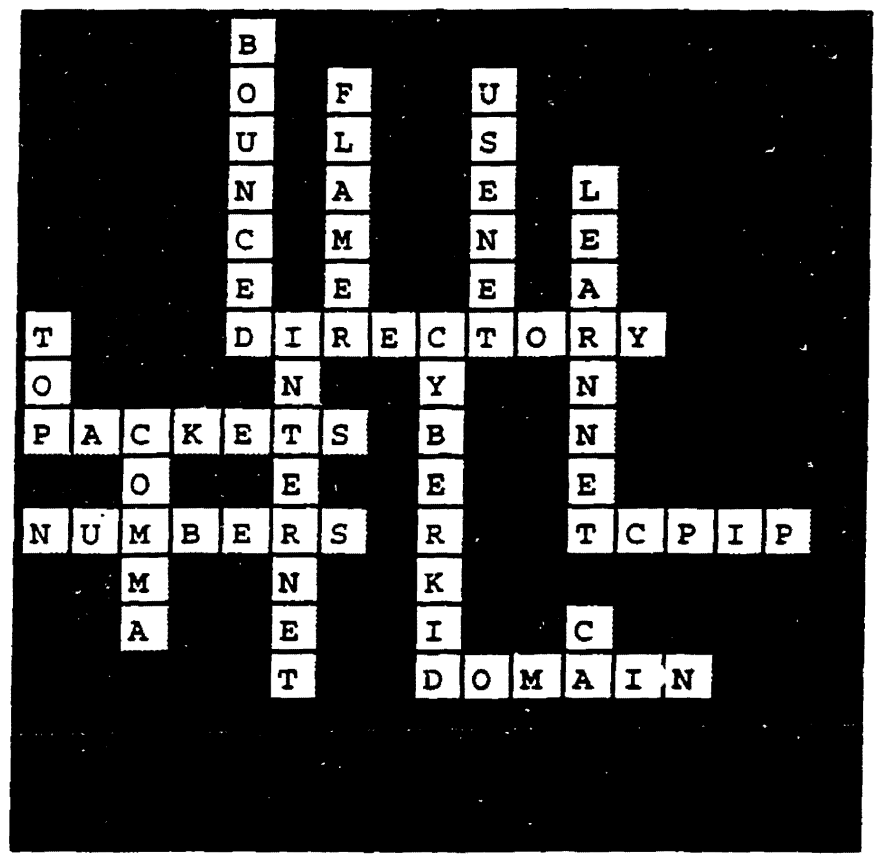
Name:_____

Unit 2/3 Crossword Review



Answer Key

Unit 2/3 Crossword Review



Unit Four

The World Wide Web

Unit Four: The World Wide Web

4.1 What is the WWW?

Think about a spider's web. If you break one little strand, does the whole web shift a little?

The World Wide Web project was started in 1989, by Tim Berners-Lee at the CERN high-energy physics laboratory. The goal of the project was to find a way to share research and ideas with other employees and researchers scattered around the world.

Web pages can be created using hypertext (text containing connections to other documents), and hypermedia (documents that include information in multimedia such as sound and video).

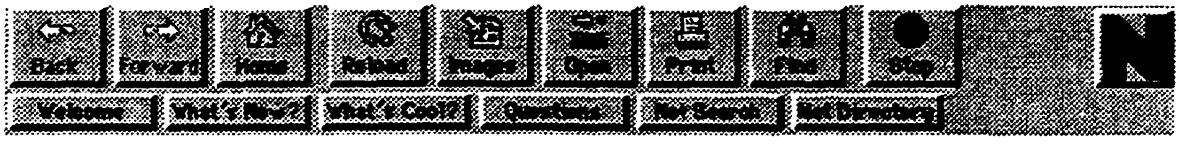
The WWW is used much like the Internet as it is simply a connection of many computers. However, when you view the World Wide Web you see pages instead of menus (as on the BBS). A Web page can contain entire paragraphs of text. Individual pages are linked together using hypertext - that is, the Internet is seen as a huge collection of documents, with links between related documents. You explore the Internet by following the links from one document to another.

In 1995, it was estimated that there were more than three-and-a-half-million users world wide already, and this number is growing very rapidly. In fact, it is estimated that the Web doubles in size every ten months! To put it another way, there are roughly 4 new users every minute!

4.2 Web Browsers

The communication protocol used to transfer Web pages is called HTTP (*Hypertext Transfer Protocol*), but people usually just refer to the Web or a Web page. Also, when talking about software for the Web, we use the term browser instead of client.

One of the more popular browsers is called Netscape navigator. Netscape allows browsers to explore the Web by clicking on links and icons with a mouse.



When you first start a Web browser, it immediately connects to a server and displays a home page. Usually, the home page is on your school server, or somewhere nearby, but it can be any where on the Internet.

Experiment using Netscape Navigator on the school home page.

4.3 Designing Web Pages

In designing a Web page, you first decide what you want to appear on the page, and then you go about laying it out. Your final job is actually writing the Web page using HyperText Markup Language, or HTML. HTML contains commands called tags, to mark text as headings, paragraphs, lists, quotations, and so on. It also has tags for including images within the documents, for including fill-in forms that accept user input, and, most importantly, for including hypertext links connecting the document being read to other documents or Internet resources.

Fear not though, for this course you may not even have to know any HTML commands. Thanks to some recent software packages on the market, you can create Web pages as easily as you create stories with pictures using a word processor. Maybe even easier.

For this course, the recommended Web page authoring software is Adobe PageMill.

Using the buttons seen on this tool bar, you are able to create some rather impressive Web pages.

It's your turn now. Ask your teacher for a PageMill manual and have some fun.

Unit Four

Cyberexs

Cyberex 4.3a

Complete the tutorial using the PageMill manual. If you do not have a copy, ask Neil.

Cyberex 4.3b

Using PageMill, create the first part of your own Web page which includes your name, and the following three links called: My autobiography, Interview with an elder on (include the topic you used), and My Special Web Page. Show Neil before continuing. Save your work to disk, and call it **Main Web Page**.

Cyberex 4.3c

Create a new Web page on which you are to include your autobiography, complete with your picture (Cyberex 2.3). Save this page on your disk as **Autobiography**.

Cyberex 4.3d

Create a new Web page on which you are to include your interview with an elder on some aspect of traditional life (Cyberex 2.4a/b). Save this page on your disk as **Elder Interview**.

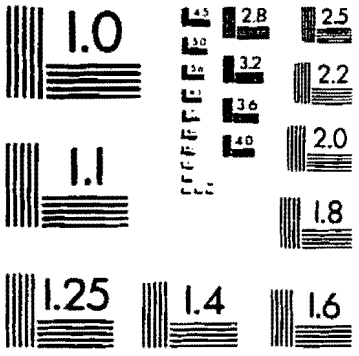
Cyberex 4.3e

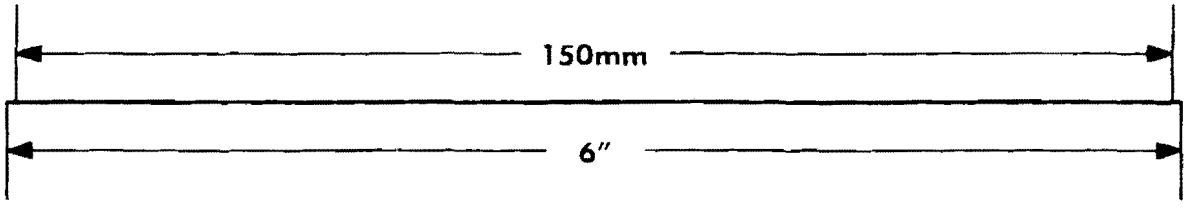
Open a new Web page. This page is yours to develop as you wish. Experiment and have fun. The more sophisticated your page is, the greater your mark!

Cyberex 4.3f

Arrange with Neil to have all your Web pages placed on the hard drive, and link them so that all the pages link to your main page which then links to the school home page. Congratulations. You're now finished the course!!

IMAGE EVALUATION TEST TARGET (QA-3)





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